Purpose of the
City of West Melbourne
Engineering Standards Manual

Engineering Standards Manual
Standard requirements for new development within the City are articulated in the City's Land Development Regulations (LDR's). The standards contained within the LDR's have evolved over the years as the City has elected to amend the LDR's. These standard details are required to be included in non-City construction drawings and civil engineering drawings. Updates will occur periodically so it is important for the user to check with the City as to whether updated standards replace an older set of details. The Engineering Standards Manual (ESM) provides a single manual that is more readily accessible and understandable by the development community (engineers, contractors, developers) and is intended to be used in conjunction with the City's ordinances.

There are several critical aspects of project development within the City in relation to the construction of needed improvements. These engineering standards are intended to address all aspects of project on-site and off-site infrastructure including roadway, water and sewer utility, and drainage improvements. The standards also establish a minimum criteria for the construction of private parking areas needed to meet zoning requirements related to the calculated parking requirement for a give project or development. The ESM includes sections that address the requirements for developers to turn over and have the city accept water, sewer, and public roadway improvements for any given project (Chapter 7) and checklists are included as Chapter 8 of this document. The City reserves the right to supersede or wave any requirement of this specification when it is determined by the City Engineer to be in the best interest of the City.
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**City Standard Details**
CHAPTER 1 – INTRODUCTION

SECTION

1.1 GENERAL

The purpose of this manual is to provide minimum standards intended for the design and construction of utilities, street, and sidewalk facilities operated within the city limits of the City of West Melbourne. These provisions are provided to ensure the safety, health, and well-being of the citizens of the City of West Melbourne.

The requirements set forth in this document are intended to be minimum and applicable environmental and safety laws and regulations should be considered concurrently with this document. The standards are a guide and specific written request can be made for a deviation during design. No changes shall be made to the approved construction plans without prior written city approval. The city reserves the right to require higher design standards when conditions dictate such for public interest, as determined by the city. Every effort will be made to ascertain that construction plans and specifications equal or exceed these minimum standards during review, however construction will be enforced to at least these minimum standards.

1.2 ACRONYMS

The following acronyms are provided for use within this manual only and may be defined differently within the City Land Development Code, by various other governmental agencies, and within the Florida Statutes and Florida Administrative Code.

- **AASHTO**: American Association of State Highway and Transportation Officials
- **ACI**: American Concrete Institute
- **ANSI**: American National Standards Institute, Inc.
- **ASCE**: American Society of Civil Engineers
- **ASTM**: American Society for Testing and Materials
- **AWWA**: American Water Works Association
- **CFR**: Code of Federal Regulations
- **CRSI**: Concrete Reinforcing Steel Institute
- **EPA**: Environmental Protection Agency of the United States Government
- **FDEP**: Florida Department of Environmental Protection
<table>
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<td>FHWA</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<td>Occupational Safety and Health Administration</td>
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<td>International System of Units</td>
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<td>USDOT</td>
<td>United States Department of Transportation</td>
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**DEFINITIONS (see City Code Chapter 63)**
SECTION 2.1 PAVEMENT STRUCTURAL SECTION

A. MINIMUM WIDTHS AND GRADES

1. Pavement shall conform to the standards contained within the City of West Melbourne Land Development Regulations as they relate to Right of Way and pavement widths as well as other design parameters contained within the Land Development Regulations.

2. Streets shall have minimum design cross-slope of 2 percent and longitudinal concrete gutter slope of 0.36 percent. Minimum slope on asphalt pavement shall be 1% and minimum slope on concrete pavement shall be 0.5%.

B. SOIL BORING & GEOTECHNICAL REPORT

The developer or engineer of record shall furnish soil boring profile information every 1,000 feet along the centerline of the proposed street to a depth of eight feet or to the water table, whichever is shallower. The soil boring shall be shown on the construction plans with a legend denoting all symbols and locations. The soil report shall identify road design requirements including pavement structural section, base and subbase requirements, and any specialty requirements such as imported soil requirements, unsuitable soil removals, underdrain systems and deepened curbs. The report shall also contain percolation tests normal and seasonal high water levels and other information for drainage design.

C. BACKFILLING

1. Backfill material for excavated areas of street or paved area construction shall be of acceptable quality as determined by the city and shall be free of 2” or larger rocks, wood, roots, and other similar deleterious material or substances.

2. Backfill areas shall be placed in maximum one-foot lifts of loose material. Each lift shall be compacted to a density of not less than 98 percent as determined by the AASHTO T-180 testing method requirements.

3. Backfill areas shall be tested at the first one-foot interval and every subsequent one-foot interval until the sub-base elevation is achieved. At a minimum, test spacing requirements shall be every 200 feet, including at every sanitary sewer and storm sewer manhole or structure. The contractor shall have tests conducted immediately after compaction and shall furnish the results to the city. All work continued by the developer prior to test results being furnished to and accepted by the city shall be at the developer’s risk, and such work may be subject to a
stop work order issued by the city. Area grading shall have compaction tests performed at a minimum of one per foot of fill per 5,000 square feet.

D. SUBBASE

1. Sub-base material for street construction shall be of acceptable quality as determined by the city and shall be free of 2 inch rocks, wood, roots, and other deleterious and unsuitable substances.

2. Sub-bases shall be compacted at a density not less than 98 percent as determined by the AASHTO T-180 testing method requirements. As an exception, for landscape areas, the required compaction shall be minimum of 85 percent of maximum density and not more than 90 percent of maximum. Landscape areas may be compacted higher to facilitate construction sequencing, however landscape areas shall be scarified to loosen the soil prior to planting.

3. Sub-bases shall be graded to a minimum depth of eight (8) inches after compaction and shall have, at a minimum, a limerock bearing ratio (LBR) of 40 using the state department of transportation method of testing. Both the limerock bearing ratio and compaction requirements shall be for within roadways and under curb and gutter.

4. Prior to base course operations, the sub-base shall be tested every 1,000ft. along the curb-line of each side of the street and every 500 feet within the roadway. The test results shall be furnished to the city. All work continued by the developer prior to test results being furnished to and accepted by the city shall be at the developer's risk, and such work may be subject to a stop work order issued by the city.

E. BASE COURSE

1. Base course material shall be of Florida limerock conforming to the state department of transportation Standard Specifications for Road and Bridge Construction, referred to as the "state department of transportation blue book." Soil cement, cemented coquina shell and crushed concrete bases conforming to the state department of transportation blue book may be used as alternatives.

2. Base material shall be obtained from mines or quarries approved by the state department of transportation. On a case-by-case basis and as approved by the city, recycled concrete may be used as an alternative for base material. For base material obtained from a mine or quarry, a copy of the state department of transportation certification papers shall be submitted to the city prior to construction.

3. The base course shall be a minimum of 8" in depth. The base material shall have a minimum limerock bearing ratio of 100 using the Florida State Department of Transportation testing method and shall compact to an average density of 98 percent of the maximum obtainable as determined by the AASHTO t-180 testing.
method requirements. Testing for compaction shall be conducted every 10,000 square feet, but in no case shall there be less than two tests per site.

4. Asphalt millings shall not be used as base material or as a stabilizing surface course.

F. SURFACE COURSE

1. Except for streets located within parking areas of multifamily developments, the surface course material for all streets constructed within the city shall be asphalt, and concrete shall be prohibited. Streets located within parking areas of multifamily developments may be permitted to be concrete when city utilities are not affected or if a developer's agreement or other agreement such as a landscape maintenance or right of way license agreement exists which provides for the maintenance of city utilities under concrete is executed by the city and the developer. Such streets, if allowed, shall be subject to the requirements set forth in article II of chapter 74.

2. Asphalt operations, including prime coat and tack coat, shall use materials specified by the state department of transportation. All streets shall be SP-12.5 asphalt concrete, with a minimum thickness of two inches and compaction to 98 percent with no individual test less than 96 percent maximum density. No deviation shall be permitted on the thickness requirement. Alternative types of asphalt may be permitted on a case-by-case basis, but must be requested and approved in writing prior to the beginning of the asphalt operation. The minimum A.C. placement thicknesses shall be in conformance with FDOT standard roadway criteria. A.C. pavement shall contain no more than 20 percent recycled material (RAP).

3. The asphalt shall be cored every 200 feet, and the core holes shall be filled with concrete upon completion of the test.

4. A professional engineer registered and licensed in the state shall conduct a test on the asphalt. The city shall not approve or accept a street with less than the minimum thickness and density requirements or a street in which test results are unsatisfactory to the city.

G. PROTECTION OF PAVEMENT

After the completion of the surface course of a street, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently set, and in no case less than 24 hours after completion, unless otherwise authorized by the city.
SECTION 2.2 CURBING

A. CURB AND GUTTER

Curb and gutter shall be provided for all streets and shall be of fiber reinforced Portland cement concrete, Class 1, with a minimum structural strength of 3,000 pounds per square inch (psi). Concrete shall conform to the standards set forth by the state department of transportation.

1. Acceptable curb types are FDOT Type E, Type F or Drop Curb shall be required, with construction in accordance with index no. 300 of the state department of transportation roadway and traffic design standards. Miami curb may be used but shall be limited to local streets within residential subdivisions. Minimum gutter slope is 0.036 ft./1 ft.

2. Curb and gutter shall be sampled and tested for strength every 50 cubic yards. The test results shall be furnished to the city.

3. All curbing shall have a minimum depth of 18 inches with six inches above ground and a minimum width of six inches.

4. Expansion and control joints shall be provided as necessary in order to control cracking. At a minimum these joints shall be located at curb returns, changes in direction and not more than 50’ apart.

5. Where required and approved prior to construction, curb cuts shall be provided as necessary for orderly disposal of surface water runoff.

SECTION 2.3 SIDEWALKS

2.3.1 Sidewalk Design Requirements

A. MINIMUM SIDEWALK STANDARDS

1. Width - Sidewalks shall be a minimum of five (5) feet in width; however, when a vehicle overhang encroaches onto a sidewalk, the sidewalk shall be a minimum of seven feet in width and raised six inches above pavement elevation. Width of sidewalk is measured from the back of curb. Sidewalks shall be minimum full 4” thick on minimum 6” of subgrade compacted to a density not less than 98 percent as determined by the AASHTO T-180 testing method requirements. Sidewalks subject to traffic or as determined by the City Engineer shall be minimum full 5-1/2” thick on minimum 6” of subgrade compacted to a density not less than 98 percent as determined by the AASHTO T-180 testing method requirements.
2. Height above pavement - All sidewalks shall be raised six inches above the edge of the pavement with a curb. Sidewalks on un-curbed roads shall be minimum 2 percent above the edge of pavement.

3. Subgrade –
   a. The subgrade under sidewalks shall be compacted to a density of not less than 98 percent as determined by the AASHTO T-180 testing method requirements. Subgrade material shall be free of large rocks, wood, roots, and other similar material or substances.
   b. Prior to concrete operations, the subgrade shall be tested for compaction. The test results shall be furnished to the city. All work continued by the developer prior to test results being furnished to and accepted by the city shall be at the developer's risk, and such work may be subject to a stop work order issued by the city.

B. CONCRETE SPECIFICATIONS; THICKNESS

Sidewalks shall be constructed of class I concrete having a required compressive strength a minimum of 3,000 pounds per square inch and with fibermesh. All sidewalks shall have a minimum thickness of four inches in landscape and non-traffic areas and six inches in areas subject to vehicular traffic and where determined by the City Engineer.

C. JOINTS

All sidewalks shall have control joints cut on five-foot centers or matching the sidewalk width, and expansion joints placed on 50-foot centers. Sidewalks abutting structures shall have expansion joint between the sidewalk and the structure. Expansion joints shall be placed at the beginning and end of curb returns and direction changes.

D. ADA COMPLIANCE

ADA access within the public rights-of-way shall be provided with walkways and curb cuts conforming to FDOT Index 522-002. Tactile pedestrian detectors are only required at street corners, driveways are not included.
SECTION 2.4 GRADING AND DRAINAGE

2.4.1 General Grading Requirements

A. SURFACE SLOPES:

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<thead>
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<th>SURFACE TYPE</th>
<th>MINIMUM SLOPE</th>
<th>MAXIMUM SLOPE</th>
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<td>2.0% (50:1)</td>
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<td>CONCRETE WALK, LONGITUDINAL SLOPE</td>
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<tr>
<td>ASPHALT ROAD, CROSS SLOPE</td>
<td>2.0% (50:1)</td>
<td>4.0% (25:1)</td>
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<tr>
<td>ASPHALT ROAD, LONGITUDINAL</td>
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<td>10.0% (10:1)</td>
</tr>
<tr>
<td>CONCRETE GUTTER, LONGITUDINAL</td>
<td>0.36% (277:1)</td>
<td>10.0% (10:1)</td>
</tr>
<tr>
<td>ASPHALT GUTTER LONGITUDINAL</td>
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<td>10.0% (10:1)</td>
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<td>0.5% (200:1)</td>
<td>**3.0% (33:1)</td>
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<tr>
<td>GRADED LANDSCAPE AREAS</td>
<td>1% (100:1)</td>
<td>25% (4:1)</td>
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</table>

*Access ramps may exceed these maximums, but must comply with ADA requirements.

**Steeper drainage swales require erosion control

Requested exceptions to the design slopes listed above shall be reviewed by the City Engineer on a case by case basis and his determination shall be final.

B. BEST MANAGEMENT PRACTICE

If site specific conditions require additional erosion and stormwater pollution control measures during any phase of construction or operation to prevent erosion or to control sediment or other pollution, beyond those specified in the Drawings or herein, implement additional best management practices as necessary, in accordance with Chapter 4, “Best Management Practices for Erosion and Sedimentation Control” of the Florida Erosion and Sediment Control Inspector’s Manual, and other references as may be required by regulatory permits.

(http://www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf)

C. BACKFILLING

1. Backfill material for excavated areas of street or paved area construction shall be structural and of acceptable quality as determined by the city and shall be free of 2" or larger rocks, or any wood, roots, and other similar deleterious material or substances.
2. Backfill areas shall be placed in maximum one-foot lifts of loose material. Each lift shall be compacted to a density of not less than 98 percent as determined by the AASHTO T-180 testing method requirements.

3. Backfill areas shall be tested at the first one-foot interval and every subsequent one-foot interval until the sub-base elevation is achieved. At a minimum, test spacing requirements shall be every 200 feet, including at every sanitary sewer and storm manhole or structure. The contractor shall have tests conducted immediately after compaction and shall furnish the results to the city. All work continued by the developer prior to test results being furnished to and accepted by the city shall be at the developer's risk, and such work may be subject to a stop work order issued by the city. Area grading shall have compaction tests performed at a minimum of one per foot of fill per 5,000 square feet.

D. PERIMETER WALLS

1. Perimeter walls are required if slopes joining the adjacent property exceed a 4H: 1V slope. Outside toe of footing must be minimum 2” inside the property line and face of wall shall be set minimum 1’ inside of the property line. If there is a drainage way adjacent to the wall, face of wall shall be set minimum 2’ inside the property line or as far in as required to have the center of the swale on the property line. Top of footing shall be minimum 1’ below level finish grade. If there is a drainage swale adjacent to the wall, top of footing shall be set minimum 1’ below the bottom of drainage swale. Walls located adjacent to a slope shall have the bottom of the wall, at top of footing, a minimum of 5’ from finish grade as measured horizontally out from the face of wall. Fill slopes behind walls shall not exceed 4H: 1V and have a conveyance system to control drainage so no water flows over the wall. Walls shall have guard railing. Property line walls may be required at the discretion of the City Engineer, on a case by case basis.

E. DRAINAGE CONTROL

1. Site drainage shall be controlled so as not to cause erosion, and shall be directed through engineered drainage swales and drainage collection and conveyance facilities including paved surfaces, curb, curb and gutter, concrete gutters, earthen ditches, inlets and storm drains and other drainage facilities required for effective and controlled handling of site drainage.

2. Site shall not be designed to surface drain to adjoining properties or the right of way. Storm drainage shall be directed to drainage facilities and controlled. Offsite and adjacent property drainage shall be evaluated and if existing conditions have flows onto the site it shall be quantified and the onsite drainage system designed to accommodate it and pass it as it has historically flowed. If the site currently drains offsite, flows shall be quantified so as not to be exceeded
and controlled so as not to cause erosion or change the character of the offsite drainage.

3. Paved surfaces shall terminate with 6’ curb or 6” curb and gutter. Asphalt flowlines shall have minimum 1.00 percent slope and concrete curb and gutter or gutter shall have a minimum of 0.36 percent slope.

4. Flumes shall be used sparingly, shall terminate at the bottom of slope and shall have engineered energy dissipation and erosion control pad. Rip rap may be required to control erosion.

5. Preferred drainage collection is with inlet structures and piping to receiving conveyance systems or treatment ponds.

6. Drainage pipes discharging to ponds shall have the top of pipe a minimum of 1’ below normal water surface, have a mitered end with adequate rip rap or cantilevered drain pipe a minimum of 2’ below so as not to cause erosion.

F. Stabilized Roads

1. Stabilized roads may be allowed outside of public rights of way, but require pre-approval by the City Engineer.

2. Subgrade shall be type “B” with minimum LBR 40 surface with a minimum of 8” thick material compacted to 98 percent. Finish base surface shall be minimum 8” crushed concrete or cemented coquina conforming compacted to 98 percent and conforming to FDOT requirements. Stabilized roads that are required to support a fire truck shall be designed by a geotechnical engineer registered in the State of Florida and the design provide to the City engineer for review. Stabilized roads used for fire and emergency services shall not be sodded.

SECTION 2.5 STREET AND PUBLIC RIGHT-OF-WAY DRAINAGE SYSTEM

2.5.1 Drainage System Design

A. DESIGN REQUIREMENTS

1. All drainage design and development shall comply with all applicable SJRWMD regulations and requirements at a minimum. Additional requirements may be required by the city to minimize development impacts to the City drainage conveyance system. A copy of the design report calculations and other permit documents shall be provided to the City for review. Projects requiring
SJRWMD permits shall have a copy of the approve permit provided to the City prior to final approval.

Flood Plain compensation for the City shall be consistent with FEMA requirements for the 100 year storm event.

2. Drainage flow lines shall not exceed 200 feet from a high point to either an inlet or flume conveying stormwater runoff from a parking lot. The grading slope shall be a minimum of 0.36 percent in a concrete gutter. Grading slope of flowlines in A.C. pavement shall be a minimum of 1 percent.

3. Storm drain inlets in pavement shall be capable of bearing heavy wheel loads and shall be type F or G as specified in the state department of transportation index 425-053. For inlets located in areas not subject to any wheel loads, types C, D, E and H are acceptable as specified in the state department of transportation index 425-052.

4. For those projects in which flumes are used, flumes shall be constructed of concrete. Riprap flumes shall not be allowed. Flumes shall be specified to extend to the bottom of the swale or retention/detention pond and shall be equipped with energy dissipating devices and discharge apron at the end of the flume to minimize erosion. Flumes shall be connected to curb cuts. Weep holes shall not be allowed.

5. All drainage piping within street rights of way shall have a 50-year design life and shall be reinforced concrete pipe (RCP), 18” minimum diameter. Other piping material may be acceptable on a case by case basis and requires pre-approval by the City Engineer. All pipe within road right-of-way or that is to be City maintained shall be RCP. All pipe joints shall have a filter fabric wrap around each joint and shall have a minimum overlap of 12 inches. Piping material other than RCP shall be capable of supporting heavy wheel loads and shall have a minimum cover as specified in the state department of transportation index 205 or based on the pipe manufacturers published design criteria. Concrete end sections (mitered, flared, or wall) are required at the end of all pipes.

6. Manholes shall be constructed of precast units. Brick manholes shall not be permitted. Cast-in-place manholes may be accepted on a case-by-case basis for conflict resolution. The design of the precast manhole shall include a precast monolithic base with the bottom section of the manhole walls. The minimum base thickness shall be eight inches. Precast manholes, including steel
reinforcement and wall thickness, shall conform to ASTM C-478, except as otherwise specified in this division. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each precast section. The minimum wall thickness for a sewer manhole shall be five inches for manholes 12 feet or less in depth and six inches for manholes deeper than 12 feet. For pipe diameters of 24” and less manholes shall be 48” diameter minimum. Pipes larger than larger than 24” shall be 60” diameter minimum. A minimum access cover diameter of 24 inches for a manhole shall be provided for sewers up to 15 inches in diameter. Access covers for sewers larger than 15 inches in diameter or manholes deeper than 12 feet shall have provided a minimum 30-inch clear opening diameter, or larger if required by the city. Manholes 30” and larger shall have two concentric covers with the inside cover 22” diameter and the outside cover the size of the required opening. Manhole including frame and cover shall be H-20 load rated. Cover shall read “STORM DRAIN”.

7. Retention/detention ponds (lakes) shall be sized in conformance with SJRWMD design criteria. In addition, ponds and shall contain the 25 year 24 hour event. Sites shall be designed so that the storm drain hydraulic grade line is not above any catch basin rim or drainage structure flowline and all pavement is free of ponding. Pond slopes above water and dry pond side slopes shall be maximum 4h: 1V with minimum one-foot wide level top. Top of pond or lake elevation shall be minimum 6” above the design high water level to provide freeboard. Above water interior side slopes may be maximum 3H: 1V if the area is fenced. Pipes discharging to ponds shall be located with top of structure a minimum of one foot below normal water elevation for discharges with an MES or two feet below the surface for cantilevered pipe discharge. MES structures shall have rip rap placed at the discharge as required to prevent scour and erosion.

8. Dry retention pond side slopes and bottoms shall be fully sodded. Wet retention ponds shall be fully sodded to the low water level of the pond.

9. On property conveyance ditches shall have side slopes of 4H: 1V with minimum one-foot wide bottom. Minimum slope is 0.5%.

10. Roadside Ditches within R/W shall have side slopes of 4H: 1V with minimum one-foot wide bottom. Side slope may be allowed to be 3H: 1V if directed by the City Engineer. Driveways with culverts shall have Mitered End Sections.
on the end of the drainpipe. Pipe size shall be 18" minimum and shall be RCP or HP Polypropylene. Culvert size shall be determined based on the upstream or downstream culvert size or the cross-sectional area of the ditch, whichever is greater.

11. Outfall control structures shall be type C inlets or other structures acceptable to the city. Outfall control structures shall have an aluminum skimmer designed to be six inches above and below the weir. Fiberglass or plastic skimmers are also allowable provided they have been specifically manufactured to function as a skimmer. Top grates are required on all outfall structures. Outfall pipes shall discharge to an approved public drainage facility and shall have a concrete end section (mitered, flared, or wall). Energy dissipation devices such as rip rap shall be required as needed to minimize erosion.

SECTION 2.6 STORMWATER MANAGEMENT SYSTEMS

2.6.1 Retention and detention design

A. Design of storm water systems shall be on one of the following software design packages:

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<th>Hydrology / Infiltration / Recovery</th>
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B. Retention and detention areas shall be designed so that shorelines, when practical, are sinuous rather than straight and so that the length of shoreline is maximized, thus providing more space for the growth of littoral vegetation.

C. Each retention and detention facility, except where wetlands are used for detention purposes, shall have slopes designed at a maximum of 4H: 1V to facilitate maintenance, to prevent erosion, and for safety purposes. The top of the slope shall match the existing grade no closer than two feet from the property line. A
retaining wall may be substituted for this requirement when such installation is necessary to protect adjacent property.

2.6.2 Curb Inlets and Piping

A. CURB INLETS

1. All curb inlet bottoms shall be type J or P as specified in the state department of transportation index 425-010. Curb inlet bottoms shall be specified at all low points of a drainage path and shall not exceed 600 feet in linear spacing. Curb inlets shall be equipped with state department of transportation type 3 or 4 tops or, if a narrow right-of-way with type 5 or 6 as specified in state department of transportation indexes 425-020 and 425-021, respectively. Flat grates, type S, or type V gutter inlets shall not be permitted.

2. All curb inlet manholes shall be designed such that the invert of the manhole is a minimum of 24 inches below the invert of the out flowing pipe. Manhole lids and sump bottom design shall conform to state department of transportation index 425-001.

3. All stormwater curb inlets and manholes shall be installed with a minimum of a ten-foot section of six-inch perforated pipe, with a manufactured filter fabric sock around the pipe and end cap, at a minimum depth of 24 inches below the curb elevation. The section of perforated pipe shall be grouted on the inside and outside of the storm drain manhole. The perforated pipe shall be installed in conformance with state department of transportation index 440-001, type I.

4. Continuous under-drain shall be required if hardpan is encountered in the course of sanitary sewer or storm sewer installation or if the soil boring test reveals the wet season groundwater table to be within 36 inches of the crown of the road. The under-drain shall be connected to the nearest inlet and shall be constructed in accordance with state department of transportation index 440-001, type II. The perforated pipe shall be equipped with a manufactured filter fabric sock around the pipe and with end caps at all pipe termini. Cleanouts shall be provided at perforated pipe termini and every 200 linear feet, or as specified by the city.

B. PIPING

1. All stormwater drainage pipes conveying runoff from the streets to retention/detention facilities shall be round reinforced concrete pipe (RCP). Elliptical pipe shall only be accepted on a case-by-case basis where round pipe is not feasible. RCP shall be the only acceptable material for stormwater piping in rights-of-way and subdivisions. Where the pipe is to be beneath the base material, a clearance of at least six inches between the bottom of the base material and the top of pipes shall be provided. Pipe sizing shall be determined
by the engineer of record; however, the minimum acceptable pipe size shall be 18 inches.

2. All pipes shall have specified either a mitered or flared end section or, when finished grades exceed a practical height for a mitered or flared end section, a concrete end wall may be used. End walls or riprap may be permitted on a case-by-case basis only when concrete end sections are not practical. It shall be in the sole discretion of the city to allow end walls or riprap.
CHAPTER 3 – PARKING LOT CONSTRUCTION STANDARDS

SECTION 3.1 DESIGN CRITERIA

A. PAVED PARKING LOTS

1. A geotechnical report shall be provided that includes at least one soil boring per acre of site or at a greater frequency as may be specified by the Engineer of Record for the geotechnical analysis or the Engineer of Record for the site or building improvements. The Soil boring shall have a minimum depth of 12ft and shall identify an estimated seasonal high water table for the site, the soil classifications, and any defining layers. For sites where dry detention ponds or swales are proposed, the geotechnical report shall provide permeability rates for the soil. The location of each boring shall be shown on the site plan.

2. Earth work and backfill construction operations shall comply with the requirements set forth in chapter 6.2.

3. The sub-base shall be a minimum of eight inches in depth. Asphalt parking lots shall have a minimum limerock bearing ratio (LBR) of 40 using the state department of transportation method of testing for asphalt parking lots; concrete parking lots shall also have a minimum limerock bearing ratio of 40. Sub-bases shall be compacted at a density not less than 98 percent as determined by the AASHTO T-180 testing method requirements. Testing for compaction shall be conducted every 10,000 square feet, but in no case shall there be less than two tests per site.

4. Base course material shall be Florida limerock conforming to the state department of transportation standard specifications for road and bridge construction (state department of transportation blue book). As an alternative to limerock, crushed concrete and cemented coquina shell bases conforming to the state department of transportation blue book may be permitted on a case-by-case basis. The alternative base material may be allowed only after justification and written approval by the city. The base course shall be a minimum of eight inches in depth. The base material shall have a minimum limerock bearing ratio of 100 using the state department of transportation testing method and shall be compacted to an average density of 98 percent of the maximum obtainable as determined by the AASHTO T-180 testing method requirements. Testing for compaction shall be...
conducted every 10,000 square feet, but in no case shall there be less than two tests per site.

5. Asphalt operations shall use materials specified in the state department of transportation blue book. All asphalt parking lots shall be a minimum of 1-1/2 inch thick using SP-9.5 asphalt. In areas subject to heavy and/or frequent traffic loads as determined by the city, a minimum thickness of 2 inches shall be required. The asphalt shall be cored and tested every 10,000 square feet, but in no case shall there be less than two tests per site, and shall have a compaction no less than 96 percent maximum density.

6. Concrete parking lots shall have a minimum nominal depth of five inches thick using class I concrete. The design shall include a saw cut and construction joint plan for the entire parking lot. Concrete shall have a minimum structural strength of 3,000 pounds per square inch (psi) with fiber reinforcement and shall have a test sample of cylinders conducted every 50 cubic yards.

7. As an alternate to the requirements set forth in subsections 3, 4 and 5 above, equivalent flexible pavement section utilizing the D.O.T. flexible pavement design criteria may be used for parking lot construction. The minimum structural number acceptable for pavement design shall be 2.38 in the case of standard construction. In those areas subject to heavy and/or frequent traffic loads as determined by the city, a minimum structural number of 2.53 must be obtained. All design, construction, and testing shall be in accordance with D.O.T. criteria.

8. Wheel stops are not permitted. End stall treatments comprised of continuous concrete curbing or pylons not exceeding 8 inches in diameter shall be permittable.

9. Minimum slope on asphalt pavement shall be 1% and minimum slope on concrete pavement shall be 0.5%.

10. Landscape and planter areas shall be compacted to no more than 90% of maximum density. If landscape and planter areas have been compacted concurrent with construction of paved surfaces, those areas shall be tilled or scarified and loosened so as not to exceed 85% compaction.

11. Drainage systems shall meet the requirements of Section 2.4 Grading and Drainage.
B. UNPAVED PARKING LOTS

1. For those intermittent uses in which a percentage of the parking area is allowed to be unpaved, the sub-base shall consist of a soil material which is acceptable to the city. The sub-base shall be compacted and shall have a limerock bearing ratio of 40.

2. Unpaved parking areas shall be fully sodded or installed with paving blocks.

3. The size of unpaved parking spaces shall be in conformance with the requirements this article.

4. Raised curbing shall be provided for unpaved parking areas in conformance with the requirements of this article and shall be installed in the same manner that is required for paved parking areas.

5. In no case shall asphalt millings be allowed for unpaved parking lots. All unpaved parking areas require site plan approval prior to be used.

6. For projects proposing unpaved parking, the stormwater calculations and proposed stormwater pond volume are to be designed as if the unpaved parking is impervious with a runoff coefficient of 98.

C. ENTRANCE AND EXIT DRIVEWAYS

1. Concrete driveways shall be constructed so that a footing eight inches thick is formed at the point the driveway pavement meets the edge of the street pavement. All concrete aprons shall be 3,000 psi with fiber reinforcement. The existing street pavement shall be saw-cut to form a smooth transition point from the edge of street pavement to the driveway. The driveway pavement shall be raised three-fourths of an inch higher than the existing street pavement by forming an edge to pour the concrete against.

2. If allowed in advance during design, driveways can be constructed of Asphaltic Concrete. The pavement shall be a minimum 1.5” of SP-12.5 asphalt over 8” construct Limerock or equivalent to 98% of maximum density per AASHTO T-180 over 8” Type B, stabilized subgrade compacted to 98% of maximum density per AASHTO T-180.
SECTION 4.1 SOLID WASTE CONTAINMENT REQUIREMENTS

A. Containment facilities within multifamily residential developments shall be located no closer than 20 feet to and no further than 250 feet from any residential building.

B. All containment facilities shall be located a minimum of 20 feet from any adjacent residential property line.

C. Containment facilities shall not be located within driveways, parking spaces, or required landscape areas.

D. Containment facilities shall not be located within any public or private street right-of-way.

E. For those sites required to provide loading areas, containment facilities shall be located adjacent to or in close proximity to each loading area.

F. A clear area extending to a height of 21 feet shall be provided. Within this area, there shall be no obstructions that would prohibit or hinder sanitation vehicles from having access to containers.

G. Each solid waste container for commercial, industrial, professional, institutional and multifamily developments shall be placed on a separate pad a minimum of 12 feet in width and twelve feet in depth; for larger containers, the size shall be specified by the sanitation hauler. If more than one container is required in the same area, pads may be joined together.

H. For multifamily developments, a separate pad a minimum of 12 feet in width and 18 feet in depth shall be used if a solid waste container and 90-gallon recycling totes are combined. If dumpsters are to be used for recycling, a 12-foot by 12-foot pad shall be provided for each dumpster.

I. All pads for solid waste and recycling containers shall be constructed with reinforced concrete having a minimum thickness of six inches.

J. Containers shall be screened from view on both sides and to the rear with an opaque fence or wall. The fence or wall shall be a minimum of six feet in height or a minimum of one foot above the height of the enclosed container, whichever is greater. For container sites which are joined together, screening is not required between the containers. Chain link fences with slats shall be unacceptable to meet the screening requirement.
K. For those containment areas and facilities not located to the rear of a building and/or not otherwise blocked from view from public or private street rights-of-way and adjacent properties, a continuous hedge shall be required in addition to the opaque fence or wall. The hedge shall be planted along both sides and to the rear of the screen and shall consist of allowable hedge material as set forth in chapter 71.

L. For protection of the screening during pickup, a minimum of two concrete filled pipe guard posts per container shall be placed a minimum of one foot from the rear wall of the screening. Each guard post shall have a minimum length of eight feet with four feet above ground and a minimum diameter of six inches. The guard posts shall be parallel and spaced four feet apart. A 2” x 6” rub board shall be mounted on the sidewalls to protect them from container impact. For 18-foot multifamily containment areas, the pipe guard posts shall be located eight feet from the rear wall of the screening to provide protection for the 90-gallon recycling totes.

M. All enclosures shall be designed to drain adequately and not have standing water. Floor and apron slope shall be a minimum of 0.5% and maximum of 2.5% with predominant direction of flow not less than 1%. Containment areas shall not be connected to the sanitary sewer system with floor drains.

N. Containers equipped with side loading doors shall be provided with outward opening doors that provide access to the side doors.

O. Apron in front of the enclosure shall match the enclosure width and extend a minimum 12’ from the face of the enclosure.
SECTION 5.1 – GENERAL

5.1.1 Purpose

The purpose and intent of this article is to provide a basis for the minimum design and construction requirements of the sanitary sewer system within the corporate limits and within areas outside the corporate limits which may receive service in the future. Refer to the standard details relating to construction projects.

Developments may be required to evaluate the sanitary sewer system to determine if there is adequate capacity in the system. This could include the gravity system, forcemain(s) and lift stations. Connection requirements such as replacing existing manhole with lined manholes to accommodate a forcemain connection, extending the gravity system, upgrading lift stations, adding odor control systems to existing lift stations and the like should be anticipated. The specific requirements for a particular project will be identified during the design review process.

5.1.2 General Standards

A. PIPES GENERAL

1. Pipe used for sanitary sewer construction shall be polyvinyl chloride (PVC), SDR 35. Minimum sewer main size shall be 8”. Interior pipe walls shall be smooth. Dimpled or textured interior surfaced shall not be installed and shall be properly disposed by the developer at no cost to the City.

2. Ductile iron pipe (DIP) may be used if justification is provided and at the sole discretion of the City Engineer. Pressure class shall be Class 250 PSI minimum. DIP used in sanitary sewers shall be epoxy lined and coated with Protecto 401 or approved equal.

3. Where reference is made to an ASTM, ANSI or AASHTO designation, it shall be the latest edition.

4. All pipe shall have a homing mark on the spigot provided by the manufacturer. On field cut pipe, the Contractor shall provide the homing mark on the spigot in accordance with the manufacturer’s recommendations.

5. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant, and the class or strength classification of the pipe. The markings shall be clearly visible on the pipe barrel.

6. Pipe which is not marked clearly shall be subject to rejection. All rejected pipe shall be promptly removed from the project site by the developer at no cost to the
City.

7. All pipe and accessories shall be inspected and tested by the manufacturer as required by the standard specifications to which the material is manufactured.

8. If any pipe or fitting is damaged in the process of transportation, unloading, or handling, it shall be rejected and immediately removed from the project site by the developer at no cost to the City.

9. All pipe and fittings shall be stored in a manner which will ensure the protection of the material from damage and which will keep it clean. This includes but is not limited to tarping pipe stored onsite to protect it from UV exposure.

B. VERTICAL SEPARATION

1. A minimum vertical separation of 12 inches shall be provided between all sewer force mains or gravity sewer mains and potable water mains, storm sewers and reclaimed water mains.

2. If existing conditions prevent the required vertical separation of 12” between sewer force mains or gravity sewer mains, potable water mains, reclaimed water mains or storm sewers, the force main or gravity main shall consist of 20 feet of epoxy lined and coated ductile iron pipe, centered on the point of crossing with a minimum of 6” separation, with density tests required demonstrating a minimum compaction of 98% per AASHTO T-180 at the crossing. This requires prior approval by the Utility.

3. Where storm sewers cross over gravity sewer mains or sewer force mains with less than 18” of vertical separation between the bottom of the storm sewer and the top of the sanitary sewer, support cradles shall be constructed under the storm sewer on each side of the crossing to transfer the load of the pipe at the crossing to the surrounding soil and prevent point loading of the sanitary sewer.

C. HORIZONTAL SEPARATION

1. When a sewer force main or gravity sewer main parallels a potable water main, a horizontal separation of a minimum of ten feet (outside to outside) shall be provided.

2. If existing conditions prevent the required horizontal separation, the sewer force or gravity sewer main may be closer than the required ten feet, provided that the potable water main invert is a minimum of 12 inches above the crown of the force or gravity main and is either in a separate trench or in the same trench on an undisturbed earth shelf located to one side of the force or gravity main.

3. When a sewer force main or gravity sewer main parallels a reclaimed water main, a horizontal separation of a minimum of five feet (center to center) or
three feet (outside to outside) shall be maintained.

4. Where, due to existing conditions, a horizontal separation of five feet cannot be maintained between sewer force main or gravity sewer mains and reclaimed water mains, the sewer force or gravity sewer main shall be epoxy lined and coated ductile iron pipe, and in no case shall this reduced clearance be acceptable without the prior written approval of the Utility.

5. If existing conditions prevent the required horizontal separation, the sewer force or gravity sewer main may be closer than the required five feet to the reclaimed water main, provided that the reclaimed water main invert is a minimum of 12 inches above the crown of the sewer force or gravity sewer main and is either in a separate trench or in the same trench on an undisturbed earth shelf located to one side of the sewer force or gravity sewer main, with prior written approval by the Utility.

6. If it is not possible to obtain proper horizontal and vertical separation for gravity sewer as provided for in this section, the gravity sewer shall be designed and constructed equal to the potable water or reclaimed water pipe with C-900 PVC Class 200 or Class 2000 Ductile Iron Pipe and shall be pressure tested to ensure water tightness prior to backfilling.

SECTION 5.2 – GRAVITY SEWER SYSTEM

5.2.1 Design Criteria

A. MINIMUM GENERAL STANDARDS

1. The minimum size of gravity sewers mains shall be eight inches in diameter.

2. The minimum cover to finished grade for gravity sewers shall be no less than 60 inches. Exceptions to this subsection may be made for a short length of pipe where structural considerations are incorporated into the design. Exceptions must have prior written approval by the City Engineer.

3. Gravity sewers shall be designed and constructed with the following minimum slopes:

<table>
<thead>
<tr>
<th>Size (inches)</th>
<th>Design (%)</th>
<th>As-Built (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.40</td>
<td>0.36</td>
</tr>
<tr>
<td>8 (upper run)</td>
<td>0.44</td>
<td>0.40</td>
</tr>
<tr>
<td>10</td>
<td>0.28</td>
<td>0.25</td>
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<tr>
<td>12</td>
<td>0.22</td>
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<tr>
<td>15</td>
<td>0.17</td>
<td>0.15</td>
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4. Connections to the City’s gravity sewer shall not be allowed until the minimum constructed slopes as shown above of this section are met. In addition to the minimum slopes, there shall be no deflections (dips) in excess of ½”. As-built drawings showing slopes less than the minimum will not be accepted and the pipe slopes shall be corrected, resurveyed and videoed. All construction showing slopes less than the minimum shall be rejected until corrected by the contractor. The engineer of record shall resubmit revised as-builts showing the correct slopes.

5. A minimum of 0.10 of fall is required across each manhole. All changes in pipe size or direction shall occur at a manhole.

6. All sewers shall be laid with uniform slope and with straight alignment between manholes.

5.2.2 Pipe and Joint Standards

A. POLYVINYL CHLORIDE PIPE

1. The minimum standard length of polyvinyl chloride pipe in the gravity sewer system shall be 13 feet.

2. Polyvinyl chloride pipe four inches to 12 inches in diameter shall be SDR 35 in accordance with ASTM D-3034. The applicable UNI-Bell Plastic Pipe Association standard is UNI-B-4.

3. Polyvinyl chloride pipe 18 inches to 24 inches in diameter shall be SDR 35 in accordance with ASTM F-679. The applicable UNI-Bell Plastic Pipe Association standard is UNI-B-7.

4. When a polyvinyl chloride sewer pipe is connected to clay, ductile iron or other types of polyvinyl chloride pipe, stainless steel two band Fernco Coupler couplings or approved equal, encased in concrete, shall be used for the connection.

5. Polyvinyl chloride gravity sewer pipe shall be of a solid green color.

6. Detectable pipe warning/locating tape shall be provided for all buried pipe. The tape shall be located 12 inches above the pipe and shall consist of solid aluminum foil encased in a protective, high visibility, color coded, yellow inert plastic jacket. When placing the tape, the soil shall be leveled and compacted at the 12-inch mark to ensure a continuous strip of tape without breaks. Foil shall be visible on the unprinted side. The minimum overall thickness shall be 5.5 mils,
with a minimum width of six inches. The tape shall be Allen Detectatape or city-approved equal. The warning message on the tape shall be repeated every 20 inches and printed in green with the following information:

CAUTION: SANITARY SEWER LINE BURIED BELOW

B. DUCTILE IRON PIPE

1. Ductile iron pipe used in the gravity sewer system shall be minimum class 250 conforming to AWWA C-151 and ANSI A21.51, designed with mechanical or push-on joints.

2. All ductile iron pipes shall have city-approved interior polyurethane lining, epoxy lined (Protecto 401) applied at the factory as an integral part of the pipe production, or an approved equal.

3. The exterior of the pipe shall have a bituminous coating a minimum of one mil thick.

4. The minimum standard length of ductile iron pipe shall be 18 feet.

5. All ductile iron pipe force mains shall be marked with a continuous stripe located within the top 90 degrees of the pipe. The stripe shall be a minimum of two inches in width and shall be green in color. Backfill shall not be placed for 30 minutes following the paint application.

C. PIPE JOINTS

1. Pipe joints for polyvinyl chloride gravity sewers shall be flexible elastomeric seals meeting all requirements of ASTM D-3212.

2. Ductile iron pipe for gravity sewers shall be mechanical or push-on joints and shall conform to ANSI A21.11.

3. All changes of material shall take place at a manhole. If approved in writing in advance, pipe joints between pipes consisting of different material shall be made with a no hub, non-shear coupling secured by type 304 stainless steel bands. The coupling shall be the type manufactured by DFW/HPI, or city-approved equivalent.

5.2.3 Service Laterals

A. The minimum size of service laterals in the gravity sewer system shall be four inches in diameter for single services and six inches in diameter for dual
services.

B. Service laterals shall have a minimum slope of one percent.

C. All gravity sewer service lateral connections and fittings shall conform to ASTM D-3034 unless otherwise approved by the city.

D. Both single and double lateral stub outs shall be located within 12 inches of the right-of-way line.

E. The invert of the sewer lateral shall not enter the sewer main below the spring line.

F. All lateral stub outs shall have a minimum of 30 inches of cover and a maximum of 42 inches of cover. The cover shall be measured from the finished grade at the stub-out cleanout.

G. Service laterals shall not discharge into sanitary manholes. The last lateral on a line shall connect into the sewer mainline a minimum of 5’ from the terminus manhole.

H. In addition to those cleanouts required by the plumbing code, a cleanout shall be located at the property line at finished grade for service laterals. A cleanout is also required within 5’ of the building being connected.

I. Unless otherwise specified, wye branches shall be provided in the gravity sewer main for service lateral connections. Wyes shall be four inches diameter or greater. All fittings shall be of the same material as the pipe.

J. Plugs for lateral stub outs shall be capped at the wye fitting or at the property line cleanout at the discretion of the City.

K. Stub outs shall have an electronic location marker placed no more than one foot above the wye. The marker shall be a type approved by the city.

L. Service laterals shall be provided for sewer service to adjacent lots and parcels when a gravity sewer is constructed. The service laterals shall extend to the right-of-way or easement line and shall be constructed regardless of benefit to or ownership of the adjacent lots or parcels. The number and location of service laterals for large parcels shall be determined on a case-by-case basis.

M. Where curbing is available, a two-inch letter "S" shall be stamped into the face of curb to mark the location of each lateral.

5.2.4 Construction Requirements
A. SURVEY LINE AND GRADE

1. Temporary benchmarks in the gravity sewer system shall be set at a maximum of 500-foot intervals.

2. The developer shall constantly check the line and grade of the pipe by laser beam method or other normally accepted method.

3. If line and grade do not meet the limits as described in this section, the work shall be immediately stopped, the city notified, and the cause remedied prior to proceeding with the work. Deficient work shall be corrected and completed before acceptance of the system.

B. EXCAVATION, SHORING, AND SHEETING

1. Excavation of gravity sewer trenches shall not be opened in advance of the laying of the sewer pipe for a distance greater than that required to install the sewer pipe. In no case shall the open trench ahead of the sewer pipe exceed 25 feet. Backfill in the pipe zone shall be accomplished immediately after jointing the pipe to prevent movement.

2. When necessary, the Contractor shall install shoring, sheeting, and bracing of the trench to prevent caving during excavation work in unstable material and to protect adjacent structures, property, workers, and the public. Sheetings shall be maintained in place until the pipe or structure has been placed, backfilled and compacted. During the backfilling operation, shoring and sheeting shall be removed in a manner that will not damage or move the pipe or structure, and that will not permit voids in the backfill.

3. All excavation, shoring, sheeting, and bracing shall be in conformance with the most current requirements of 29 CFR 1926-650 and 651, Excavation Standards; 29 CFR 1926, Construction Standards; and 29 CFR 1910, General Industry Standards.

C. CONTROL OF WATER

1. The Contractor shall furnish, install, and operate all necessary machinery, appliances, and equipment to keep the excavations reasonably free from water during construction of the gravity sewer system and shall dewater and dispose of the water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public. The Contractor shall also be responsible for obtaining all applicable permits required to operate such equipment and subsequent discharge of water. The Contractor shall at all times have on hand sufficient pumping equipment and machinery in good working condition.
for all ordinary emergencies and shall have available at all times competent workers for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays, on weekends, or during work stoppages. The developer shall be responsible for any outside agency permit necessary to perform dewatering, such as a St. Johns River Water Management District dewatering permit.

2. When adjacent properties and neighborhoods may be adversely affected by noise, the developer shall adequately attenuate the noise in a manner satisfactory to the city in order to reduce the impact.

3. The control of groundwater shall be such that softening of the bottom of excavations or formation of "quick" conditions or "boils" shall be prevented. Dewatering systems shall be designed and operated so as to prevent the removal of the natural soils. Well point holes shall be backfilled and compacted to grade with existing sand. Sand shall be graded from fine to coarse, free from objectionable material.

4. The static water level shall be drawn down 5' below the bottom of the excavation so as to maintain the undisturbed state of the natural soils and allow the placement of backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

D. MATERIAL HANDLING

Every precaution shall be taken to prevent damage to materials during transportation and delivery to the work site for the gravity sewer system. Under no condition shall materials be dropped, bumped, or dragged. If any item is damaged in the process of transportation, unloading, or handling, it shall be rejected by the city and immediately removed from the site at no cost to the City. All materials shall be stored such that quality is not degraded. City inspectors shall be notified when pipe and structures are delivered to the site. No materials shall be installed in the ground without being previously inspected by the City.

E. PIPE BEDDING MATERIAL AND TRENCH PREPARATION

1. The trench for the gravity sewer shall be excavated so that the pipe can be laid to the alignment and grades shown on the approved drawings.

2. Material used for bedding and backfilling shall be dry, clean, natural sand or gravel. Samples of the material shall be submitted sufficiently in advance of the intended use to enable inspection and testing by the
Contractor.

3. Trees, stumps, and roots within the limits of the trench excavation shall be removed to a depth of at least 12 inches below the bottom of the trench. Stump and root holes shall be refilled to existing grade and compacted with mechanical compacting equipment. No stumps, roots, or organic matter of any description shall remain on the site.

4. The bedding or backfilling material shall be placed in six-inch layers and compacted, using mechanical compacting equipment to a dry density equal to 98 percent of the maximum dry density as determined by the standard proctor compaction test ASTM D698. Compaction by flooding, ponding or puddling water is not allowed. Each layer shall be compacted to the required density prior to placing the next layer. The Contractor shall check the density by a licensed laboratory at each manhole and at two points between as selected by the inspector, at no cost to the city.

5. The trench shall be dry when the bottom is prepared. The trench shall be excavated so that the bedding is to proper grade, and providing a firm unyielding support along the entire pipe length. Preparation of the trench bottom and placement of the pipe shall be such that the final position of the pipe is true to line and grade and uniformly supported throughout the barrel of each pipe length. If the trench has been excavated below the required depth for pipe bedding material placement, the developer shall fill the excess depth with pipe bedding material to the proper grade. Bell holes shall be excavated at each joint to permit proper assembly and inspection of the entire joint.

6. Wherever excavation of the trench exposes unsuitable material such as peat, soft soil, clay, quicksand, or other unstable material, such unsuitable material shall be removed to a depth necessary to reach material having adequate bearing capacity and at a width at least equal to the minimum trench width as specified. The space created by removal of the unsuitable material shall be backfilled using suitable backfill or bedding material as specified.

F. PIPE PREPARATION AND HANDLING

1. All pipe and fittings for the gravity sewer system shall be inspected prior to lowering into the trench to ensure no cracked, broken, or otherwise defective materials are being used. The Contractor shall clean the ends of pipe thoroughly, shall remove foreign matter and dirt from the inside of the pipe, and shall keep the pipe clean during and after laying. The pipe shall not be dropped or dumped into the trench under any circumstances.
G. PIPE LAYING AND JOINTING

1. When pipe laying is not in progress, the open end of the pipe shall be kept tightly closed with an approved temporary plug.

2. The pipe shall be laid in the trench only after it has been dewatered and the trench has been properly prepared. Pipe laying shall proceed upgrade with the spigot ends of the pipe pointing in the direction of flow.

3. All pipe laid shall be retained in position and shall be properly haunched so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipe shall be laid according to the line and grade shown on the approved plans.

4. Variance from established line and grade at any point along the length of the pipe shall not be greater than 1/32 of an inch per inch of pipe diameter and under no circumstance greater than one-half inch.

5. Backfill shall be placed in no more than 12 inch lifts, with each lift compacted to 98 percent of maximum density as determined by AASHTO T-180 testing method requirements. Density testing results for all pipe installation shall be provided at a frequency not less than every 750ft of pipe and a minimum depths of 18" beginning at the bottom of the trench and terminating within 12" of finished grade.

5.2.5 Gravity Sewer Testing

A. FIELD TESTING OF SEWERS

The field testing of sewers by the city cannot begin until all components of the sewer system are constructed, including manhole inverts and the vehicular travel area base rock.

1. All sewer lines shall be subject to a leakage test. The test may be either an infiltration or ex-filtration test as determined by the city. The test shall be conducted by and at the expense of the developer in the presence of an appropriate city representative.

2. The allowable leakage shall be 50 gallons per day, per inch diameter of pipe, per mile of pipe maximum. If leakage exceeds this amount, the Contractor shall make the necessary repairs and schedule a retest. Contractor shall excavate and repair leaks and unacceptable vertical pipe deflections.

3. All gravity sewer lines shall also be subject to deflection testing.
Deflection testing shall be performed a minimum of 30 days after backfilling and compaction is completed. Upon notification by the developer, the city will perform lamping on all gravity sewer lines. If the lamping indicates abnormal deflection of any section of pipe, the city shall have the option of having the Contractor mandrel testing of the line, or reject the section.

4. Visible leaks in structures will not be accepted.

5. A leakage and/or deflection test may be waived by the city on runs which have been televised and show no defects.

6. A television inspection shall be required on all sewer mains and shall be provided by the Contractor at no cost to the City. A digital record of the inspection with an audible description of the run, direction, location and description of any defect or abnormality as well as written notes in the video shall be provided to the city. Contractor shall also provide written record of the inspection. The video shall be in color with good clarity. No black and white or poor quality videos will be accepted. Television inspection shall be scheduled a minimum of two working days in advance so that a city representative can be present, or the television inspection will be invalid.

7. Force mains shall be hydrostatically tested at a pressure of 150 pounds per square inch for two hours. The Contractor shall remove all air from the system prior to testing. The maximum allowable leakage of water in pressure mains shall conform to AWWA C-600. The formula use is

\[ L = S \times D \times \sqrt{\frac{P}{148,000}} \]

Where \( S \) = Pipe length in feet, \( D \) = Pipe diameter in inches, \( P \) = Test pressure and \( L \) = Allowable leakage in gallons. The pressure test form found in Section 10 shall be used for pressure tests

8. No visible leakage in manholes or at pipe connections shall be permitted. All manholes shall be inspected by the city prior to acceptance. All manholes failing to meet specifications, or visual evaluation, shall be acceptably repaired or replaced by the Contractor.

9. The Utility shall be notified a minimum of 48 hours prior to testing operations. All tests shall be during normal city working hours.

10. In the event portions of the sewer system are reworked, that portion shall be re-televised from manhole to manhole.
SECTION 5.3 – MANHOLES

5.3.1 Design, Placement and Design Criteria

A. LOCATION

1. Manholes shall be installed at the end of each gravity sewer line; at all changes in pipeline slopes, size, and alignment; and at distances not greater than 400 feet.

2. There shall be a minimum 5’ of mainline between the last lateral and the last manhole on each run. All mainlines shall terminate with a manhole.

3. Manholes shall be located within the road right-of-way or dedicated minimum 20’ wide easements and preferably within the limits of pavement. Manholes located in pavement shall be located on street centerline, centered on a lane line or located in the center of a lane. If manholes are located outside the pavement they should be located such that the manhole and associated mainline are in a sidewalk or sodded area with no obstructions such as fences, landscaping (trees and bushes), walls, etc. Manholes shall not be located in driveways or in curbs or gutters. Manhole should not be located within parking stalls.

4. Manholes on a cul-de-sac with planter islands shall have the manhole located outside the planter island and the mainline alignment shall also be outside of the limits of the planter island.

B. INSIDE DIAMETER

For sewers 15 inches in diameter and smaller, the minimum inside diameter of manholes shall be 48 inches. For sewers between 16 inches and 36 inches in diameter, the minimum inside diameter shall be 60 inches. For sewers larger than 36 inches in diameter, a 72-inch inside diameter manhole shall be provided. Manholes deeper than 12 feet from finished grade shall have a minimum diameter of 60 inches.

C. ACCESS COVER DIAMETER

A minimum access cover diameter of 24 inches for a manhole shall be provided for sewers up to 15 inches in diameter. Access covers for sewers larger than 15 inches in diameter or manholes deeper than 12 feet shall have provided a minimum 30-inch clear opening diameter, or larger if required by the city. Manholes covers larger than 24 inches in diameter shall have two concentric covers with the inside cover 22” diameter and the outside cover the size of the required opening.
D. **FLOW CHANNEL**

The flow channel through manholes shall be smooth and accurately shaped to a semicircular bottom conforming in shape and slope to the inside of the adjacent sewer pipe section. Steep slopes outside the channels shall be avoided. Flow direction changes in excess of 90 degrees shall not be allowed in sewer alignments. A minimum flow line elevation drop of one-tenth foot across manholes shall be provided. Benching shall be provided with a minimum slope of two inches per foot.

See Force Mains, for additional manhole requirements when a force main enters a manhole.

E. **OUTSIDE DROP PIPE**

An outside drop pipe shall be provided for a sewer entering a manhole where its invert elevation is 24 inches or more above the manhole invert. No interior piping configurations are allowed.

F. **PRECAST UNITS**

1. Manholes shall be constructed of precast units. Brick manholes shall not be permitted. Cast-in-place manholes may be accepted on a case-by-case basis for conflict resolution.

2. The design of the precast manhole shall include a precast monolithic base with the bottom section of the manhole walls. The minimum base thickness shall be eight inches.

3. Precast manholes, including steel reinforcement and wall thickness, shall conform to ASTM C-478, except as otherwise specified in this division. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each precast section.

G. **WALL THICKNESS**

The minimum wall thickness for a sewer manhole shall be five inches for manholes 12 feet or less in depth and six inches for manholes deeper than 12 feet.

H. **CONCRETE STANDARDS**

Concrete to be used in the construction of precast manholes shall be Portland type II in accordance with ASTM C-150. All concrete shall have a minimum compressive strength of 4,000 pounds per square inch. Sections shall be cured by an approved method for at least 28 days prior to painting.
and shall not be shipped until at least two days after being painted.

I. JOINTS

Barrel, top, and base sections of a sewer manhole shall have tongue and groove joints. All jointing material shall be cold adhesive preformed plastic gaskets in accordance with DOT article 942-2 (Ram-Nek or city-approved equal).

J. LIFT RINGS OR HOLES

Each precast manhole section shall have lift rings or non-penetrating lift holes. The lift rings shall be cut off and grouted over after installation of the manhole. Non-penetrating lift holes shall be filled with non-shrink grout after the installation of the manhole.

K. CAST-IN-PLACE BASES

If the city has approved a cast-in-place manhole for conflict resolution, cast-in-place bases shall be at least 12" inches in thickness and shall extend at least 12" inches radially outside of the outside dimension of the manhole section. Cast-in-place bases shall have the first section of barrel cast into the base. Pipe resilient connectors or replaceable pipe sealing gasket are required on cast-in-place manholes. Reinforcement and connection to the riser sections shall be designed by the developer's engineer and submitted to the city for approval.

L. PROTRUDING PIPES

Pipes protruding into the manhole shall extend approximately one-half inch inside the inner wall, measured at the horizontal midsection points of the pipe. Pipes with an inside diameter of 30 inches or greater shall be contoured such that the maximum protrusion into the manhole at any point around the pipe shall not exceed five inches.

M. PRECAST CONCRETE TOP SLABS

Precast concrete top slabs shall be used where the depth of the manhole is four feet or less. In such cases an access hole shall be offset from the center. Lift rings or non-penetrating lift holes shall be provided for handling precast manhole sections. Non-penetrating lift holes shall be filled with non-shrink grout after installation of the manhole sections.

N. CLEANING OF CONCRETE SURFACES

Concrete surfaces of a manhole shall have form oil, curing compounds, dust, dirt and other interfering materials removed by sandblasting and shall be fully
cured prior to the application of any coatings.

O. COATING OF INTERIOR SURFACES

Interior surfaces of manholes shall have a protective epoxy coal tar coating with a minimum dry mil thickness of 16 mils. Exterior surfaces shall have a protective epoxy coal tar coating with a minimum dry mil thickness of nine mils. Coatings shall be applied in two applications, black over red, by the manhole manufacturer in strict accordance with the paint manufacturer’s recommendations (Koppers Bitumastic 300 M; no substitute allowed).

I. DEPTH

The top of the manhole cone shall be set between three inches and eight inches below the bottom of the manhole cover ring. It is the intent of this section to provide a minimum of 2½ inches of flexibility to accommodate future grade changes without disturbing the manhole.

Manholes for sewer shall have a minimum depth of 5’ from finish grade to invert. Shallower manhole may be considered on a case by case basis and require prior written approval.

J. FRAMES

Manhole frames shall be positioned over the barrel opening, raised and tilted as necessary to meet the roadway or finished grade by the use of solid brick shims and set in a full bed of mortar. Gray iron castings for manhole frames, covers, adjustment rings, and other items shall conform to ASTM A-48, class 30. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects which would impair their strength or otherwise make them unfit for the service intended. The seating surfaces between frames and covers shall be machined to fit true with an O-ring seal manufactured into the ring at the factory. No plugging or filling shall be allowed. Lifting or pick holes shall be provided but shall not penetrate the cover. Reinforced concrete rings, the same size as the manhole barrel, shall be used to adjust manhole tops so long as the adjustment does not exceed 12 inches in height from the top of the barrel to the top of the manhole cover.

M. TRAFFIC-BEARING LOADS

All manhole frames and covers shall be traffic bearing to meet AASHTO H-20 loadings. Frames shall be suitable for future addition of a cast iron ring for upward adjustment of the top elevation.
N. ADJUSTMENT RINGS
Adjustment rings for a manhole shall be allowed only for resurfacing projects; adjustment rings shall not be permitted for new construction. Adjustment rings where used shall be concrete, bricks shall not be used.

O. DESIGNATION ON TOP OF COVER
The manhole cover shall state "West Melbourne Sanitary Sewer" in raised 1½-inch letters flush with the top of the cover. Manholes used for storm drains shall state “Storm Drain” in raised 1½-inch letters flush with the top of the cover. Private manholes shall not include the words “West Melbourne” on the cover. Covers that state “West Melbourne” on them that are private manholes shall have the West Melbourne ground out.

P. ACCESS DIAMETER
A minimum access diameter of 24 inches shall be provided on a manhole. The standard 24-inch ring and cover shall be U.S. Foundry no. 225-AS-ORS or city-approved equivalent. The standard 30-inch ring and cover shall be double cover U.S. Foundary no. 230-AB-M unless a single cover is specifically requested by the city, it shall be U.S. Foundry no. 230-AA-ORS or city-approved equivalent.

Q. SERVICE CONNECTION
A drop manhole is required if the incoming service is 24 inches or more above the manhole invert. Services less than 24” shall use a bench drop for a smooth transition between incoming and outgoing pipes. The crown of the incoming service shall not be lower than the crown of the outgoing sewer.

R. POLYVINYL CHLORIDE PIPE PENETRATION
Resilient connectors (boots) shall be used where polyvinyl chloride pipe penetrates manhole walls. Boots on new construction shall be cast-in-place by the manufacturer. Boots used on existing manholes shall be NPC Kor-N-Seal or city-approved equivalent, watertight, and manufactured of materials resistant to decay caused by the sanitary sewer environment or by ambient soil conditions. All hardware shall be stainless steel. Boots shall be installed in accordance with the manufacturer’s recommendations.

S. SEALING OF PIPE OPENINGS
Pipe openings in a manhole shall be sealed with EMBECO non-shrink grout or city-approved equal, except where flexible pipe to manhole connections are used.
T. ELEVATION

The developer shall check the elevation of each manhole from an established site benchmark. The site benchmark shall be indicated on the as-built drawings.

U. LINERS

1. All new and existing manholes which are to receive discharge from a force main and any other manholes that, in the opinion of the city, will be adversely affected by corrosive gases shall be lined with fiberglass or HDPE.

Fiberglass liners shall be of the integral corbel polyester wound design with the intent of withstanding hydrogen sulfide and methane gases. All liners shall meet DOT specifications and shall be in conformance with ASTM D-3753 specifications for a minimum 16,000-pound wheel load capacity. Liners shall be of full interior length and full inside diameter. The liner and corbel shall have a minimum thickness of three-eighths inch.

2. The interior of all wet wells and valve vaults shall have a high-density polyethylene (HDPE) or polypropylene copolymer (PPR) thermal plastic liner installed at the foundry as an integral part of the concrete casting process. Liner shall be minimum 80 mil thickness, Argu Sure Grip or an approved equivalent will be required.

V. DROP MANHOLES

1. Drop pipe shall be provided for a sewer entering a manhole where its invert elevation is 24 inches or more above the manhole invert. The drop pipe shall be the same size and material as the influent sewer.

2. Drop manholes shall be precast and designed for an outside drop for new construction. Field constructed drop manhole base shall be monolithically constructed and shall extend under the drop connection a minimum of 24 inches outside the manhole wall with a minimum width of three feet and with a minimum of four, #5 rebars extended up a minimum of 12 inches. The maximum pipe drop size shall be 12 inches inside diameter.

3. Inside drops require pre-approval by the City Engineer. If allowed, the minimum manhole diameter for any inside drop shall be six feet and the maximum sized pipe shall be 8”. All securing hardware shall be 304 stainless steel.

5.3.2 Manhole Construction Standards
A. NEW CONSTRUCTION AROUND EXISTING LINES

New manholes constructed around existing lines shall be constructed without disturbing the existing line. When this "doghouse" manhole is completed, the top half of existing pipe shall be removed and the lower half of pipe and invert shall be protected in place. Immediately upon completion of the manhole, including pouring and forming a minimum eight-inch base and benching, all waste mortar and debris shall be removed from the bottom and invert. When the walls are completed, a standard manhole frame and cover shall be set in place.

B. CONSTRUCTION AND PLACEMENT

1. Excavation for manholes shall comply with the Florida Trench Safety Act. Manholes shall be built to an elevation not less than that of the finish or existing ground surface or as shown on the approved drawings.

2. Base sections for precast manholes and for cast-in-place manholes, if approved, precast base shall be placed on a minimum of 9" of Type 57 Stone bedding on firm and non-yielding dewatered subgrade. If soils are yielding once subgrade has been exposed the City inspector shall be on site to review the condition and approve any adjustments proposed by the contractor prior to the work being performed to obtain a solid non-yielding foundation. Density testing may be required demonstrating a minimum subgrade compaction of 95% in accordance with AASHTO t-180.

4. The bedding rock shall be mechanically compacted and made smooth and level to ensure uniform contact and proper support of the precast structure.

5. The precast base shall be carefully placed on the bedding so as to be fully and uniformly supported in true alignment, ensuring that all entering pipes can be inserted at proper grade.

6. The first precast section shall be placed and carefully adjusted to true grade and alignment. The sections shall be uniformly supported by the base structure and shall not bear directly on any of the pipes.

7. Precast sections shall be placed and aligned to provide vertical alignment with a one-fourth-inch maximum tolerance per five feet of depth. The completed manhole shall be rigid, true to dimensions, and watertight.

8. All inlet pipes shall be properly installed so as to form an integral watertight unit. Special care shall be taken to ensure that openings for
pipes are provided with watertight connections. For polyvinyl chloride pipe and ductile iron pipe, connections shall conform with ASTM C-923.

9. Castings for manhole frames shall be fully bedded in mortar with adjustment brick courses placed between the frame and manhole. Bricks shall be a minimum of two and a maximum of four courses. Mortar shall conform to ASTM C-270, type M. Bricks shall be clay, in conformance with ASTM C-216, grade SW, and shall be 3½ inches in width, eight inches in length, and 2¼ inches in height.

10. Castings located in pavement, shouldered areas and sidewalks shall be set flush with grade. Castings located outside of these areas shall be placed a minimum of six inches above grade or at a height specified by the city.

11. Manhole flow channels shall be constructed with smooth and carefully shaped bottoms, built-up sides, and benching using concrete or grout with no voids. Channels shall conform to the dimension of the adjacent pipe and shall provide changes in size, grade and alignment evenly. Cement shall be Portland type II only.

12. All newly constructed manholes shall be cleaned of any accumulation, silt, debris or foreign matter of any kind and shall be free from such accumulations at the time of final inspection. Completed manholes shall receive two coats of coal tar epoxy, with the first coat being red and the second coat being black, with a minimum dry mil thickness of 9 mils.

5.3.3 Manhole Inspection Requirements

A. The quality of all materials, the process of manufacture and the finished sections of manholes shall be subject to inspection and approval by the city. Such inspection may be made at the place of manufacture, at the site after delivery, or at both places, and the sections shall be subject to rejection at any time if there is a failure to meet any of the specification requirements, including those sections which may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site immediately. All sections which have been damaged after delivery shall be rejected and, if already installed, removed and replaced at the developer’s expense.

B. At the time of inspection, the sections shall be carefully examined for compliance with the specified ASTM designation and with all approved manufacturer's drawings. All sections shall be inspected for general
appearance, dimensions, scratch-strength blisters, cracks, roughness, soundness and the like. The surface shall be dense and close-textured to form an integral watertight unit.

SECTION 5.4 - GREASE TRAPS

5.4.1 Grease Traps

A. Minimum requirements for the design of grease traps shall be those in F.A.C. Chapter 64E-6.013 and as stated in this section.

B. Grease traps shall be required for automotive repair facilities, service stations and food service establishments such as restaurants, hotel kitchens, cafeterias, school cafeterias and similar establishments where grease or oils can be introduced into the city sewer system and hinder sewage disposal.

C. Grease traps shall be installed in the waste line from sink drains and kitchen fixtures leading to the sewage collection system and shall be located outside the building in an accessible location for inspection, cleaning and maintenance. No under-sink unit are allowed and are strictly prohibited. Sewage flows from water closet and other waste sources shall not be piped to the grease trap.

D. Grease traps shall be of concrete and shall be watertight. Exterior surfaces shall have a protective coal tar epoxy coating with a minimum dry mil thickness of 9 mils. Coating shall be applied in two applications, black over red by the structure’s manufacturer in strict accordance with the paint manufacturer’s recommendations.

E. Cement used in the construction of grease traps shall be Portland Type II with a minimum compressive strength of 4,000 pounds per square inch.

F. Manholes shall be provided over the inlet and outlet of each trap and shall be brought to finished grade in accordance with manhole construction specifications detailed in Section 5.3.2 (B) (9).

G. The invert of the inlet shall be a minimum of three inches above the liquid level line of the grease trap.

H. Flow from the trap shall be baffled with a tee or vented sweep at the outlet, extending within eight inches of the trap bottom.

I. The size of the grease trap shall be based on the anticipated flow rate, water temperature, and grease concentration. Adequate detention time in accordance with F.A.C. Chapter 64E-6.013 shall be provided to allow the
collection of grease to be deposited within the grease trap. Grease trap calculations determining size shall be submitted to the Utility for review during the plan review phase.

J. The minimum size of the grease trap shall be 750 gallons; the maximum capacity of a single unit shall be 1,250 gallons. If flows exceed 1250 gallons, additional grease traps shall be installed in series with separate inlet and outlet cleanouts for each unit.

K. The design of an acceptable grease trap is the responsibility of the owner and/or the owner’s engineer. Approval by the city does not in any way ensure that the grease trap will function properly. The city reserves the right to require modifications to the grease trap if it does not perform satisfactorily as determined by the city.

L. The owner shall be responsible for the operation and maintenance of the grease trap.

SECTION 5.5 – FORCEMAINS

5.5.1 Forcemain Design Criteria

A. MINIMUM STANDARDS

1. The minimum size of municipally owned sewer force mains shall be four inches in diameter.

2. The developer’s engineer shall submit signed and sealed design calculations and the plans for all force main projects. The calculations shall show that force mains will have sufficient hydraulic capacity to transport all design flows.

3. The minimum cover to finished grade over force mains shall be 48 inches unless otherwise provided in this division.

4. At design pumping rates, a cleansing velocity of at least two feet per second shall be maintained. The maximum velocity at design pumping rates shall not exceed five feet per second .

B. DESIGN PRESSURE

1. The sewer force main and fittings, including all thrust blocking and
restrained joint fittings, shall be designed to withstand pump operating pressures and pressure surges of not less than 100 pounds per square inch.

2. Force mains shall be pressure tested by the developer/contractor in the presence of a city representative. During that time the pressure must remain at 150 pounds per square inch for a period of two hours. Allowable losses shall be calculated in accordance with AWWA C-600 and results submitted on City standard form.

C. DESIGN FRICTION LOSSES

1. Friction losses through sewer force mains shall be based on the Hazen and Williams’s formula. In the use of the formula, the value for C shall be 120 for ductile iron pipe and 130 for polyvinyl chloride pipe. C values greater than 130 shall not be allowed.

2. When initially installed, force mains may have a significantly higher C factor. The higher C factor shall be considered only in calculating maximum power requirements and duty cycle time of the motor.

D. JOINT RESTRAINTS AND THRUST BLOCKING

1. Mechanical joint restraints, such as metal harnesses (mega lug or approved equal), tie rods, or clamps of adequate strength to prevent movement, shall be installed at all sewer force main valves, bends, tees, crosses, and dead ends. Rods and clamps shall be stainless steel. Restraining glands may be used in certain situations at the sole discretion of the city.
2. Restraints shall be detailed in accordance with the following table:

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<th>Pipe Diameter (Inches)</th>
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<th>P.V.C.</th>
<th>Pipe Diameter (Inches)</th>
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3. At the sole discretion of the city, thrust blocks may be installed at locations where mechanical joints are not practical as determined by and pre-approved by the City Engineer. Thrust blocks shall be of concrete having a minimum compressive strength of 2,500 pounds per square inch after 28 days. The bearing area of the thrust blocks shall be adequate to prevent any movement of the fitting. Fittings shall be wrapped with plastic sheeting prior to pouring thrust blocks. Care shall be taken that concrete shall not be poured around bell, gland and bolts.

E. TERMINATION

1. Sewer force mains shall not terminate directly into a gravity sewer line.

2. Force mains entering the gravity sewer system at a point not more than one foot above or less than 6" above the flow line of the receiving manhole. The alignment of the forcemain shall be within 160° - 200°of the discharge gravity line it empties into across the manhole. Manholes receiving forcemains shall be lined with HDPE or PVC for new construction, and shall be SewperCoat for modifying an existing manhole to accept a forcemain connection.

3. Connections from one force main to another shall be with a tapping sleeve and valve or Tee connection. Valve shall be epoxy lined and coated. Private force mains connecting to a city forcemain shall have an
eccentric plug valve located at the property line in order allow for isolation of the private line within the property for maintenance purposes.

F. CONSTRUCTION

1. All critical operations facilities including manholes, valves, lift stations and the like shall be accessible to the utility at all times. Contractors work requiring restricting access to these facilities shall be approved in advance by the utility, with written schedule for when the work will be performed and written contingency plan for if the utility needs immediate access due to an emergency.

5.5.2 Forcemain Pipe, Valves, Fittings and Appurtenances

A. POLYVINYL CHLORIDE PIPE

1. Sewer force main pipe shall be approved through AWWA standards and shall have a minimum rating of 200 pounds per square inch. All pipes shall be in standard 18-foot lengths.

2. Polyvinyl chloride force mains which are eight inches to 12 inches in diameter shall be DR-14 in conformance with AWWA C-900.

3. For projects where the pipe diameter is 14 inches and greater, the pipe shall be DR-25 in conformance with AWWA C-905, UNI-B-11, latest version, approved cast iron O.D. DR-25 with factory-installed gaskets meeting cell classification specified by ASTM D-1784, or city-approved equal.

4. All polyvinyl chloride force main pipe shall be solid green in color.

5. All joints shall be of the elastomeric-gasket type with thickened, integral solid-wall bell or coupling with the same DR as the barrel. All polyvinyl chloride pipe and couplings shall bear the U.L. rating. Solvent-cement joints shall not be acceptable.

6. The contractor shall conduct a test to ensure that the tape has been placed without breaks. A copy of the test results shall be submitted to the city.

B. DUCTILE IRON PIPE

1. For sewer force mains, ductile iron pipe shall be required when an underground or aerial ditch crossing is necessary, when the when the Florida Department of Environmental Protection (FDEP) minimum vertical or horizontal separation between water and sewer lines cannot
be provided, or when the city deems necessary due to existing conditions.

2. Ductile iron pipe shall be fusion epoxy lining class 50 conforming to AWWA C-151, designed with mechanical or push-on joints. Epoxy Lining shall be Protecto 401.

3. Ductile iron pipe and fittings shall be protected from deterioration on the exterior of the pipe. Soil studies shall be conducted to determine if a bituminous coat and polyethylene sleeve are sufficient for protection of the pipe.

4. All ductile iron pipe force mains shall be marked with a continuous green stripe located within the top 90 degrees of the pipe. The stripe shall be a minimum of two inches in width and shall be green in color. Backfill shall not be placed for 30 minutes following the paint application. All force mains shall have a trace wire. City shall witness continuity testing as a part of final acceptance.

C. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

NOTE: HDPE Pipe will be allowed for directional drill applications or at the written discretion of the Utility.

Pipe

1. HDPE pipe with 4” to 65” diameter shall be PE4710 conforming to the latest edition of ANSI/AWWA C906 and ANSI/NSF Standard 61. For potable water applications, PE4710 compound shall conform to ASTM D3350 minimum Cell classification PE445574C-CC3. Refer to PPI TN-44 for CC3 calculations.
   • HDPE pipes shall be extruded by a PPI member with dependent listings in PPI TR-4, and shall meet the requirements of AWWA C906. Sample list of sizes is shown in Appendix B.1.
   • Dimensions and tolerances for HDPE pipe and fittings shall meet the requirements of AWWA C906.

1. If rework compounds are required, only those generated in the manufacturers’ own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

2. HDPE pipe and accessories 4” and greater in diameter, shall be 200 psi at 80° F meeting the requirements of Dimension Ratio (DR) 13.5 as minimum
3. The pipe manufacturer must certify compliance, with the above requirements.

4. HDPE flange adapters at pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers’ specified torques. Bolts shall be tightened alternatively and evenly.

Fittings

1. All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No fabricated fittings shall be used unless approved by the City.

2. The manufacturer of the HDPE pipe shall supply or specify all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the drawings and specified herein.

3. All transition from HDPE pipe to PVC or ductile iron shall be made per the HDPE, PVC, or ductile iron pipe manufacturers’ recommendations and specifications whichever is more stringent. A molded flange connector adapter within a carbon steel back-up ring and stainless steel pipe stiffener assembly shall be used for pipe type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A 316 stainless steel back-up ring shall mate with a 316 stainless flange per ANSI B16.1.

4. The pipe manufacturer must certify compliance with the above requirements.

Joints

1. The HDPE pipe shall be joined with butt, heat fusion joints. All joints shall be made in strict compliance with the manufacturers' recommendations.

2. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be
furnished in standard lay lengths not to exceed 50 feet.

3. All above ground HDPE pipe shall have flange adapters. Below ground shall be MJ adapters. Stainless Steel inserts allowed on water main only 4” to 6”. FM 4” and larger MJ adapter only with no insert. Pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers’ specified torques. Bolts shall be tightened alternatively and evenly.

4. Pipe which will be installed using horizontal directional drilling technology shall be pressure tested and pass prior to installation. Once pipe is installed it will need to be pressure tested again prior to final acceptance.

D. PIPE INSTALLATION

1. Detectable pipe warning/locating tape shall be provided for all buried pipe. The tape shall be located 12 inches above the pipe and shall consist of solid aluminum foil encased in a protective, high visibility, color coded, yellow inert plastic jacket. When placing the tape, care shall be used by leveling and compacting the soil at the 12-inch mark to ensure a continuous strip of tape without breaks. Foil shall be visible on the unprinted side. The minimum overall thickness shall be 5.5 mils, with a minimum width of six inches. The tape shall be Allen Detectatape or city-approved equal. The warning message on the tape shall be repeated every 20 inches and printed in green with the following information:

   CAUTION: SEWER FORCE MAIN BURIED BELOW

2. Detectable solid uninterrupted locating wire with green shielding shall be installed the entire length of the main. Wire shall be Number 12 solid conductor copper trace wire with green THWN-2 coating and shall be spiral wrapped or affixed to the top of all pipe and fittings. Wire shall be continuous or spliced with direct bury connectors. Splices shall be kept to a minimum. Contractor shall be responsible for continuity throughout the entire project for all trace wire. Wire shall be terminated inside valve boxes and care shall be taken that valve operation does not impact the wire.
E. VALVES

1. A minimum of one valve for each leg of branches (e.g. 3 valves per tee and 4 valves per cross) shall be provided on sewer force main systems to facilitate effective isolation of the pipe system for repairs and maintenance.

2. For straight runs of force main, valve spacing shall not exceed 1000 feet.

3. Valves shall be accessible through a valve box with cover that states "sewer" in raised capital letters. The cover shall be U.S. Foundry Type 7500FA or city-approved equal. Valve boxes shall not be located in driveways or in curbs or gutters.

5. Valves shall be eccentric plug valves except at tapping locations where valves shall be gate valves. Gate valves shall be American Darling or city-approved equal and shall be manufactured to meet or exceed the requirements of ANSI/AWWA C-509.

6. All internal and external ferrous surfaces of the gate valve, including the interior of the gate, shall have a fusion bonded epoxy coating with a minimum thickness of eight mils. The coating shall be applied to castings prior to assembly to ensure that all exposed areas, including bolt holes and flange face surfaces, will be covered.

F. AIR RELEASE VALVES

1. Air release valves shall be provided in the sewer force main, at high points where high and low difference exceeds 2’, to prevent air locking and vacuum formation. All such valves shall be clearly delineated on the force main profile of the submitted drawings.

2. The developer's engineer shall submit calculations to the city justifying the valve size.

3. Air release valves shall be a heavy duty combination air release and air vacuum type for 150 pounds per square inch working pressure, tested to 250 pounds per square inch. Body, cover, and baffle shall be stainless steel or reinforced nylon. All internal metal parts shall be the highest quality stainless steel, and the inside of the valve shall be coated with a rust inhibitor. Acceptable manufacturers of air release valves shall be A.R.I., or city-approved equal.

4. Connection to the forcemain shall be with a two band stainless steel repair clamp with tap with type 304 stainless steel. Repair clamp and tap shall be Ford FS1-xxx or Romac 304, 305 & 306 service saddle. All
piping shall be 304 stainless steel. Isolation ball valve shall be stainless steel.

5. All air release valves shall be accessible through a minimum 34-inch clear opening. The access cover shall state "West Melbourne Sanitary Sewer" in raised 1 1/2-inch letters flush with the top of the cover. The access cover shall be U.S. Foundry Type USF 667 Ring and CR/CE Cover NPPH or city-approved equivalent.

5.5.3 Forcemain Construction Requirements

A. PIPE LAYING AND JOINTING

1. The bottom of the trench for the sewer force main shall not be excavated below the specified grade. If undercutting occurs, the bottom of the trench shall be brought up to the specified grade with approved material and thoroughly compacted as directed by the city engineer.

2. Prior to placing the pipe in the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil and grease.

3. Each pipe shall be laid true to line and grade so as to form a close concentric joint with the adjoining pipe, preventing offsets in the flow line. The interior of the pipe shall be cleaned of all dirt and superfluous materials prior to joining the next section. Every precaution shall be taken to prevent foreign material from entering the pipe. During the laying operation, no debris, tools, clothing, or other material shall be placed in the pipe.

4. All mechanical joints shall be made in strict accordance with the manufacturer's specifications. Gaskets shall be evenly seated, the gland placed in position with the bolts, and evenly tightened.

5. All slip joints shall be made in strict accordance with the manufacturer's specifications. Gaskets shall be evenly seated in the gland, placed in position with bolts, and evenly tightened.

6. After placing a length of pipe in the trench, the spigot end shall be centered in the bell, and the pipe forced home to correct alignment. The pipe shall then be covered with an approved backfill material.

7. Detectable solid uninterrupted locating wire with green shielding shall be installed the entire length of the main. Wire shall be Number 12 solid conductor copper trace wire with THWN-2 coating and shall be spiral wrapped or affixed to the top of all pipe and fittings with half hitches or
duct tape. Wire shall be continuous or spliced with direct bury connectors. Splices shall be kept to a minimum. Contractor shall be responsible for continuity throughout the entire project for all trace wire. Wire shall be terminated inside valve boxes and care shall be taken that valve operation does not impact the wire. The wire in valve boxes shall have an extra 2 feet of wire to extend out of the valve box for the locator device.

8. Pipe shall be installed with a minimum cover of 36 inches; the maximum acceptable cover is 48 inches. The depth of cover shall be as measured from the proposed finish grade as indicated on the approved plans. At those times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other approved means. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

9. All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, stones, or other material which is considered unsuitable.

10. Density testing results for all pipe installation shall be provided at frequency not less than every 750ft of pipe and a minimum intervals of 18” beginning at the bottom of the trench and terminating within 12” of finished grade.

B. FINAL CLEANUP AND STREET RESTORATION

1. Upon completion of the work and before acceptance of the sewer force main by the city, the developer shall remove all debris and shall complete sodding, sprigging, or seeding as required by the approved plans.

2. Backfill, base, pavement, driveways, shoulders, curbs, and sidewalks shall conform to the requirements of the agency charged with maintenance of the street.

3. The Contractor shall restore all areas affected by the operations to existing condition or better.
SECTION 5.6 – LIFT STATIONS

5.6.1 Lift Station Design Criteria

A. GENERAL STANDARDS

1. Pumps shall be designed to operate with high efficiency for the service intended. The pumps shall be installed so that under all operating conditions the pump and motor will remain submerged. Pump suction and discharge openings shall be at least four inches in diameter, and pumps shall be capable of passing spheres of at least three inches in diameter. Pump motors shall be sized so as to be non-overloading throughout the entire range of the pump curve plus a 1.15 service factor. Minimum pump size shall be 4”. Smaller pumps may be allowed if it can be shown that a 4” pump will not meet the pumping requirements.

2. The pumping units shall be complete, including integral pump and motor with proper alignment and balancing of the individual units. All parts shall be designed and proportioned so as to have sufficient strength, stability, and stiffness and be specifically adapted for the wastewater service in a confined space. Pumps shall be explosion rated and ample room in the wet well shall be provided for inspection, repairs and adjustments.

3. Each foundation plate for each pump shall be rigidly and accurately anchored into position so there is no strain on the pump and associated piping. All necessary foundation bolts, plates and washers shall be stainless steel, and furnished by the pump manufacturer for installation by the developer.

4. Stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed, and all other pertinent data shall be attached to each pump and motor. A nameplate shall be placed inside the control panel identifying the pump size, amp readings and voltage.

5. All bolts, plates, washers, fasteners and appurtenances shall be stainless steel throughout the lift station, valve vault and control panel.

6. Cement to be used in the construction of lift stations shall be Portland type II in accordance with ASTI C-150. All concrete shall have a minimum compressive strength of 4,000 pounds per square inch.

7. Buoyancy calculations for the wet well shall be designed with a safety factor of 1.25, with no allowance for soil friction or bridging. Wet well shall be sized so pumps cycle no more than six times per hour peak flow, and no fewer than 2 cycles per hour at average daily flow. The low water level shall be a minimum of 0.25’ above the top of the pump and motor.
8. Top of wet well and valve vault shall be set at the minimum of the 100 year flood elevation and one foot above the nearest curb, whichever is higher.

5.6.2 Pump Standards

A. PUMPS

1. A minimum of two pumps shall be required for all lift stations. Each unit shall be capable of handling the peak hour flow and shall be of equal capacity. Pumps shall be Hydromatic. The City may accept comparable alternative pumps at the City’s sole discretion.

2. All stations shall be designed for not less than 480 volt, three-phase, 60 hertz electrical service. The electrical service shall be true three-phase; phase converters shall not be acceptable. At the sole discretion of the city, a 230 volt, three-phase 60 hertz electrical service may be permitted on a case-by-case basis for those stations containing pumps less than 20 horsepower and that are located in an area that will not be subject to additional flows and for which 480 volt, three phase power is not available.

3. The standard sewage lift station shall be the belowground submersible pump type, with totally submersible non-clog centrifugal pumps and submersible close-coupled motors designed to pump raw unscreened sewage. The design shall be such that the pumping units shall be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose or the need for personnel to enter the wet well. Each pump shall be fitted with a stainless steel lifting bracket of adequate strength to permit raising the pump for inspection and removal.

4. The volute casing and the impeller shall both be constructed of close-grained cast iron or stainless steel. The impeller casing design shall result in a passage free of surfaces to which solid or fibrous materials can adhere and the ability to handle high solids concentrations of a three-inch minimum diameter. All external bolts and nuts shall be stainless steel.

5. Each pump shall be fitted with dual mechanical seals mounted in tandem with the upper seal mounted in an oil reservoir with an electrode probe to detect the presence of the liquid being pumped. The rotating faces of the seals shall be carbon, and the stationary faces shall be
6. The pump shaft shall be constructed of stainless steel and shall rotate on open type ball bearings lubricated by the oil in the motor housing. The bearings shall be sized to withstand the axial and radial forces and be rated for minimum B-10 life of 50,000 hours of service.

7. A sliding guide bracket shall be bolted to the pump discharge and shall have a machined flange to connect with the cast iron discharge elbow which shall be bolted to the floor of the sump with stainless steel anchor bolts and so designed to receive the pump connection without the need of any bolts or nuts or other connectors. The pumping unit shall seal tightly against the discharge elbow by lowering it into place.

8. Pump motors shall be housed in an oil filled watertight casing and shall have class F insulated windings which shall be moisture resistant. Motors shall be NEMA design B rated 155 degrees Celsius. Pump motors shall have cooling characteristics suitable to permit continuous operation in a totally, partially or non-submerged condition. Each motor shall incorporate an ambient temperature compensated overheat sensing device and a moisture sensing device wired in series. The protective devices shall be wired into the pump controls in such a way that, if either device operates, the pump will shut down. The devices shall be self-resetting.

9. The manufacturer shall factory test all pumps prior to shipment in accordance with the standards of the Hydraulic Institute. Flow, head, current draw and input kilowatts shall be recorded for at least five points, including the following three points on the flow/head curve: (i) shutoff; (ii) design flow; (iii) minimum TDH and highest flow. Certified copies of the test report shall be furnished to the city for each pump.

10. All mated surfaces shall be machined and fitted with O-rings for watertight sealing.

11. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum runout speed of the unit to confirm motors are properly rated for the pump.

5.6.3 Wetwell and Valve Vault Standards

A. WETWELLS

1. Steel reinforcement and wall thickness for lift station wet wells shall conform with ASTM C-478.
2. The minimum wall thickness shall be eight inches, and the minimum inside diameter shall be six feet. Hydraulic design and depth of the lift station may require a larger diameter wet well. Wet wells deeper than 16’ shall be minimum eight feet in diameter. Only one gravity line shall discharge into the wet well. Configurations with multiple gravity lines shall terminate in a single manhole with one line discharging into the wet well.

2. Hydraulic calculations for sizing wet well shall conform to the following. High Water Alarm shall be 6” below the invert of the of the gravity sewer inlet. Spacing between floats shall be minimum 6”. Low water cut off shall be 6” above the top of the pump motor housing and lead connectors.

3. Joints shall be assembled using a non-sag grade of polysulfide rubber filler meeting Federal Specifications SSS-210A, type I, and AASHTO M-198 75, type B, or city-approved equal. Plastic joint sealing compound shall be Ram-Nek or city-approved equal. Each joint shall be trimmed after assembly. No infiltration or inflow into the wetwell shall be permitted.

4. Each wetwell section shall have a minimum of three lifting loops, not rebars. Loops shall be cut off and grouted over prior to completion of installation of the structure. Lifting holes through the structures shall not be permitted. Partially penetrating lift holes are permitted in riser sections if the following conditions are met: (i) The hole shall not penetrate the wall deeper than what would allow a minimum 2½ inches of cover over the hole from the other side of the wall; (ii) only lifting pins furnished and approved by the pre-caster are used. Structures dropped during handling shall be rejected. The hole shall be acid washed if oil is present and sealed with EMBECO non-shrink grout or city-approved equal.

5. The developer shall verify the elevation of each wetwell off the established site benchmark. A copy of the field notes shall be provided to the city representative.

6. Resilient connectors (boots) shall be used where polyvinyl chloride pipe penetrates wetwell walls. Boots shall be cast in place by the manufacturer for new construction and when modifying existing manholes shall be NPC KOR-N-Seal or city-approved equal, watertight, and manufactured of materials resistant to decay caused by the sanitary sewer environment or by ambient soil conditions. All hardware shall be stainless steel. Boots shall be installed in accordance with the manufacturer’s recommendations.
7. The interior of all wetwells and valve vaults shall have a high-density polyethylene (HDPE) and polypropylene copolymer (PPR) thermal plastic liner installed at the foundry as an integral part of the concrete casting process. Argu Sure Grip or an approved equivalent will be required. The city, at its discretion, may require a fiberglass liner for lift station rehabilitation projects.

8. Wet wells shall have the base and first riser unit cast monolithically.

9. All pipe openings shall be sealed with EMBECO non-shrink grout or city-approved equal, except where flexible pipe to manhole connectors are used.

10. There shall be no valves or electrical junction boxes installed within the wet well.

11. The wet well shall include the aluminum access frames and cover of diamond-plate construction with a load rating of 300 pounds per square foot. The wet well cover shall have hold-open arms to securely hold the door in the open position. The doors shall be hinged and equipped with locking hasps as manufactured by Halliday Products or city-approved equal. The wet well cover shall be sized as shown in the standard details. All hatch hardware shall be stainless steel. The bottom side of the aluminum hatch and frame (and all portions of aluminum cast into concrete) shall be coated with 8 mils of coal tar epoxy.

12. The wet well cover shall include stainless steel upper guide brackets fitted with expandable rubber plugs. Lower guide holders shall be integral with the discharge connection. Intermediate guide rail brackets are required only for wet well depths of 15 feet or more.

13. The wet well shall have two-inch stainless steel guide rails of schedule 40 304 SS construction. Each guide rail shall be all one piece.

14. The vent shall be four-inch cast or ductile iron with a cap and screen, Josam Model 26700 or city-approved equal.

15. Pipes protruding into the wet well shall extend approximately one-half inch inside the inner wall, measured at the horizontal midsection points of the pipe. Pipes of 30 inches or greater diameter shall be contoured such that the maximum protrusion into the wet well at any point around the pipe shall not exceed five inches.

16. New openings in existing wet wells shall be constructed by core drilling. Methods other than core drilling, such as jack hammering, shall not be permitted.
17. All piping in the wet well shall be HDPE or if approved in advance C-900 PVC. All PVC joints shall be Certa Lok or approved equivalent, welded, glued fittings or PVC flanges. All HDPE joints shall be butt fusion welded or flanged. The proposed method and materials shall be defined in the construction plans during the design process prior to approval of the plans. All piping within the wet well shall be properly supported with stainless steel supports and hardware.

18. Excavation and subgrade preparation for lift stations shall be reviewed by the city prior to setting the wet well. The contractor shall notify the city 48 working hours in advance so city personnel can be present while the wet well is being set into place. Failure to notify city personnel will result in the installation being rejected.

19. Wet well ballast shall be designed by the engineer to have a minimum safety factor of 1.10 assuming the water surface is at the top of an empty wet well and saturated soils vertically for the width of the base extension. Volume of ballast in cubic yards shall be indicated on the drawings.

B. VALVE VAULTS

1. Valve vault walls and floor shall have a minimum clearance of 8 inches from all piping and flanges. Flanges on pipes penetrating the vault wall shall have 8” clearance between the back of flange and the wall.

2. The valve vault shall have a two-inch polyvinyl chloride drainpipe with a P-trap.

3. All piping in the valve vault shall be flanged ductile iron pipe with stainless steel bolts. Ductile iron pipe shall be painted with two coats of EP214 Epoximastic type 315 paint or city-approved equal.

4. All pipe openings shall be sealed with EMBECO non-shrink grout or city-approved equal, except where flexible pipe to manhole connectors are used.

5. A 4½-inch pressure gauge shall be installed on each pump discharge. The gauges shall be mounted at 45-degree angle on a one-fourth-inch NPT brass nipple with petcock. Gauges shall be Ashcroft or city-approved equal, calibrated in pounds per square inch and feet of head increments. The range shall be such that the gauge can be read under normal operating conditions at approximately 1/4 or more of the full gauge range and shall be approved by the city. Gauges shall be oil filled with a stainless steel housing. Stainless steel diaphragm gauge protectors shall be furnished. Shop drawings shall be submitted for approval by the city.
6. Depending on the lift station pipe size, a plug valve and check valve, nipple, male Camlock or city-approved equal quick disconnect and dust cap shall be installed on the pump station discharge as an emergency bypass. The emergency bypass shall be located inside the valve box and readily accessible.

7. Shutoff valves shall be placed on discharge lines of each pump. A check valve with an outside weight and lever shall be placed on each discharge line between the shutoff valve and the pump. Check valves shall not be located in the vertical position unless they are specifically designed for such usage and approved in advance by the city.

8. Piping in valve vault and forcemain shall be 4” minimum.

5.6.4 Pump Control System

A. For a lift station, a telemetry control unit (TCU) as manufactured by Data Flow Systems, Inc., shall be provided and shall respond to the liquid level sensors to start, stop and alternate pumps and to indicate alarm conditions and compile all other data needed to operate and maintain the performance of the lift station. There shall be no substitutes allowed. No substitutes are allowed unless written approval from the Village is obtained. The lift station control panel shall have its power supply furnished directly from the power company. The lift station control panel shall have its power supply furnished directly from the city's franchised electric provider.

B. All equipment shall be housed in a NEMA-3R type 304 SS enclosure with a pad-lockable hasp and fold-back clip-type latches.

C. The enclosure shall include a stud-mounted back panel and hinged inner door of 0.80 (minimum) thickness aluminum sheets, finished with electro-statically applied nylon pigmented paint.

D. The control panel shall include an emergency power receptacle, Russell-Stoll model JRSB1044FR amp with a main circuit breaker of an adequate size as approved by the city, an emergency circuit breaker and a mechanical safety interlock. A circuit breaker shall be provided for each motor in addition to circuit breakers for the control circuit and the G.F.I. receptacle. A Square D size 1 (minimum) magnetic starter with three-leg overload protection shall be provided for each motor.

E. A vapor-proof alarm light, Ohio Electric Model RL3K, and an alarm horn, Federal Model 350WP, shall be mounted on the enclosure and shall be prewired to terminals to operate on high level control signal. An alarm silence push button, G.E. model CR104PBG10B1, shall be mounted on the
enclosure and prewired to a silence relay to silence the horn.

F. A six-digit, non-reset elapsed time meter shall be connected to each motor starter to indicate total running time of each pump in hours and tenths of hours. The meters shall be Cramer model 6X137 or city-approved equal.

G. A duplex G.F.I. type convenience receptacle, G.E. model TGTR115, shall be mounted on the inner door and prewired to a 115-volt one-pole circuit breaker, Square-D type QO.

H. The controller shall include a phase monitor relay, diversified model or city-approved equal, to provide protection against loss of phase, low voltage on any or all phases, or phase reversal.

I. The controller shall include a duplex seal failure module, Syrelec PRNU-110-6-0, signaled by probes installed in the upper seal chamber of each pump and which operate indicator lights mounted on the inner door.

J. A three-phase lightning arrestor, Tight-Wad type, shall be prewired to the point of incoming line service and shall be mounted to the outside of the enclosure.

K. An adjustable time delay relay shall be installed to prevent simultaneous starting of both pumps. The relay shall be Paragon series JW or city-approved equal.

L. A Square-D fused safety switch in a NEMA-4 stainless steel enclosure shall be installed ahead of the controller.

M. All control wiring shall be numbered and color coded.

N. All float wiring and pump wiring shall pass through a J2 explosion proof junction box with terminal connectors prior to entering the main enclosure. The junction box shall be sealed to prevent gas from passing into the control box from the wetwell. Wiring for each pump and the float controls shall be placed in separate conduits between the wetwell and the enclosure.

O. A complete and permanently installed on-site emergency generator assembly with an enclosed fuel tank, that is properly sized and designed for the lift station, shall be provided at all new lift station sites. The cost for designing, permitting and installing the permanent emergency generator assemblies shall be borne by the developer. The generator manufacturer shall be Generac, no exceptions or substitutes shall be allowed. The generator assembly and transfer switch shall be sized according to the design of the lift station, not the population of the area being served. Portable, transportable, or any other nonpermanent installations shall not be allowed as a substitute.
5.6.5 Lift Station System Operation

A. OPERATION OF SYSTEM

1. As the water level rises within the wet well of a lift station, the lower mercury switch (pump off) shall first be energized, then the upper level switch shall next energize and start the lead pump.

2. With the lead pump operating, the level shall lower to the low switch turnoff setting, and the pump shall stop. The alternating relay shall index on stopping of the pump so that the lag pump will start on the next operation.

3. If the level continues to rise when the lead pump is operating, the override shall energize and start the lag pump. Both pumps shall operate together until the low level switch turns off both pumps.

4. If the level continues to rise when both pumps are operating, the upper switch shall energize and signal the visual and audible alarm.

5. If one pump fails for any reason, the second pump shall operate on the override control; if the level rises above the override control, the audible alarm shall signal.

6. All level switches shall be adjustable, for level setting, from the surface within reach from an open hatch, and not require anyone to enter the wet well for such adjustments.

B. TOOLS AND SPARE PARTS

1. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.

2. The developer shall furnish one spare pump for the lift station being built. The spare pump shall be of the identical manufacturer and model and impeller size, as those in the design.

3. The developer will be required to provide an on-site generator for the site in conformance with FDEP criteria or the current adopted lift station generator policy of the Public Works Department.
SECTION 6.1 WATER SYSTEM DESIGN CRITERIA

6.1.1 General

A. PIPES GENERALLY

1. All water line projects within the city shall be constructed using polyvinyl chloride (PVC) pipe or, in specific cases, ductile iron pipe (DIP).

2. The minimum cover to finished grade over a water main shall be within 30 to 36” inches, unless authorized by the City.

3. Permanent dead ends on water mains shall not be approved unless they are reasonably unavoidable such as to serve a future need to promote system looping. Dead ends shall be equipped with valve at the beginning of the extension and a valve and a blow-off including automatic flush at the end.

4. Markings and color shall accurately describe the use of the pipe.

5. Flows for water mains shall meet peak domestic requirements plus fire flow with a residual pressure not less than 20 pounds per square inch (psi). Design velocity shall not exceed five feet per second.

6. The engineer shall provide in the plans details identifying the total vertical clearance proposed between all proposed water and sewer utility improvements that will become part of the public system and any other utility, pipe or substructure that the public system is proposed to cross. Clearances shall meet or exceed FDEP standard separation requirements and will not be less than 12” unless approved in advance by the City Engineer.

7. The engineer shall provide hydraulic calculations for the project. Projects requiring an extension of the public water system for lines twelve inches in diameter (12”) and greater shall function as a looped interconnection to the public system unless one of the following conditions exists:

   a. Looping to the public water system will result in a spacing of less than 500ft between the new system interconnection points to the existing public system.

   b. Looping to the public water system is determined as not necessary or not in the interest of the city utility system by the Public Works
Director or the City Engineer.

The final connection sizing of all projects to the public water system shall be at the sole discretion of the Public Works Director or the City Engineer. Water mains shall be minimum 8” in diameter whether public or private.

8. Service connections to the city water system shall be on distribution lines only and not on main transmission lines which are defined as lines 14” in diameter or greater without prior approval by the City Engineer. The internal water distribution network for the site or development shall be planned so as to preclude the need to tap existing or proposed city transmission lines for services. If a transmission line is required to be tapped, it shall be tapped with a minimum 8” pipe and extended as a distribution loop.

9. Typically valves are required for each leg of a tee or cross. Valves shall be added where in the opinion of the utility they are required for operational purposes. The goal is to minimize the number of buildings that are out of water in the event a portion of piping is required to be removed from service. Valves shall be spaced as called for in the valve section. Directional drills shall have a valve and a manual blow off on each side of the directional drill, unless determined not required by the utility or the FDEP. Air release valves will only be required when determined necessary by the utility. An effort shall be made to locate system operational components, e.g. valves and blow-offs, close to one another on transmission lines to facilitate field operations.

SECTION 6.2 PIPES, VALVES, FITTINGS AND APPURtenANCES

A. POLYVINYL CHLORIDE PIPE

1. All polyvinyl chloride pressure pipes for the water distribution system shall conform to American Water Works Association (AWWA) standards.

2. Polyvinyl chloride pipe installed for water line projects in which pipes are four inches to 12 inches in diameter shall conform to AWWA C-900, shall be minimum DR-18 and shall be standard 18-foot lengths.

3. For projects in which the pipe diameter is 14 inches and greater, the pipe shall be DR-25 in conformance with AWWA C-905, UNI-B-11, latest version, approved cast iron O.D. DR-25 with factory-installed gaskets meeting cell classification specified by ASTM D-1784 or city-approved equal.
4. Pipes two-inch diameter and smaller shall be brass, copper or CTS Poly pipe. Services crossing pavement shall be installed in an appropriately sized HDPE sleeve.

5. Polyvinyl chloride pipe installed as potable water mains shall be of a solid blue color.

6. Detectable pipe warning/locating tape shall be provided for all buried pipe. The tape shall be located minimum 12 inches above the pipe and shall consist of solid aluminum foil encased in a protective, high visibility, color coded, yellow inert plastic jacket. When placing the tape, the soil shall be leveled and compacted at the 12-inch mark to ensure a continuous strip of tape without breaks. Foil shall be visible on the unprinted side. The minimum overall thickness shall be 5.5 mils, with a minimum width of two inches. The tape shall be Allen Detectatape or city-approved equal. The warning message on the tape shall be repeated every 20 inches and printed in blue with the following information:

“CAUTION: POTABLE WATER MAIN BURIED BELOW”

7. Detectable solid uninterrupted locating wire with blue shielding shall be installed the entire length of the main. Wire shall be Number 12 solid conductor copper trace wire with THWN coating and shall be spiral wrapped or affixed to the top of all pipe and fittings with half hitches or duct tape. Wire shall be continuous or spliced with direct bury connectors. Splices shall be kept to a minimum. Contractor shall be responsible for continuity throughout the entire project for all trace wire. Wire shall be terminated inside valve boxes and care shall be taken that valve operation does not impact the wire. The wire in valve boxes shall have an extra 2 feet of wire to extend out of the valve box for the locator device.

8. All joints shall be of the elastomeric-gasket type with thickened, integral solid-wall bell or coupling with the same DR as the barrel. All polyvinyl chloride pipe and couplings shall bear the U.L. rating. Solvent-cement joints shall not be acceptable.

B. DUCTILE IRON PIPE

1. For the water distribution system, ductile iron pipe shall be required when an underground vertical offset or aerial vertical offset ditch crossing is necessary, when the state department of environmental protection minimum vertical or horizontal separation between water and sewer lines cannot be provided, or when the city deems it necessary due to existing conditions.
2. Ductile iron pipe shall be cement-lined and minimum class 250 conforming to AWWA C-151.

3. Ductile iron pipe and fittings shall be protected from deterioration on the outside of the pipe with bituminous coat. Soil studies shall be conducted to determine if a bituminous coat and polyethylene sleeve are sufficient for protection of the pipe. If not, pipe shall be lined and coated with fusion-bonded epoxy conforming to AWWA C213 Fusion-Bonded Coating for the Interior and Exterior of Steel Water Pipelines.

4. All ductile iron pipe water mains shall be marked with a continuous stripe located within the top 90 degrees of the pipe. The stripe shall be a minimum of two inches in width and shall be blue in color. Backfill shall not be placed for 30 minutes following the paint application.

C. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

NOTE: HDPE Pipe will be allowed for directional drill applications or at the written discretion of the Utility.

Pipe

1. HDPE pipe with 4" to 65" diameter shall be PE4710 conforming to the latest edition of ANSI/AWWA C906 and ANSI/NSF Standard 61. For potable water applications, PE4710 compound shall conform to ASTM D3350 minimum Cell classification PE445574C-CC3. Refer to PPI TN-44 for CC3 calculations.
   • HDPE pipes shall be extruded by a PPI member with dependent listings in PPI TR-4, and shall meet the requirements of AWWA C906. Sample list of sizes is shown in Appendix B.1.
   • Dimensions and tolerances for HDPE pipe and fittings shall meet the requirements of AWWA C906.

2. If rework compounds are required, only those generated in the manufacturers’ own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

3. HDPE pipe and accessories 4” and greater in diameter, shall be 200 psi at 80° F meeting the requirements of Dimension Ratio (DR) 13.5 as minimum strength.

4. The pipe manufacturer must certify compliance, with the above requirements.
5. HDPE flange adapters at pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers’ specified torques. Bolts shall be tightened alternatively and evenly.

D. FITTINGS, TAPPING SADDLES, SLEEVES, AND VALVES

1. All underground fittings for the water distribution system shall be of the mechanical joint type, cement lined and a bituminous coating on the outside.

2. Ductile iron compact fittings shall conform to AWWA C-153.

3. Tapping saddles (One-inch and two-inch only) shall be double strapped bronze for DIP and PVC mains. Class saddles shall be clam shell type.

4. Tapping sleeves for cast iron pipe shall be flanged with gate valve type as manufactured by the American Darling Valve Company, Muller or city-approved equal. Tapping sleeves for asbestos cement or polyvinyl chloride pipe may be type 432 or 532 (all stainless) as manufactured by JCM Industries, or city-approved equivalent.

5. All tapping valves shall be as manufactured by the American Darling Valve Company, or city-approved equivalent.

E. VALVES, CHECKVALVES AND FIRE LINE CHECKVALVES

1. Valves shall be designed to facilitate the isolation of each section of pipeline between intersections of the water distribution system. The minimum number of valves at an intersection shall be match the number of pipes forming the intersection.

2. Valves shall be installed at intervals of not more than 1,000 linear feet on transmission mains, at intervals of not more than 700 linear feet 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 and as approved by the city to minimize the number of properties which would be affected by a break.

Valves shall be marked with a stamped “V” in the concrete curb for subdivisions and new construction, and cut in, not exceeding ¼” deep if curbs are existing. The point of the “V” should point to the valve.
3. For those water line projects in which the pipe diameter is 4 to 24 inches, resilient seat gate valves with mechanical joints shall be used. Gate valves shall be as manufactured by the American Darling Valve Company, Mueller, or city-approved equivalent; shall conform to AWWA C-509 and C-515; and shall be manufactured in the United States. Valves larger than 12" may be side actuated right angle gear reduction gate valves in lieu of a standard gate valve. Valve seats shall be of natural or synthetic rubber and shall be bonded or mechanically attached to the gate using stainless steel hardware and shall be rated at a working pressure of 200 pounds per square inch. To provide a corrosion-resistant seat, the interior and exterior of the valve body shall be fusion bonded epoxy coated in accordance with AWWA C-550. The application shall be in a manner to withstand the action of line fluids and operation of the sealing gate under long term service. Valve seats shall seal by compression only. Valves shall be supplied with two-inch-square operating nuts and shall be designed to provide a bubble-tight seal regardless of the direction of flow. The opening shall be in the counterclockwise direction.

4. For those water line projects in which the pipe diameter is 16" and larger, gate valves shall be side actuated gear reduction configuration. Pipelines shall be swept down to accommodate the increased depth to provide adequate cover over the bonnet and valve nut or a side actuated right-angle gear reduction gate valves in lieu of a standard gate valve. Butterfly valves require written preapproval of the City Engineer and will be evaluated on a case by case basis. If allowed, butterfly valves with mechanical joint ends shall be of the rubber seated 90-degree tight closing type, short body, AWWA C-504, class 150 B. The valve shaft shall be of the 18-8 type 304 stainless steel or type 316, stainless steel. Body dimensions and the minimum shaft diameter shall be in accordance with tables 3 and 4 of AWWA C-504. The valve seat shall be of molded natural or synthetic rubber and shall be mechanically secured to the disc or to the valve body and shall mate against a stainless steel seat surface. Buried valves shall be for rated for submerged service and equipped with totally enclosed gear operators, permanently lubricated, and equipped with adjustable stops for open and closed positions. The gear ratio shall be such as to require not more than 150 foot pounds of input to produce an output torque equivalent to the maximum shaft torque indicated in table 1 of AWWA C-504. Each buried valve shall have a standard two-inch-square operating nut. The opening shall be in the counterclockwise direction.

5. All water lines entering buildings for the purpose of fire sprinklers or other firefighting purposes shall have a double detector check (DDC)
valve of the same diameter as the water line. A DDC valve shall be installed in the line prior to entering the building. Double detector check valves shall be installed with gate valves before and after the check valve, with an approved five-eighths-inch by three-fourths-inch detector meter. Fire piping shall have an isolation valve so a water service is not impacted when the fire line is shut down.

6. Backflow Prevention Assemblies shall be manufactured and installed in full conformance with the follow standards:

1. Double Check Valve Assembly: AWWA C510
2. Reduced Pressure Zone (RPZ) Assembly: AWWA C511
3. Conform to AWWA M14 – Recommended Practice for Backflow Prevention and Cross Connection Control
4. Backflow prevention devices shall have the laboratory and field performance specifications of the Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California.

Backflow preventers shall have interior epoxy coating and shall be installed above grade on a concrete slab adjacent to the meter or, for residential connections, in line in a separate dual check residential meter box. Final approval shall be based on a “Certificate of Approval” issued by an approved laboratory certifying full compliance with the above standards.

5. Backflow preventers shall be tested and the certification provided to the City before they are put into service.

F. VALVE BOXES

1. Valve boxes for the water distribution system shall two-piece and made of cast iron, including cast iron top and bottom sections, as approved by the city. New and existing valve boxes shall be set flush with the finished grade in such a manner as to permit easy use of a valve wrench and to prevent surface loads from being transmitted to the valve or pipe. Box sections shall be telescopic and adjustable. Valve box lids shall have the word "water" cast on the top. Valve boxes shall not be located in driveways or in curbs or gutters.

2. Each valve box shall have a 24-inch by 24-inch by six-inch concrete pad at finished grade, and the valve box lid shall be painted blue. The concrete shall have a minimum strength of 3,000 pounds per square inch.
G. FIRE HYDRANTS

1. Fire hydrants shall be in accordance with AWWA C-502 and shall have bronze to bronze main seat threading surfaces. Acceptable manufacturers of fire hydrants shall be Mueller, American Darling, or city-approved equivalent. All hydrants shall be of the traffic type, and drain holes shall be plugged at the factory. Hydrants shall have breakable connection features and a breakable coupling on the stem immediately above the buried line which has a lower breaking point than the rest of the unit. All hydrants shall be equipped with one 5¼-inch valve opening, one 4½-inch pumper nozzle, two 2½-inch hose nozzles, standard bell or mechanical joint hub, 36-inch minimum buried length, an O-ring seal, a counterclockwise opening, and replaceable nozzle threads. A six-inch M.J. hydrant connection shall be provided using a hydrant valve anchoring tee or anchor coupling with integrally cast standard M.J. gland on six-inch plain and branch. Hydrants shall be factory painted red.

2. Nozzles shall be a minimum of 18 inches above finished grade and shall not be less than three feet from the curb or more than eight feet from the curb. Nozzles shall be a type which is easily replaceable.

3. Nozzle caps with gaskets shall be provided for all outlets to provide a tight closure for the nozzles. Caps shall be securely chained to the barrel of the hydrant. Cap nuts shall have the same dimensions as the operating nut of the hydrant.

4. Hydrant lead pipe shall be fitted with lock-type joints approved by the city engineer and the public works department.

5. GradeLok fittings are acceptable for installation where needed for construction adjustment. All fittings shall be fully restrained in all fire assemblies.

SECTION 6.3 SERVICE LINE CONNECTIONS

A. One-inch services shall be type CTS 250 psi AWWA C901 Polyethylene. All connections shall be compression type. Two-inch services shall be threaded brass pipe with threaded brass fittings. Polyethylene pipe (Poly Pipe) is the preferred service pipe. Lead based solder joints shall not be accepted. Service connections shall be equipped with backflow preventers.

B. All service line connections shall have corporation stops and saddles.

C. The minimum corporation stops shall be made of one-inch brass. Acceptable manufacturers shall be Mueller, Ford Meter Box Company, Hays
Manufacturing Company, or city-approved equal.

D. The saddle body shall be bronze.

E. Acceptable manufacturers of one-inch curb stops shall be Mueller, Hays Manufacturing Company, or city-approved equivalent. Curb stops shall have locking wings and a swivel meter nut. All two-inch services shall have a two-inch threaded resilient seat gate valve installed at the tap. Acceptable manufacturers of the valve shall be M&H Valve Company or city-approved equivalent.

F. Material requirements for service connections larger than one inch shall be at the sole discretion of the city.

G. Service lines shall be located at alternating lot lines within two feet of the right-of-way line. Curb stops shall be buried in a horizontal position no deeper than 12 inches below finished grade. Service locations shall be permanently marked on the curb by stamping in new construction and subdivisions or cutting not deeper than $\frac{1}{4}$" in existing concrete, a two-inch letter "W" for potable water into the curb. Water services shall be located at the opposite lot corner from reclaimed services or sewer laterals.

H. Service taps on the water main shall be spaced at a minimum distance of 18 inches. If two or more taps are required at the minimum spacing, they shall be offset 45 degrees alternately to each side of the centerline of the crown of the water main. Service taps shall be prohibited within 36 inches of pipe joints or fittings. Taps shall be either 1 inch for residential or 2 inch for commercial.

I. Apartment complexes, hotels and other facilities as determined by the Utility shall have a minimum 4 inch service extended to the meter location and then reduced as required to the meter size.

SECTION 6.4 PIPE SEPARATION STANDARDS

A. PIPELINE SEPARATION

1. Pipeline separation between potable water mains and other pipes shall be in accordance with F.A.C. Rule 62-555.314.

2. A minimum vertical separation of 12 inches shall be provided between all potable water mains and sewer force mains, gravity sewer mains, storm sewers, or reclaimed water mains.

3. If existing conditions prevent the required vertical separation between
potable water mains and sewer force mains or gravity sewer mains, the potable main shall consist of 20 feet of ductile iron pipe, centered on the point of crossing, but in no case shall such clearance be less than 6” or the minimum as defined in FAC Rule 62-555.314, latest edition.

4. If existing conditions prevent the required vertical separation between potable water mains and reclaimed water mains, the potable water main shall consist of 20 feet of ductile iron pipe, centered on the point of crossing.

5. If existing conditions prevent the required vertical separation between potable water mains and storm sewers, the potable water main shall consist of 20 feet of ductile iron pipe centered on the point of crossing, but in no case shall such clearance be less than 6” or the minimum as defined in FAC Rule 62-555.314, latest edition.

6. Where storm sewers cross over potable water mains with less than 18” of vertical separation between the bottom of the storm sewer and the top of the potable water main, support cradles shall be constructed under the storm sewer on each side of the crossing to transfer the load of the pipe at the crossing to the surrounding soil and prevent point loading of the potable water main. Water main should typically cross over storm sewers, unless pre-approved by the City Engineer.

SECTION 6.5 PIPELINE CONSTRUCTION AND TRENCH STANDARDS

A. TRENCH PREPARATION

1. Trenches shall be excavated to the minimum required to place the pipe. The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing support for the pipe on undisturbed ground. Trench excavation shall account for bell diameter at each joint.

2. During excavation, if ashes, cinders, muck, or other organic or unsuitable materials are uncovered at the bottom of the trench, the material shall be removed and backfilled with approved material for a depth not less than 12 inches. This material shall be compacted in layers of eight inches to provide a uniform and continuous bearing characteristic of that area's soil condition. Where the bottom of the trench consists of unstable material to such a degree that it cannot be removed and replaced with an approved backfill to support the pipe properly, a suitable foundation must be constructed.

3. Excavated material shall be stockpiled in such a manner that it will not endanger work or obstruct natural watercourses, sidewalks, or
driveways.

4. Gutters shall be kept clear, or other satisfactory provisions shall be made to maintain street drainage.

5. Fire hydrants, valve boxes, or other utility infrastructure shall be left unobstructed and accessible at all times.

6. All materials which are unsuitable for reuse shall be kept separate from the excavated materials and stockpiled materials.

7. Open cut trenches shall be sheeted and braced or shored as required by any governing state law, municipal ordinance, and standards of the Occupational Safety and Health Administration and as may be necessary to protect life, property, or the work. All trenching work shall be in strict accordance with the Florida Trench Safety Act.

8. Water shall not be allowed in the trench at any time. An adequate supply of well points, headers, or pumps, all in first class operating condition, may be used to remove the groundwater. The use of gravel and pumps shall also be an acceptable means of removing the water. The trench shall be excavated no more than the available pumping facilities are capable of handling. This discharge from pumps shall be legally discharged and all permits required obtained. Any permit required for dewatering is the responsibility of the developer and engineer of record, and shall be obtained prior to commencement of construction. Any fines or actions due to non-compliance shall be the responsibility of the developer and contractor.

B. PIPELINE CONSTRUCTION

1. PIPE LAYING

For the water distribution system, pipe laying shall be in accordance with the following:

a) The bottom of the trench shall not be excavated below the specified grade. If undercutting occurs, the bottom of the trench shall be brought up to the required grade with approved material and thoroughly compacted as directed by the city engineer.

b) Prior to placing the pipe in the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil, grease and dirt and debris.

c) Each pipe shall be laid true to line and grade so as to form a close concentric joint with the adjoining pipe, preventing offsets in the
flow line. The interior of the pipe shall be cleaned of all dirt and superfluous materials prior to joining the next section. Every precaution shall be taken to prevent foreign material from entering the pipe. During the laying operation, no debris, tools, clothing, or other material shall be placed in the pipe.

d) All mechanical joints shall be made in strict accordance with the manufacturer's specifications. Gaskets shall be evenly seated, the gland placed in position with the bolts, and evenly tightened.

e) All slip joints shall be made in strict accordance with the manufacturer's specifications. The bell shall be carefully cleaned before the gasket is inserted.

f) After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home to correct alignment. The pipe shall then be covered with an approved backfill material.

g) Pipe shall be installed with a minimum cover of 30 inches and a maximum of 42 inches, except as required for conflicts. The depth of cover shall be as measured from the proposed finish grade as indicated on the approved plans to top of pipe. At those times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other approved means. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

h) All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, stones, or other unsuitable material.

i) Density testing results for all pipe installation shall be provided at a frequency not less than every 750ft of pipe and at minimum intervals of 18" beginning at the bottom of the trench and terminating within 12" of finished grade.

j) Pipe shall not be deflected or in a stressed condition during installation. All fittings shown on the drawings shall be installed. Fittings determined to be required during construction to prevent deflection or stressing the pipe shall be installed.

2. VALVES AND FITTINGS

Valves and fittings shall be in accordance with the following:
a) All valves and fittings shall be set and joined to the pipe in the proper location as specified on the approved plans. Valve and fitting location shall not be changed without authorization from the City Engineer. Pipe shall not be deflected in lieu of fittings.

b) A roadway valve box shall be provided for every valve. The valve box shall set on so as not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve. The box cover shall be flush with the surface of the finished pavement or grade level as specified on the approved plans.

c) A 24-inch square pad, six inches thick, shall be poured around the valve box when it is located outside of pavement.

d) The nut shall be not less than 12" deep or more than 48" deep and shall have extensions with guides provided as required.

3. FIRE HYDRANTS

Fire hydrants shall be in accordance with the following:

a) Fire hydrants shall be located as shown on the approved plans and shall be marked on the pavement with a blue reflector, offset from road centerline to the side the hydrant is on.

b) Hydrants shall be no more than eight feet from the back of curb, with the steamer connection facing the adjacent public street unless otherwise designated by the city or by the fire department.

c) Hydrants shall be plumb and shall be set 18 inches from the finished grade to the center of the steamer connection. The bury score line of the hydrant shall be at the finished grade.

d) Hydrants shall be located so as not to interfere with proposed sidewalks.

e) Hydrant spacing shall not exceed 400’.

f) The tee and valve at the mainline, piping to the hydrant, bury and hydrant are all considered a part of the fire hydrant assembly. If a fire hydrant is shown on the drawings it is considered a fire hydrant assembly and all the listed components installed. If the valve at the connection to the main exceeds 20’ from the hydrant, and additional valve is required at the hydrant.

4. JOINT RESTRAINTS AND THRUST BLOCKING

Joint restraints and thrust blocking shall be in accordance with the
following:

a) Mechanical joint restraints, such as metal harnesses (mega lugs), tie rods, or clamps of adequate strength to prevent movement, shall be installed at all valves, bends, tees, crosses, dead ends, and fire hydrants, or as specified on the approved plans. Rods and clamps shall be stainless steel or rustproof treated and wrapped steel. Restraining glands may be used in certain situations at the sole discretion of the city.

<table>
<thead>
<tr>
<th>Pipe Diameter (Inches)</th>
<th>D.I.P</th>
<th>P.V.C.</th>
<th>Pipe Diameter (Inches)</th>
<th>D.I.P</th>
<th>P.V.C.</th>
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b) At the sole discretion of the city, thrust blocks may be installed at locations where mechanical joints are not practical. Thrust blocks shall be of concrete having a minimum compressive strength of 2,500 pounds per square inch after 28 days. Fittings or appurtenances shall be wrapped in plastic prior to pouring of thrust blocks. Concrete shall not be placed on the bell, gland or bolts.

5. PIPE CASING

Pipe that is required in casing shall be installed in accordance with the following:

a) Pipe to be installed under pavement where open trenching is not permitted shall be installed through a steel casing which has been jacked and/or bored. The minimum casing size shall be as follows:
Pipe Size (inches) | Minimum Casing Size (inches)
---|---
4 | 12
6 | 14
8 | 18
10 | 20
12 | 24
16 or larger | The manufacturer’s recommendation

All pipe in casing shall have restrained joints, which may require a larger casing size.

b) Water mains shall be pushed or pulled through the casing on high density polyethylene casing insulators spaced at five feet. Restrained joints are required on mains installed inside casings. Casing ends shall be sealed with a removable rubber boot secured to the pipe and casing with stainless steel bands.

c) Casing for service lines under roads shall be sized so the pipe slides freely through the sleeve. Sleeve ends shall be sealed to keep debris and soil from entering the sleeve after the pipe is installed and before it is backfilled. The City shall witness sleeve sealing before the pipe is backfilled.

6. BLOWOFFS

Blow-offs shall be installed at the end of all dead-end water mains unless otherwise specified by the city. Automatic blowoff may be required as determined by the utility.

SECTION 6.6 WATER SYSTEM INSPECTIONS AND TESTING

A. HYDROSTATIC TESTING

1. All newly installed pipe which has been backfilled in the water distribution system shall be hydrostatically tested at a gauge pressure of 150 pounds per square inch. The test pressure shall be maintained for a period of two hours. All tests shall be in accordance with AWWA standards for ductile iron pipe C-600 or manual M23 for polyvinyl chloride.

2. A blow-off, fire hydrant, or service connection shall be located at the end of the line under test. Before applying the specified test pressure, all air
shall be expelled from the test section, including that from all hydrants and service connections.

3. The line under test shall be slowly filled with water at the specified test pressure. The lowest elevation point on the section being tested shall be determined, and any corrections necessary shall be done to the elevation of the test gauge.

4. If the line fails to pass the test, it shall be repaired and retested until the test requirements are satisfied.

5. The public works department shall be notified a minimum of 48 hours prior to testing operations. All tests shall be during normal city working hours.

B. LEAKAGE TESTING

1. A leakage test shall be conducted at a gauge pressure of 150 pounds per square inch. The leakage test may be conducted during the hydrostatic test. All tests shall be in accordance with AWWA standards for ductile iron pipe C-600 or manual M23 for polyvinyl chloride.

2. The leakage test shall be performed on all newly laid sections of pipe after installation of all service connections.

3. Any leakage discovered shall be less than the following per 1,000 feet of pipe:

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Gallons (per hour)</th>
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<tbody>
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<td>2</td>
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<tr>
<td>16</td>
<td>1.32</td>
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</table>

4. The public works department shall be notified a minimum of 48 hours prior to testing operations. All tests shall be during normal city working hours.

C. FINALING OF WATER MAINS

1. Before the water distribution system is put into operation, all water mains
shall be thoroughly flushed.

2. The public works department shall be notified a minimum of 48 hours prior to the flushing operation. All tests shall be during normal city working hours.

3. Flushing operations shall be in accordance with AWWA C-651. Lines shall be pigged until clean. Pigging shall be witnessed by the utility.

4. The city will make available an adequate water for filling, pigging, and testing of mains. The pressure in the city’s water system shall be monitored during the flushing. At no time should pressure in the system be allowed to drop below 40 pounds per square inch.

5. Water used during wasteful or unsupervised flushing shall be at the developer’s expense. The tie-in valve shall remain off. All water used shall be obtained through a temporary jumper. Jumper and sampling points shall be tested and results sent to the Water Supervisor. All new waterlines require FDEP clearance before they are put into service.

D. DISINFECTION

1. Before the water distribution system is put into operation, all water mains, appurtenances, and any item of new construction with which the water comes into contact shall be thoroughly disinfected. Service connections made before testing shall also be disinfected.

2. The public works department shall be notified a minimum of 48 hours prior to disinfection. All tests shall be during normal city working hours.

3. The disinfection process shall be in accordance with AWWA C-651.

4. Water with a chlorine content of 100 parts per million shall be evenly distributed throughout the pipe system and allowed to remain in the pipe for 24 hours before it is flushed out and samples are taken by the Contractor. Water mains shall not be flushed between samples.

5. Valves in the lines being disinfected shall be opened and closed several times during the sterilization period.

6. The chlorine shall be flushed until measurements show that the chlorine residual in the water leaving the main is not higher than that generally prevailing in the system supplying water to the new main.

E. BACTERIOLOGICAL TESTING

1. After the water system has been sterilized and thoroughly flushed as specified in this article, the Contractor shall take samples of water from
remote points of the distribution system in suitable disinfected containers. Samples shall be taken from the same location on two consecutive days.

2. The Contractor shall retain a certified laboratory to obtain samples and perform testing. If tests of such samples indicate the presence of coliform organisms, the disinfection process as provided for in section 90-62 shall be repeated until two consecutive tests indicate the absence of coliform organisms.

3. The bacteriological tests shall be satisfactorily completed in accordance with state department of environmental protection requirements before the system is placed in operation.

4. Sampling and all testing / retesting shall be performed at the developer's expense.

CHAPTER 7 – PROJECT STARTUP, CLOSEOUT, AND ACCEPTANCE

SECTION 7.1 PROJECT STARTUP

1. All projects are required to submit water and sewer concurrency forms for those projects which utilize the City of West Melbourne water or sewer systems.

2. For projects which are receiving water or sewer service from another jurisdiction, the developer shall provide evidence to the city that the outside agency has agreed to provide service to the project.

3. All projects are required to obtain a city building permit prior to any work on the site including clearing or silt fence staking.

4. Projects will be required to coordinate a pre-construction meeting with the city of west Melbourne if any of the following is proposed in conjunction with the project:

   a. Construction work involving existing city water, reclaim, or sanitary sewer system lines.

   b. Construction work involving the installation of new water or sewer system lines that will be accepted by the City. This includes all water and sewer improvements permitted by the FDEP as well as the construction of new hydrants and new hydrant leads.
c. Construction work involving clearing or grading of sites where the total area of disturbance would be expected to equal or exceed ½ acre which is the threshold for requirement of an NPDES permit.

d. Construction work involving a site that when complete will discharge stormwater runoff into any drainage facility that ultimately discharges to the city’s stormwater system regardless of if it is physically connected. This includes culverts, road right of way areas, and ditches whether privately or publicly maintained.

e. Construction work involving the construction or modification of any driveway that connects to a City maintained street or any construction work occurring in any city of West Melbourne public right of way.

SECTION 7.2 PROJECT CLOSEOUT AND ACCEPTANCE

1. All projects requiring a pre-construction meeting with the City as outlined in Project Startup above shall be required to adhere to the following project closeout requirements prior to applying for a meter installation, connecting to the city sewer system, and obtaining a Certificate of Occupancy for the building.

a. Prior to or concurrent with requesting FDEP clearance for water or sewer improvements, the project owner shall provide:

   i. Draft copies of easements for water and sewer that utilize the city’s standard easement language adopted for those facilities and included in this manual.

   ii. Draft copies of bills of sale for any and all water facilities that will become part of the public utility system.

   iii. Draft copies of maintenance bonds for water and sewer.

   iv. Copies of all inspection reports for the water or sewer system including trench and structure density testing, hydrostatic testing, bacterial testing, sewer video, and leakage testing.

b. Following approval of the clearance request, the project owner shall provide final executed documents for items i through iii within ten (10) business days of the FDEP approving the clearance request.

c. Once all required documents have been provided, a final inspection walk through date and time will be set and a final inspection by the city of all site improvements will be performed on or before that time. A punchlist will be developed listing items requiring action by the project owner. Once all punchlist items have been satisfied,
the project owner will schedule a project re-inspection with the City until successful completion of the construction of the project.

d. Once FDEP water and sewer final clearance has been obtained or if no FDEP clearance is required (a letter provided), the project owner will provide the following minimum documentation in a single package in order to schedule for a final inspection for the site or subdivision improvements.

i. Signed and Sealed letter from a Professional Engineer certifying that the improvements are complete in accordance with the design drawings and with all City, State and Federal requirements.

ii. Copies of all material inspection reports

iii. Signed and sealed as-builts for all utilities, paving and grading, and drainage meeting City requirements, including O.R. Book and Page for proposed easements.

iv. Final copies of maintenance bonds associated with any work performed on publicly maintained rights-of-way or easements (existing or proposed).

v. Copy of recorded easements, indicating O.R. Book and Page.
INDEX OF FORMS AND CHECKLISTS

1. Subdivision Closeout Checklist

2. As-built Drawing Checklist

3. Construction Closeout Checklist
Subdivision Closeout Checklist

• Complete all required construction inspections. This includes water, sewer, roads and drainage punch lists be completed. At that time a final inspection walk-thru and punch list can be scheduled for the project.

• Submit test results for compaction for pipe backfill, structure backfill (manholes and drainage structures) and for the road structural section (AC pavement and concrete).

• Submit materials tickets for concrete and AC pavement delivered to the project for public improvements.

• Provide As-builts for water, sewer, drainage, roads and site finish grades (note: city requirements exceed FDEP requirements). Please note that there are specific things the City requires for As-builts that are different than that required by other agencies. See the City’s As-built drawing checklist.

• FDEP clearances for water and sewer improvements

• Schedule a final construction walk-through (submit as-builts prior to scheduling walk through)

• Prepare bill(s) of sale for public improvements constructed by the developer that are being transferred to the city (include only the cost of portion transferred). Provide separate accounting for road improvements, drainage improvements, water improvements and wastewater improvements. Bill of sale shall be signed and sealed by the engineer of record.

• Using the cost(s) from above provide a 2-year maintenance bond for 20% of the value, for improvements transferred to the city.

• Transfer easements for public improvements (min. 20’ wide centered on public water and sewer improvements) to the city.
Site Plan As-Built Checklist

In accordance with City of West Melbourne code of ordinances Section 66-572, no certificate of occupancy shall be issued by the building official unless construction is completed in accordance with the approved site plan and specifications and unless as-built documents indicate no deviation from an approved site plan.

The following is a list of information required to be shown on as-builts. If any item is checked NO, as-builts must be resubmitted addressing that item. Review fees are to be paid at time of submittal Refer to Section 66-486 for fee schedule.

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Five (5) copies of as-builts.</td>
<td>☐</td>
</tr>
<tr>
<td>2.</td>
<td>Scale not more than 1&quot;=50'.</td>
<td>☐</td>
</tr>
<tr>
<td>3.</td>
<td>Prepared, signed and sealed by a Florida PE or PLS.</td>
<td>☐</td>
</tr>
<tr>
<td>4.</td>
<td>As-builts sheets 24&quot;x36&quot;.</td>
<td>☐</td>
</tr>
<tr>
<td>5.</td>
<td>North arrow on each applicable sheet.</td>
<td>☐</td>
</tr>
<tr>
<td>6.</td>
<td>Total number of parking spaces including HC spaces.</td>
<td>☐</td>
</tr>
<tr>
<td>7.</td>
<td>Building setbacks (front, rear, side) required and provided.</td>
<td>☐</td>
</tr>
<tr>
<td>8.</td>
<td>Name, address, and phone number of owner or the site upon completion of project.</td>
<td>☐</td>
</tr>
<tr>
<td>9.</td>
<td>Legal description of the site. Bearings and distances of all boundary lines shall be shown.</td>
<td>☐</td>
</tr>
<tr>
<td>10.</td>
<td>Location of all dumpsters and/or compactors, dimensions of pad.</td>
<td>☐</td>
</tr>
<tr>
<td>11.</td>
<td>Location of site lighting.</td>
<td>☐</td>
</tr>
<tr>
<td>12.</td>
<td>If a detached sign was installed, its location on the site with dimensions from the closest point of such sign to the property lines.</td>
<td>☐</td>
</tr>
<tr>
<td>13.</td>
<td>Full dimensions, including all structures, distance between driveways, distance between parking areas and the property line, width of interior driveways, width of driveway entrances, parking space dimensions and landscape island dimensions.</td>
<td>☐</td>
</tr>
<tr>
<td>14.</td>
<td>Location and width of sidewalks, driveways, driveway entrances, and streets.</td>
<td>☐</td>
</tr>
<tr>
<td>15.</td>
<td>FEE of each structure's first floor level.</td>
<td>☐</td>
</tr>
<tr>
<td>16.</td>
<td>Layout of all water distribution (including fire hydrants), sanitary sewer, storm drainage, and retention systems with as-built grades and sizes.</td>
<td>☐</td>
</tr>
<tr>
<td>17.</td>
<td>Location and elevation of all drainage structures and culverts, with size and grades.</td>
<td>☐</td>
</tr>
<tr>
<td>18.</td>
<td>Side lot elevations to ensure adequate protection from side lot runoff onto adjacent properties, including existing elevations on adjacent parcels</td>
<td>☐</td>
</tr>
</tbody>
</table>
within five feet of the subject property.

Project Name: ________________________________

19. Sufficient number of elevations at appropriate locations in order to determine whether the drainage system will function properly and to ensure the orderly disposal of surface water runoff. ☐ ☐

20. Sufficient information to verify handicap accessibility. ☐ ☐

21. Off-site improvements, including improvements in state or county rights-of-way. ☐ ☐

As applicable:

1. Proof of acceptance of the construction of drainage, driveway connection, And utilities by all applicable outside agencies, such as SJRWMD, DOT, DEP, Brevard County and MTWCD. ☐ ☐

2. Dedication and recordation on documents approved by the city of all rights-of-ways, easements, and other public lands as shown on the approved site plan. ☐ ☐

3. Bill of sale conveying to the city water and sewer utility lines, mains, lift stations, and other personal property required to be installed within dedicated public rights-of-way or easements. ☐ ☐

4. Maintenance warranty bond or cash in lieu of the bond in the amount of 20% of the actual construction costs as approved by the city for all public roadways, drainage facilities, and water and sewer utility lines, mains, and lift stations installed by the developer and dedicated to the city. The maintenance warranty bond shall be for a period of two years and shall cover all improvements mentioned in this subsection. ☐ ☐

Comments: ____________________________________________________________

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Construction Closeout Checklist

DATE: ____________

PROJECT NAME: ____________________________________________________________

OWNER: ____________________________________________________________

DESIGN ENGINEER: ______________________________________________________

CONTRACTOR: ______________________________________________________

DESCRIPTION OF WORK: ____________________________________________________

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**FINAL Inspection Walk-thru Checklist**

Prior to scheduling a final walk-thru, as-built and as-built review fee must be submitted. Re-inspection and re-review of as-built will require additional fees per City code.

<table>
<thead>
<tr>
<th>GENERAL</th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has Brevard County approved this site?</td>
<td></td>
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<tr>
<td>2. Has St. Johns approved this site?</td>
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<tr>
<td>3. Has Melbourne-Tillman approved this site?</td>
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<td>4. Has FDOT approved this site?</td>
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<tr>
<td>5. Has maintenance bond been submitted?</td>
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<tr>
<td>6. Has Bill of Sale been submitted?</td>
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<tr>
<td>7. Do P &amp; D as-builts match plans?</td>
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<tr>
<td>8. Do sewer as-builts match plans?</td>
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<tr>
<td>9. Do water as-builts match plans?</td>
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<tr>
<td>10. Do reuse as-builts match plans?</td>
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<tr>
<td>ROADS/DRAINAGE</td>
<td>YES</td>
<td>NO</td>
<td>N/A</td>
<td>COMMENTS</td>
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<tr>
<td>----------------------------------------</td>
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</tr>
<tr>
<td>1. Are roadways clean?</td>
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<tr>
<td>2. Were streets cored?</td>
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<tr>
<td>3. Did core samples pass City Code Req’s?</td>
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<td>4. Were streets flood tested?</td>
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<td>5. Did any section of curbing hold water?</td>
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<tr>
<td>6. Do any curb sections need replaced?</td>
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<tr>
<td>7. Is paving damaged in any location?</td>
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<td>8. Are sidewalks installed at all common areas?</td>
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<td>9. Are any sidewalks cracked?</td>
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<tr>
<td>10. Do all curbs have 2 feet of sod?</td>
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<td>11. Are ponds sodded from top of bank to water?</td>
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<td>12. Are all other areas seeded and mulched?</td>
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<td>13. Do any canals or ditches need cleaned?</td>
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<td>14. Have street signs been posted?</td>
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<td>15. Have speed limit signs been posted?</td>
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<td>16. Are streets striped with thermoplastic striping?</td>
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<td>17. Were handicap ramps installed?</td>
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<tr>
<td>18. Are storm manholes clean?</td>
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<tr>
<td>19. Are storm manholes damaged?</td>
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<tr>
<td>20. Is control structure clean?</td>
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<tr>
<td>21. Is control structure damaged?</td>
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</tbody>
</table>
22. Are ponds clean?  ___________________________________

23. Are any pipe ends damaged?  ___________________________________

<table>
<thead>
<tr>
<th>WATER</th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Were Bac T’s taken and passed?</td>
<td></td>
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<tr>
<td>2. Was FDEP water clearance received?</td>
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<tr>
<td>3. Was jumper pulled?</td>
<td></td>
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<tr>
<td>4. Are all services installed?</td>
<td></td>
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<td>5. Are any services damaged?</td>
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<td>6. Are all services past Y’s or T’s sufficiently above ground?</td>
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<tr>
<td>7. Do all services have correct curb stops?</td>
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<tr>
<td>8. Are all curbs marked?</td>
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<td>9. Are all valves installed and centered in valve box?</td>
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<td>10. Are valve pads poured?</td>
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<td>11. Are there any cracked valve pads?</td>
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<tr>
<td>12. Are valves marked at curb?</td>
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<tr>
<td>13. Are blow-offs installed?</td>
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<tr>
<td>14. Are blow-offs marked at curb?</td>
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<td>15. Are all fire hydrants installed?</td>
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<td>16. Are fire hydrants factory painted with red?</td>
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<td>17. Are fire hydrants facing correct direction?</td>
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<tr>
<td>18. Are fire hydrant markers installed?</td>
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<tr>
<td>19. Did fire hydrants pass fire flow test?</td>
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<tr>
<td>20. Has anti-cease been applied to fire hydrant weir (nozzle)?</td>
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<tr>
<td>21. Does fire hydrant have oil in reservoir?</td>
<td></td>
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<tr>
<td>22. Are caps securely chained to the barrel of the hydrant?</td>
<td></td>
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</tr>
</tbody>
</table>
23. Has main line been cleaned by pigging method? ___________________________________
24. Were pressure tests taken and passed? _________________________________________
25. Are the service Y’s or T’s buried below grade? _________________________________
26. Are the fire hydrants either American Darling or Mueller? ________________________

<table>
<thead>
<tr>
<th>Sewer</th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Video inspection of sewer complete and accepted?</td>
<td>______________________</td>
<td></td>
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</tr>
<tr>
<td>2. FDEP clearance received?</td>
<td>______________________</td>
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<tr>
<td>3. All services on approved construction drawings installed?</td>
<td>______________________</td>
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<tr>
<td>4. All service connections marked with an S on curb?</td>
<td>______________________</td>
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<tr>
<td>5. All sewer service electronic locators functioning?</td>
<td>______________________</td>
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<tr>
<td>6. All manhole cover stamped City of West Melbourne Sewer?</td>
<td>______________________</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7. All manholes over 12-feett in depth have 2 part 32-inch manhole ring cover with 22-inch center cover?</td>
<td>______________________</td>
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<td>8. All manhole troughs smooth?</td>
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<td>9. All manhole mud work smooth and properly coated?</td>
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<td>10. All lined manhole seams properly sealed, no signs of infiltration?</td>
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<td>11. All manholes with 24-inch or more difference in invert elevations have outside drop constructed?</td>
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<td>12. All inverts flow into manhole trough. If difference in elevation is less than 24 inches, Slide/trough constructed into existing manhole trough?</td>
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13. Sewer force main and/or reuse main pressure test complete. Two hours at 150 PSI?

______________________________

14. All valves shown on approved construction drawings installed?

______________________________

15. All valves clearly marked with a V in curb, painted green for sewer and purple for reuse?

______________________________

16. All valves in green areas have 24-inch by 24-inch by 6-inch concrete pad?

______________________________

17. Lift station start up completed successfully including Data Flow and generator startup?

______________________________

18. Spare pump turned over to the City of West Melbourne?

______________________________

19. Inside of top slab of wet well coated to match wet well liner?

______________________________

20. Ground elevation slopes away from Lift station wet well and valve vault?

______________________________

21. Top of wet well is above crown of road?

______________________________

22. Driveway installed per the approved construction drawings?

______________________________

23. Lift station valve vault drain clean and functioning?

______________________________

24. All lifting devices removed from structures below concrete surface and grouted over?

______________________________

25. Wet well liner seams properly sealed with no signs of infiltration in wet well?

______________________________

26. Above ground meter and RPZ backflow preventer installed with concrete pad per city specifications and painted blue?

______________________________

92 July 2020
27. Fence surrounding lift station complete and undamaged? ____________________________

28. 7 master locks keyed to a 2258 key to match city locks turned over to City of West Melbourne? 
_____________________________

29. As-built drawings have been submitted and approved? _____________________________

30. City of West Melbourne utility department personnel were notified prior to installation of underground utility structures and material? 
______________________________

31. Contractor verifies that all pipe plugs used during construction of utility system have been removed?
______________________________
City of West Melbourne
Engineering Standards Manual

APPENDIX – CITY STANDARD DETAILS
July 2020
APPENDIX

Note to Design Engineer:

The Engineer of Record is responsible for including all required standard details in the project drawings. All drawing sets shall include Standard Detail G-0. The notes detail for each type of improvement (e.g. W-0 for water, S-0 for sewer, etc.) shall be included in the project drawings if a detail from that group is included on the drawings.

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GENERAL NOTES:

1. THE FOLLOWING ITEMS ARE INCORPORATED INTO THESE DRAWINGS BY REFERENCE AND SHALL BE AS IF SPELLED OUT IN THEIR ENTIRETY:
   CHAPTER 74 - DEVELOPMENT STANDARDS
   CHAPTER 82 - STREETS, SIDEWALKS AND PUBLIC WAYS
   CHAPTER 86 - SUBDIVISIONS
   CHAPTER 90 - UTILITIES
   ENGINEERING STANDARDS MANUAL AND CONSTRUCTION DETAILS

   ALL CITY REQUIREMENTS WILL BE ENFORCED WHETHER SPECIFICALLY INCLUDED IN THE APPROVED DRAWINGS OR NOT.

2. CONTRACTOR IS RESPONSIBLE FOR CALLING FOR AND SCHEDULING CITY INSPECTIONS. PLEASE PROVIDE 48 HOURS ADVANCED NOTICE.

3. WORK NOT INSPECTED BY THE CITY DURING THE CONSTRUCTION PROCESS SHALL BE UNCOVERED AND EXPOSED BY THE CONTRACTOR AS REQUIRED TO CONFIRM PROPER INSTALLATION AND MATERIALS. WORK NOT INSPECTED IS SUBJECT TO REJECTION.

4. IN THE EVENT OF CONFLICTING REQUIREMENTS, THE MORE STRINGENT REQUIREMENT, AS DETERMINED BY THE CITY, WILL BE ENFORCED.

5. ALL UTILITIES THAT WILL BECOME PUBLIC SHALL BE LOCATED WITHIN A STREET RIGHT-OF-WAY OR BE CENTERED IN A MINIMUM 20' WIDE UTILITY EASEMENT.

6. CONTRACTOR SHALL MAINTAIN AN APPROVED DRAWING SET ON-SITE AT ALL TIMES.

7. CONTRACTOR IS RESPONSIBLE FOR PREPARING AS-BUILT DRAWINGS FOR WATER, SEWER, GRADING AND DRAINAGE, PREPARED BY A REGISTERED LAND SURVEYOR IN THE STATE OF FLORIDA, AND DELIVER TO THE CITY.

8. CONTRACTOR IS REQUIRED TO OBTAIN AND MAINTAIN ALL PERMITS NEEDED FOR THE PROJECT, OVER THE COURSE OF THE PROJECT.

9. CONTRACTOR IS REQUIRED TO MAINTAIN EROSION CONTROL, INCORPORATE BMPS INTO THE WORK, AND CONTROL ALL SEDIMENT AND DEBRIS FROM THE SITE. TRACKING OR DEBRIS ENTERING PUBLIC RIGHTS-OF-WAY SHALL BE REMOVED AND CLEANED UP IMMEDIATELY.

10. CONTRACTOR IS REQUIRED TO COLLECT ALL MATERIALS TICKETS AND PERFORM COMPACTION TESTING OF SITE FILL, PIPE AND STRUCTURE BACKFILL, ROAD SUB-GRADE, ROAD BASE, AND ROAD A.C. AND DELIVER TO THE CITY AS OUTLINED IN THE PRE-CONSTRUCTION CONFERENCE.

11. NO OUTSIDE DRAINS (FLOOR, YARD OR PATIO DRAINS) SHALL BE CONNECTED TO THE SANITARY SEWER SYSTEM.

12. POTABLE WATER SHALL NOT BE USED FOR IRRIGATION. IRRIGATION WATER SHALL BE SUPPLIED BY AN ON-SITE WELL.
PROFILE VIEW

LEGEND AND NOTES:

1. ROADWAY SURFACE COURSE:
   2" OF TYPE SP-9.5 ASPHALT CONCRETE TESTED PER FDOT AND/OR BREvard COUNTY
   STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

2. PRIME/TACK COAT:
   PER FDOT STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 300.

3. ROADWAY BASE:
   8" LIMEROCK, CRUSHED CONCRETE OR CEMENTED COQUINA. MINIMUM LBR 100 COMPACTED
   TO 98% MAXIMUM DENSITY PER AASHTO T-180.

4. ROADWAY SUBGRADE:
   8" TYPE B, STABILIZED TO MINIMUM LBR 40, COMPACTED TO MINIMUM 98% AASHTO T-180.

5. SIDEWALK:
   4" THICK CONCRETE, FDOT CLASS 1, FIBER REINFORCED, 28 DAY 3000 PSI, WITH LIGHT
   BROOM FINISH CROSS SLOPE SHALL BE BETWEEN 1.0% MIN AND 2.0% MAX.

6. SIDEWALK SUBGRADE:
   6" THICK COMPACTED TO MIN. 98% MAXIMUM DENSITY PER AASHTO T-180.

7. SIDEWALK WIDTH:
   SIDEWALK WIDTH MUST BE 5'. CONSULTATION SHALL BE MADE WITH CITY STAFF IF
   DEVELOPER REQUIRES A SIDEWALK WIDTH GREATER THAN 5'.

8. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED.

9. CONCRETE CURBING:
   MODIFIED DROP CURB SHOWN - OTHER FDOT TYPE CURBS ARE ACCEPTABLE. ALL CURBS
   ARE TO CONFORM TO FDOT DESIGN STANDARDS LATEST EDITION (MINIMUM LONGITUDINAL
   SLOPE ALONG GUTTER IS 0.36%) - MIAMI CURB MAY BE USED

A. CONSTRUCT 1" A.C. PAVEMENT DURING CONSTRUCTION AND CAP WITH 1" A.C. AT COMPLETION
   OF PROJECT.
LEGEND AND NOTES:

1. ROADWAY SURFACE COURSE:
   2" OF TYPE SP-9.5 ASPHALT CONCRETE TESTED PER FDOT AND/OR BREVARD COUNTY
   STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

2. PRIME/TACK COAT:
   PER FDOT STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 300.

3. ROADWAY BASE:
   8" LIMEROCK, CRUSHED CONCRETE OR CEMENTED COQUINA. MINIMUM LBR 100 COMPACTED
   TO 98% MAXIMUM DENSITY PER AASHTO.

4. ROADWAY SUBGRADE:
   8" TYPE B, STABILIZED TO MINIMUM LBR 40, COMPACTED TO MINIMUM 98% AASHTO T-180.

5. SIDEWALK:
   4" THICK CONCRETE, FDOT CLASS 1, FIBER REINFORCED, 28 DAY 3000 PSI, WITH LIGHT
   BROOM FINISH CROSS SLOPE SHALL BE BETWEEN 1.0% MIN AND 2.0% MAX.

6. SIDEWALK SUBGRADE:
   6" THICK COMPACTED TO MIN. 98% MAXIMUM DENSITY PER AASHTO T-180.

7. SIDEWALK WIDTH:
   SIDEWALK WIDTH MUST BE 7'. CONSULTATION SHALL BE MADE WITH CITY STAFF IF
   DEVELOPER REQUIRES A SIDEWALK WIDTH GREATER THAN 7'.

8. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED.

9. CONCRETE CURBING:
   MODIFIED DROP CURB SHOWN - OTHER FDOT TYPE CURBS ARE ACCEPTABLE. ALL CURBS
   ARE TO CONFORM TO FDOT DESIGN STANDARDS LATEST EDITION (MINIMUM LONGITUDINAL SLOPE
   ALONG GUTTER IS 0.36%). - MIAMI CURB MAY BE USED

A. CONSTRUCT 1" A.C. PAVEMENT DURING CONSTRUCTION AND CAP WITH 1" A.C. AT
   COMPLETION OF PROJECT.
LEGEND AND NOTES:

1. ROADWAY SURFACE COURSE:
   2" OF TYPE SP-9.5 ASPHALT CONCRETE TESTED PER FDOT AND/OR BREVARD COUNTY STANDARDS REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

2. PRIME/TACK COAT:
   PER FDOT STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 300.

3. ROADWAY BASE:
   8" LIMEROCK, CRUSHED CONCRETE OR CEMENTED COQUINA. MINIMUM LBR 100 COMPACTED TO 98% MAXIMUM DENSITY PER AASHTO T-180.

4. ROADWAY SUBGRADE:
   8" TYPE B, STABILIZED TO MINIMUM LBR 40, COMPACTED TO MINIMUM 98% AASHTO T-180.

5. SIDEWALK:
   4" THICK CONCRETE, FDOT CLASS 1, FIBER REINFORCED, 28 DAY 3000 PSI, WITH LIGHT BROOM FINISH CROSS SLOPE SHALL BE BETWEEN 1.0% MIN AND 2.0% MAX.

6. SIDEWALK SUBGRADE:
   6" THICK COMPACTED TO MIN. 98% MAXIMUM DENSITY PER AASHTO T-180.

7. SIDEWALK WIDTH:
   SIDEWALK WIDTH MUST BE 5'. CONSULTATION SHALL BE MADE WITH CITY STAFF IF DEVELOPER REQUIRES A SIDEWALK WIDTH GREATER THAN 5'.

8. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED.

9. CONCRETE CURBING:
   MODIFIED DROP CURB SHOWN - OTHER FDOT TYPE CURBS ARE ACCEPTABLE. ALL CURBS ARE TO CONFORM TO FDOT DESIGN STANDARDS LATEST EDITION (MINIMUM LONGITUDINAL SLOPE ALONG GUTTER IS 0.36%) - MIAMI CURB MAY BE USED

A. CONSTRUCT 1" A.C. PAVEMENT DURING CONSTRUCTION AND CAP WITH 1" A.C. AT COMPLETION OF PROJECT.
PROFILE VIEW

LEGEND AND NOTES:

1. ROADWAY SURFACE COURSE:
   1-1/2" OF TYPE SP-9.5 ASPHALT CONCRETE TESTED PER FDOT AND/OR BREVARD COUNTY STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

2. STRUCTURAL COURSE:
   2" OF TYPE SP-12.5 ASPHALTIC CONCRETE TESTED PER FDOT AND/OR BREVARD COUNTY STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

3. PRIME/TACK COAT:
   PER FDOT STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 300.

4. ROADWAY BASE:
   10" LIMEROCK, CRUSHED CONCRETE OR CEMENTED COQUINA. MINIMUM LBR 100 COMPACTED TO 98% MAXIMUM DENSITY PER AASHTO T-180.

5. ROADWAY SUBGRADE:
   12" TYPE B, STABILIZED TO MINIMUM LBR 40, COMPACTED TO MINIMUM 98% AASHTO T-180.

6. SHOULDER:
   8" TYPE "B", STABILIZED TO A MINIMUM LBR 40 & COMPACTED TO 98% AASHTO T-180. STRUCTURAL COURSE SHALL BE 2" OF TYPE SP-12.5 ASPHALT CONCRETE.

7. SIDEWALK:
   4" THICK CONCRETE, FDOT CLASS 1, FIBER REINFORCED, 28 DAY 3000 PSI, WITH LIGHT BROOM FINISH CROSS SLOPE SHALL BE BETWEEN 1.0% MIN AND 2.0% MAX.

8. SIDEWALK SUBGRADE:
   6" THICK COMPACTED TO MIN. 98% MAXIMUM DENSITY PER AASHTO T-180.

9. CONCRETE CURBING:
   MODIFIED DROP CURB SHOWN - OTHER FDOT TYPE CURBS ARE ACCEPTABLE. ALL CURBS ARE TO CONFORM TO FDOT DESIGN STANDARDS LATEST EDITION (MINIMUM LONGITUDINAL SLOPE ALONG GUTTER IS 0.36%) - MIAMI CURB MAY BE USED

10. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED.
PROFILE VIEW

NOTE: ADDITION OF A RIGHT TURN LANE WILL REQUIRE AN ADDITIONAL 12 FEET OF RIGHT-OF-WAY

LEGEND AND NOTES:

1. ROADWAY SURFACE COURSE:
   1-1/2" OF TYPE SP-9.5 ASPHALT CONCRETE TESTED PER FDOT AND/OR BREVARD COUNTY
   STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

2. STRUCTURAL COURSE:
   2" OF TYPE SP-12.5 SUPERPAVE MIX, TESTED PER FDOT AND/OR BREVARD COUNTY
   STANDARD REQUIREMENTS. RAP CONTENT SHALL NOT EXCEED 20%

3. PRIME/TACK COAT:
   PER FDOT STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 300.

4. ROADWAY BASE:
   10" LIMEROCK, CRUSHED CONCRETE OR CEMENTED COQUINA, MINIMUM LBR 100
   COMPACTED TO 98% MAXIMUM DENSITY PER AASHTO T-180.

5. ROADWAY SUBGRADE:
   12" TYPE B, STABILIZED TO MINIMUM LBR 40, COMPACTED TO MINIMUM 98% AASHTO T-180.

6. CONCRETE CURB AND GUTTER:
   MODIFIED DROP CURB SHOWN - OTHER FDOT TYPE CURBS ARE ACCEPTABLE. ALL CURBS
   ARE TO CONFORM TO FDOT DESIGN STANDARDS LATEST EDITION (MINIMUM LONGITUDINAL
   SLOPE ALONG GUTTER IS 0.36%).

7. SIDEWALK:
   4" THICK CONCRETE, FDOT CLASS 1, FIBER REINFORCED, 28 DAY 3000 PSI, WITH LIGHT
   BROOM FINISH CROSS SLOPE SHALL BE BETWEEN 1.0% MIN AND 2.0% MAX.

8. SIDEWALK SUBGRADE:
   6" THICK COMPACTED TO MIN. 98% MAXIMUM DENSITY PER AASHTO T-180.

9. ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED.
OPTIONAL LANDSCAPED ISLAND WITH FDOT TYPE "A" CURB OR "D" CURB. LANDSCAPE TRACT TO THE PROPERTY OWNERS ASSOCIATION. (TYPICAL)

NOTES:
1. SLOPE PERIMETER OF PAVEMENT IN CUL-DE-SAC IN APPROPRIATE DIRECTION WITH A SLOPE OF 0.005 FT/FT (0.5%) MINIMUM.
2. DRAIN PAVEMENT TO PERIMETER WITH MINIMUM RATE OF SLOPE OF 0.01 FT/FT (1.0%) TO 0.05 FT/FT (5.0%) MAXIMUM.

PLAN VIEW

CUL-DE-SAC LAYOUT DETAIL
OPTIONAL LANDSCAPED ISLAND WITH FDOT TYPE "A" CURB OR "D" CURB. LANDSCAPE TRACT TO THE PROPERTY OWNERS ASSOCIATION. (TYPICAL)

RIGHT-OF-WAY

HIGH POINT

1% MIN

44' RADIUS

0.5%

0.5%

60' MIN. PAVEMENT

32' RADIUS TO B.C.

2' CONCRETE CURB MINIMUM: TYPE VARIES WITH APPLICATION (TYPICAL)

5' CONCRETE SIDEWALK

25' RADIUS

40' RADIUS

SLOPE: 5.0% MAX

ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE SODDED (TYPICAL)

NOTES:
1. SLOPE PERIMETER OF PAVEMENT IN CUL-DE-SAC IN APPROPRIATE DIRECTION WITH A SLOPE OF 0.005 FT/FT (0.5%) MINIMUM.
2. DRAIN PAVEMENT TO PERIMETER WITH MINIMUM RATE OF SLOPE OF 0.01 FT/FT (1.0%) TO 0.05 FT/FT (5.0%) MAXIMUM.

PLAN VIEW

CUL-DE-SAC LAYOUT DETAIL
NOTES:
1. FOR A HOUSE ON A CORNER LOT, A MINIMUM DISTANCE OF 40' FROM THE INTERSECTION OF THE TWO RIGHT-OF-WAYS LINES MUST BE PROVIDED TO DRIVEWAY EDGE.
2. HORSESHOE DRIVEWAYS ARE ONLY APPROVED FOR 75 FOOT WIDE OR LARGER LOT SIZES.
NOTES:
1. A 6" CONCRETE SIDEWALK AT THE DRIVEWAY. SEE SECTION 'B'
2. REQUIRED OPERATIONAL AND MAINTENANCE AGREEMENT.
3. PAVERS REMOVED BY THE CITY FOR EMERGENCIES OR REPAIRS WITHIN THE RIGHT-OF-WAY ARE THE RESPONSIBILITY OF PROPERTY OWNER OR CITY WILL REPLACE CITY STANDARD CONCRETE IMPROVEMENTS WITHIN THE RIGHT-OF-WAY.

PLAN VIEW

SECTION 'A'

LEGEND:
1. FILL BETWEEN PAVERS WITH SAND AS NEEDED.
2. PAVER BRICK COLOR AND STYLE PER OWNER OR ARCHITECT.
3. 1/2" LIMEROCK OR CRUSHED CONCRETE SCREENINGS FOR BEDDING.
4. 4" THICK CONCRETE, 3000 PSI. CONCRETE EDGING STRIP RECOMMENDED.
5. SUBGRADE: 6" TYPE "B" STABILIZED LBR 40 & COMPACTED TO 98% MAXIMUM DENSITY, AASHTO T-180
6. 6" SIDEWALK AND DRIVEWAY STRUCTURAL SECTION PER DETAIL ST-8

SECTION 'B'
NOTE:
1. A 6" CONCRETE SIDEWALK MAY PASS THROUGH THE DRIVEWAY IN LIEU OF THE BRICK PAVED SIDEWALK.
2. REQUIRED OPERATIONAL AND MAINTENANCE AGREEMENT.
3. PAVERS REMOVED BY THE CITY FOR EMERGENCIES OR REPAIRS WITHIN THE RIGHT-OF-WAY ARE THE RESPONSIBILITY OF PROPERTY OWNER OR CITY WILL REPLACE CITY STANDARD CONCRETE IMPROVEMENTS WITHIN THE RIGHT-OF-WAY.

LEGEND:
1. FILL BETWEEN PAVERS WITH SAND AS NEEDED.
2. PAVER BRICK COLOR AND STYLE PER OWNER OR ARCHITECT.
3. 1/2" LIMEROCK OR CRUSHED CONCRETE SCREENINGS FOR BEDDING.
4. 4" THICK CONCRETE, 3000 PSI.
5. SUBGRADE: 6" TYPE "B" STABILIZED LBR 40 & COMPACTED TO 98% MAXIMUM DENSITY, AASHTO T-180

PRIVATE PAVER DRIVEWAY IN RIGHT OF WAY DETAILS
GENERAL NOTES:
1. CONCRETE PAVEMENT SHALL BE CONSTRUCTED OF 3,000 PSI (28 DAY), CLASS 1 CONCRETE.
2. CONTRACTION JOINTS SHALL BE 1/8" WIDE AND SAW-CUT OR TOOLED.
3. CONSTRUCTION JOINTS ARE REQUIRED WHEN CONSTRUCTING ADJACENT FRESH CONCRETE POURS.
4. EXPANSION JOINTS ARE REQUIRED ALONG ALL OTHER ADJACENT PAVEMENTS, AT EACH SIDE OF STORM INLET STRUCTURES, AND AT ALL RADIUS POINTS.
5. EXPANSION JOINTS SHALL BE 1/2" WIDE, (WITH 1/2" PREMOLDED JOINT MATERIAL), AND SHALL BE FULL DEPTH OF THE PAVEMENT.
6. JOINT MATERIAL SHALL BE IN ACCORDANCE WITH FDOT STANDARD SPECIFICATIONS, SECTION 932, LATEST EDITION.
7. THE SUBGRADE SHALL BE COMPACTED TO 98% MAXIMUM DENSITY PER AASHTO T-180 AND SHALL EXTEND A MINIMUM OF 6" BEYOND EDGE OF PAVEMENT.
8. DRIVEWAYS SHALL BE OF UNIFORM WIDTH FROM THE RIGHT OF WAY LINE TO THE EDGE OF PAVEMENT.
9. COMMERCIAL DRIVEWAYS SHALL HAVE A MINIMUM RADIUS AS FOLLOWS:
   A. 35' STANDARD RADIUS.
   B. 50' MINIMUM RADIUS FOR LARGE TRUCKS (WB 40& WB 50).
10. CONSTRUCT VALLEY GUTTERS PER FDOT 520-001 ACROSS COMMERCIAL DRIVEWAYS WHERE CURB AND GUTTER EXISTS.

ASPHALT DRIVEWAY
TYPICAL SECTION WITHIN CITY RIGHT-OF-WAY
(SEE NOTE BELOW FOR ON-SITE REQUIREMENTS)

NOTE:
FOR ON-SITE COMMERCIAL PAVEMENT THE BASE MAY BE REDUCED TO 6" THICK, THE SUBGRADE MAY BE REDUCED TO 8" AND THE ASPHALT MAY BE REDUCED TO A MINIMUM OF 1-1/2" OF SP-9.5.

CONCRETE DRIVEWAY
ONSITE AND WITHIN CITY RIGHT-OF-WAY CONCRETE PAVEMENT SECTION

Curb and Gutter
FDOT TYPE "F" CURB

REQUIREMENTS FOR COMMERCIAL PARKING AND DRIVEWAYS
PUBLIC STREETS:
2 - STREET NAME BLADES WITH WHITE LETTERING AND BORDER, ON BLUE BACKGROUND WITH 4" MULTI-COLORED SEAL LOGO LOCATED ON RIGHT HAND SIDE.

SIGN SHALL BE MOUNTED ON POST WITH 5/16" Ø STAINLESS STEEL NUTS & BOLTS AND SHALL BE COMPOSED OF A STANDARD METAL MATERIAL WITH WHITE REFLECTIVE LETTERING.

PRIVATE STREETS:
2 - STREET NAME BLADES WITH WHITE LETTERING AND BORDER, ON BLUE BACKGROUND. CITY SEAL LOGO NOT REQUIRED FOR PRIVATE STREETS. SIGNS SHOULD BE MOUNTED ON THE SAME POST TO COMPLY WITH CITY STANDARDS, AS MOST PRIVATE DEVELOPMENTS RELY ON CITY LAW ENFORCEMENT FOR TRAFFIC ENFORCEMENT.

R1-1
30" X 30" HIGH INTENSITY GRADE REFLECTIVE SHEETING MOUNTED ON POST WITH 5/16" Ø STAINLESS STEEL NUTS AND BOLTS

12"-0"x2"x2" HOT DIPPED GALVANIZED SQUARE-CHANNEL POST

PROFILE VIEW
STREET SIGN INSTALLATION DETAIL

TYPICAL STREET Marker
AND ROADWAY SIGNAGE
100% OPAQUE WALLS REFER TO NOTE #1 (TYPICAL)

NOTE:
GATES MAY BE INSTALLED INDEPENDENTLY ON POSTS SET AWAY FROM WALLS IN 12" DIAMETER X 30" DEEP CONCRETE FOOTINGS.

PROFILE VIEW
FRONT ELEVATION

2"x6" P.T. RUB BOARD (TYPICAL)

6" REINFORCED 3,000 PSI (28 DAY) CONCRETE SLAB WITH THICKENED EDGES

INSTALL TWO 3/4" DIA. PVC PIPES 6" LONG IN CONCRETE APPROACH APRON FOR DROP PIPES TO SECURE GATES IN CLOSED POSITION

WALL MOUNTED HINGE BRACKET BOLTED TO END BLOCK TOP & BOTTOM

CONCRETE APRON TO BE THE WIDTH OF DUMPSTER OPENING AND A MINIMUM DEPTH OF 12" AND 6" THICK.

PLAN VIEW

6" DIA. PIPE BOLLARD OR GUARD POST PIPES FILLED WITH CONCRETE AND PAINTED WITH 2 COATS OF YELLOW PAINT

INSTALL A 3/4" DIA. 6" LONG PVC PIPE SET IN 8"x12" CONCRETE FOOTINGS (BOTH SIDES) FOR GATES IN THE OPEN POSITION

60° MIN. 180° MAX.

ALL WELDED SWING GATE

ENVELOPMENT GATE SHALL BE PVC, METAL, WOOD SLATS, 100% OPAQUE OR APPROVED EQUIVALENT

100% OPAQUE WALLS (TYPICAL)

TYPICAL FOOTING & WALL

12" MIN.

60° MIN. 180° MAX.

100% OPAQUE WALLS REFER TO NOTE #1 (TYPICAL)

ALL WELDED SWING GATE

NOTES:
1. ADDITIONAL SCREENING AND VEGETATION MAY BE REQUIRED, REFERENCE PERMIT, PLAT AND DEVELOPMENT AGREEMENTS.
NOTES:

1. MITERED END SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FDOT DESIGN STANDARDS INDEX 430-021, LATEST EDITION.
2. CULVERT SIZES WILL BE DETERMINED BY EITHER THE UPSTREAM AND DOWNSTREAM CULVERT SIZES OR THE CROSS-SECTION OF THE DITCH. THIS INFORMATION MUST BE PROVIDED BY AN ENGINEER OR SURVEYOR LICENSED IN THE STATE OF FLORIDA.
3. STORM DRAIN PIPE JOINTS SHALL BE WRAPPED WITH FILTER FABRIC.
TRENCHING GENERAL NOTES:

1. ALL WORK SHALL COMPLY WITH F.A.C. RULE 62-555.314 FOR PIPELINE SEPARATIONS, REFER TO CITY DETAIL T-5.
2. TRENCHES SHALL BE DEWATERED AND MAINTAINED IN A DRY CONDITION DURING PIPE INSTALLATION AND BACKFILL.
3. WORK SHALL PROCEED WITH THE DEEPESTPIPES CONSTRUCTED FIRST AND GRAVITY PIPES INSTALLED BEFORE PRESSURE PIPES. GRAVITY LINE CONSTRUCTION SHALL START AT THE LOWEST POINT AND PROCEED FROM THERE.
4. WATER SHALL NOT BE PERMITTED IN TRENCH DURING CONSTRUCTION.
5. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF FLOW.
6. REFER TO CHAPTER 58 OF THE LAND DEVELOPMENT REGULATIONS FOR SHEETING AND BRACING.
7. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
8. CONTRACTOR SHALL DEMONSTRATE THAT ALL PIPE IS TRACEABLE.
9. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FLORIDA TRENCH SAFETY ACT.
10. COMPACTION BY FLOODING OR JETTING IS NOT ALLOWED.
NOTES:
1. PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
3. USE OF FDOT TYPE A BEDDING TO BE DETERMINED IN THE FIELD AS REQUIRED BY THE CITY OF WEST MELBOURNE.
4. 15" MAXIMUM FOR PIPE DIAMETER LESS THAN 24" AND 24" MAXIMUM FOR PIPE DIAMETER 24" AND LARGER.
5. WATER SHALL NOT BE PERMITTED IN TRENCH DURING CONSTRUCTION.
6. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF FLOW.
7. REFER TO CHAPTER 58 OF THE LAND DEVELOPMENT REGULATIONS FOR SHEETING AND BRACING.
8. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
9. CONTRACTOR SHALL DEMONSTRATE THAT ALL PIPE IS TRACEABLE.
10. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FLORIDA TRENCH SAFETY ACT.
NOTES:
1. PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
3. PIPE BEDDING UTILIZING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WITH TYPE "A" BEDDING AND TRENCHING DETAIL MAY BE REQUIRED BY THE CITY OF WEST MELBOURNE.
4. 15" MAXIMUM FOR PIPE DIAMETER LESS THAN 24" AND 24" MAXIMUM FOR PIPE DIAMETER 24" AND LARGER.
5. WATER SHALL NOT BE PERMITTED IN TRENCH DURING CONSTRUCTION.
6. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF FLOW.
7. REFER TO CHAPTER 58 OF THE LAND DEVELOPMENT REGULATIONS FOR SHEETING AND BRACING.
8. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
9. CONTRACTOR SHALL DEMONSTRATE THAT ALL PIPE IS TRACEABLE.
10. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FLORIDA TRENCH SAFETY ACT.
NOTE:
1. CONSTRUCT TRENCH PER DETAILS T-1 AND T-2.
2. REFER TO CITY DETAILS T-5, T-6, AND T-7 FOR CROSSING REQUIREMENTS.
3. INSTALLATION REQUIREMENTS BY PIPE TYPE ARE AS FOLLOWS:

   WATER MAIN: METALLIC TAPE MINIMUM OF 12" OVER MAIN LINE.
   LOCATING BALL AT FITTINGS, CORPORATION STOPS AND EVERY 250 FEET,
   12 GAUGE SOLID TRACE WIRE WITH BLUE INSULATION.

   SEWER MAIN: METALLIC TAPE OVER MAINLINE.
   LOCATING BALL AT LATERALS ON MAIN LINE AND AT RIGHT-OF-WAY.
   12 GAUGE SOLID TRACE WIRE WITH GREEN INSULATION.

   RECLAIMED: METALLIC TAPE OVER MAIN LINE.
   LOCATING BALL AT FITTINGS, CORPORATION STOPS, AND EVERY 250 FEET,
   12 GAUGE SOLID TRACE WIRE WITH PURPLE INSULATION.

   STORM DRAIN: WRAP EACH JOINT WITH 24" WIDE FILTER FABRIC CENTERED ON JOINT.

4. CONTRACTOR SHALL DEMONSTRATE THAT ALL PIPE INSTALLED IS TRACEABLE.
5. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FLORIDA TRENCH SAFETY ACT.
PROFILE VIEW

NOTES:

1. PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 95% OF THE MAXIMUM DENSITY AS PER AASHTO T-180.
2. MINIMUM ALLOWABLE BACKFILL DENSITY SHALL BE 98% OF THE MAXIMUM DENSITY AT OPTIMUM MOISTURE PER AASHTO T-180.
3. IN THE EVENT THE REQUIRED MINIMUM DENSITY IS NOT ACHIEVED, LOOSE MATERIAL SHALL BE REMOVED, REPLACED AND COMPACTED TO THE REQUIRED DENSITY, OR REPLACED WITH FULL DEPTH FLOWABLE FILL. DENSITY TESTS BELOW THE SPRING LINE OF THE PIPE ARE REQUIRED IN ADDITION TO OTHER TESTING REQUIREMENTS (IN THE EVENT FULL DEPTH FLOWABLE FILL IS USED BACKFILL, DENSITY REQUIREMENTS ARE WAIVED).
4. FLOWABLE FILL SHALL COMPLY WITH FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
5. THESE ARE MINIMUM REQUIREMENTS. ADDITIONAL RESTRICTIONS MAY BE NECESSARY ON A CASE BY CASE BASIS, AS APPROVED BY THE CITY.
6. CONTRACTOR SHALL EXCAVATE BOTTOM OF TRENCH TO ALLOW FOR BELL SECTION OF PIPE.
7. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.
8. CONTRACTOR SHALL DEMONSTRATE THAT ALL PIPE IS TRACEABLE PER CITY DETAIL T-3.
9. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FLORIDA TRENCH SAFETY ACT.
## Location of Public Water System Mains in Accordance with F.A.C. Rule 62-555.314

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<tbody>
<tr>
<td>Storm Sewer, Stormwater Force Main, Reclaimed Water (2)</td>
<td>3 ft. minimum</td>
<td>12 inches is the minimum, except for storm sewer, then 6 inches is the minimum and 12 inches is preferred</td>
<td>Alternate 3 ft. minimum</td>
</tr>
<tr>
<td>Vacuum Sanitary Sewer</td>
<td>10 ft. preferred</td>
<td>12 inches preferred</td>
<td>Alternate 3 ft. minimum</td>
</tr>
<tr>
<td>Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)</td>
<td>6 ft. minimum (3)</td>
<td>12 inches is the minimum, except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred</td>
<td>Alternate 6 ft. minimum</td>
</tr>
<tr>
<td>On-Site Sewage Treatment &amp; Disposal System</td>
<td>10 ft. minimum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.

(2) Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.

(3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.

(4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

Disclaimer: This document is provided for your convenience only. Please refer to F.A.C. Rule 62-555.314 for additional construction requirements.
PROFILE VIEW

ALL WATER MAIN JOINTS MECHANICALLY RESTRAINED USING "MEGA LUGS" OR CITY APPROVED EQUAL

- DIP WATER MAIN TREATMENT: LINING SHALL BE CEMENT, AND COATING SHALL BE POLYETHYLENE ENCASEMENT
- DIP SEWER FORCEMAIN TREATMENT: LINING SHALL BE P-401 CERAMIC EPOXY WITH QUARTZ PIGMENT, AND COATING SHALL BE POLYETHYLENE ENCASEMENT
- UNDERGROUND VERTICAL DEFLECTION SHALL BE MECHANICAL JOINT DIP
- ABOVE GROUND VERTICAL DEFLECTION SHALL BE FLANGED DIP
- NEW CONSTRUCTION ADJUST STORM DRAIN BELOW WATER AND FORCEMAIN

ARV OR BLOW OFF MAY BE REQUIRED AS DETERMINED BY CITY ENGR.
SECTION "A"

CONCRETE SUPPORT CRADLE WILL BE USED IN ALL CASES WHERE PROPOSED PIPE OVERLAY IS WITHIN 18" OF EXISTING WATER / SEWER MAIN.

PROFILE VIEW

VARIANCE REQUIRES INSPECTOR PRE-APPROVAL
PLAN VIEW

1. CONTRACTOR SHALL LOCATE THE PROPOSED SIDEWALK LOCATION WHERE THE PROPOSED SIDEWALK CROSSES THE LOT LINE PRIOR TO INSTALLING WATER AND SANITARY SEWER SERVICES TO ENSURE THAT ALL SERVICES ARE TERMINATED AT MIN 12" BEYOND THE PROPOSED SIDEWALK.

2. THE MAXIMUM SEWER SERVICE TERMINATION POINT MUST BE AT THE RIGHT-OF-WAY LINE.

3. WATER SERVICES SHALL BE CAPPED AND TERMINATED BETWEEN 8"-12" BELOW GRADE, AND TERMINUS MARKED CLEARLY ABOVE GRADE.

4. SET METER BOX AT PROPERTY LINE WITHIN UTILITY EASEMENT AND MIN 12" FROM SIDEWALK. IF THERE IS NO UTILITY EASEMENT LOCATE METER BOX WITHIN RIGHT-OF-WAY.
MOUND CONCRETE AT TOP

6" Ø SCH. 40 STEEL PIPE FILLED WITH CONCRETE PAINTED WITH TWO PART EPOXY COLOR YELLOW.

MIN. 3000 PSI CONCRETE FOUNDATION AND WITHIN PIPE.

24" 36" 40"

PROFILE VIEW
SANITARY SEWER GENERAL NOTES:

1. ALL HARDWARE, MISCELLANEOUS METAL PARTS AND THE LIKE SHALL BE TYPE 304 STAINLESS STEEL.
2. GRAVITY SEWER LINES SHALL BE PVC SDR 35, HDPE DR 17, OR DUCTILE IRON PRESSURE CLASS 200, LINED WITH P-401 CERAMIC EPOXY WITH QUARTZ PIGMENT AND POLYETHYLENE ENCASEMENT.
3. MANHOLES, GREASE INTERCEPTORS AND CONCRETE WASTEWATER STRUCTURES SHALL BE LINED AND COATED WITH RAVEN 405 OR COAL TAR EPOXY.
4. SEWER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY TRENCH DETAILS T-1 THROUGH T-7.
5. GRAVITY SEWER MAINS SHALL BE 8" MINIMUM AND TERMINATE IN A MANHOLE. MANHOLES SHALL BE LOCATED IN GRASS AREAS, MIDDLE OF STREET OR CENTERED IN A DRIVE LANE. ALL LATERALS SHALL TERMINATE IN A SEWER MAIN AND SHALL BE AT LEAST 5' FROM THE NEAREST MANHOLE.
6. MANHOLES DEEPER THAN 12', DROP MANHOLES OR MANHOLES SERVICING PIPE 36" AND LARGER SHALL BE 72" DIAMETER WITH ECCENTRIC CONE WITH 30" OPENING, FRAME, AND COVER SHALL HAVE 20" AND 30" CLEAR OPENINGS.
7. MINIMUM SLOPES FOR GRAVITY SEWER SHALL BE 0.40% WITH THE HIGHEST RUN NOT LESS THAN 0.44%.
8. NO OUTSIDE DRAINS (FLOOR, YARD OR PATIO DRAINS) SHALL BE CONNECTED TO THE SANITARY SEWER SYSTEM.
9. ALL VAULTS, WET WELLS, GREASE TRAPS AND MANHOLES TWO COATS OF COAL TAR EPOXY.

ALL MATERIALS FOR PUBLIC AND PRIVATE SEWER SYSTEM INSTALLATION SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO INSTALLATION. PROVIDE 48 HOUR NOTICE TO THE CITY TO SCHEDULE INSPECTIONS OF MATERIAL AND INSTALLATIONS.

CONSTRUCTION HOLD POINTs FOR CITY INSPECTION:

1. OBSERVE CONNECTIONS TO, AND REMOVAL/ABANDONMENT OF EXISTING SEWER MAIN SYSTEM.
2. REVIEW CONTRACTOR'S PROPOSAL FOR MAINTAINING SANITARY FLOW OF SEWAGE DURING CONSTRUCTION.
3. OBSERVE CONSTRUCTION OF MANHOLE BASE INCLUDING PIPE STUB(S), WATERSTOP(S), AND FLEXIBLE COUPLING(S).
4. INTERMITTENTLY OBSERVE CONSTRUCTION OF PIPING.
5. WITNESS VIDEO INSPECTION.
NOTES:
1. LATERAL STUB OUTS, BOTH SINGLE & DOUBLE SHALL BE LOCATED WITHIN 12" OF PROPERTY LINE / RIGHT-OF-WAY LINE JUNCTION.
2. INVERT SERVICE LATERAL SHALL NOT ENTER SEWER MAIN BELOW SPRING LINE.
3. ALL LATERAL STUB OUTS TO HAVE 30" MINIMUM & 42" MAXIMUM OF COVER AT LOT LINE. THIS COVER IS TO BE MEASURED FROM THE FINISHED GRADE OF THE LOT.
4. ENGINEER OF RECORD MUST ENSURE THAT DEPTHS ARE ADEQUATE TO PROVIDE A 1.0% SLOPE FOR HOUSE SEWER TO RIGHT-OF-WAY LINE.
5. WATER MAINS AND FORCE MAINS ARE TO BE INSTALLED SO AS TO MAINTAIN 18" VERTICAL SEPARATION WITH LATERAL.
NOTES:
1. LATERAL STUB OUTS, BOTH SINGLE & DOUBLE SHALL BE LOCATED WITHIN 12" OF PROPERTY LINE / RIGHT-OF-WAY LINE JUNCTION.
2. INVERT SERVICE LATERAL SHALL NOT ENTER SEWER MAIN BELOW SPRING LINE.
3. ALL LATERAL STUB OUTS TO HAVE 30" MINIMUM & 42" MAXIMUM OF COVER AT LOT LINE. THIS COVER IS TO BE MEASURED FROM THE FINISHED GRADE OF THE LOT.
4. ENGINEER OF RECORD MUST ENSURE THAT DEPTHS ARE ADEQUATE TO PROVIDE A 1.0% SLOPE FOR HOUSE SEWER TO RIGHT-OF-WAY LINE.
5. WATER MAINS AND FORCE MAINS ARE TO BE INSTALLED SO AS TO MAINTAIN 18" VERTICAL SEPARATION WITH LATERAL.
FLOW

UNPAVED AREAS  PAVED AREAS

COVER MARKED "S"
CENTERLINE RISER PIPE
MATCH EXISTING FINISHED SURFACE

2" ASPHALT
ROADWAY BASE
CONCRETE ALL AROUND 12"
DEEP MINIMUM WITH #4 REBAR @ 6" OCEW (TYPICAL)

GRADE

12" MIN.
30" MIN.
24" MIN.
24" MIN.
4" 45° P.V.C. BEND
6" x 4" 45° P.V.C. WYE

CAST IRON VALVE BOX AND LID

PVC CAP AT TERMINUS

6" P.V.C. MINIMUM

PROFILE VIEW

NOTES:
1. SEWER CLEANOUTS IN TRAFFIC AREAS SHALL BE TRAFFIC RATED.
**NOTES:**

1. **DROP CONNECTIONS ARE REQUIRED WHENEVER INVERT OR INFLENT SEWER IS 24" OR MORE ABOVE THE INVERT OF THE MANHOLE, SEE MANHOLE CONNECTION CITY DETAIL S-4.**
2. **APPROVED CONCENTRIC CONE DESIGN MAY BE USED AS AN ALTERNATIVE, WITH WRITTEN PRE-APPROVAL.**
3. **ALL MANHOLES AND COVERS SHALL BE CONSTRUCTED FOR H-20 LOADING TRAFFIC BEARING ACCORDING TO AASHTO.**
4. **MANHOLE COVERS >24" DIAMETER SHALL BE CONSTRUCTED OF TWO CONCENTRIC COVERS, REFER TO CITY DETAIL S-5B.**
5. **MANHOLES SHALL BE LINED AND COATED INTERIOR AND EXTERIOR WITH COAL TAR EPOXY PER SPECIFICATIONS.**
6. **MANHOLE INTERIOR SHALL BE LINED WITH HDPE OR FIBERGLASS FOR MANHOLES WITH FORCEMAIN INFLENT MAINS.**
7. **BENCHING AND TROUGHS SHALL BE SMOOTH AND PROPERLY COATED.**
NOTES:

1. DROP PIPE AND FITTINGS SHALL BE OF SAME SIZE AND MATERIAL AS THE INFUENT SEWER.
2. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL SEWER INFUENT PIPES WHICH HAVE AN INVERT 2' OR MORE ABOVE THE MANHOLE INVERT.
3. THE CITY MAY APPROVE ALTERNATE WATER TIGHT CONNECTION DETAILS FOR PIPES OF 24" DIAMETER OR LARGER.
4. FOR NEW CONSTRUCTION DROP MANHOLE MAY BE PRECAST IF APPROVED IN ADVANCE OF CONSTRUCTION.
RAISED 1-1/2" LETTERS
FLUSH WITH TOP OF COVER

2 - NON PENETRATING
PICK HOLES

PLAN VIEW

COVER

RING

PROFILE VIEW

NOTES:
1. MANHOLE RING AND COVER TO HAVE A MIN. 24" CLEAR OPENING AND "O" RING TYPE SEAL, MANUFACTURED AT THE FOUNDRY.
2. MANHOLE RING AND COVER TO BE U.S. FOUNDRY AND MANUFACTURING Co. MODEL #225-AS-ORS OR APPROVED EQUAL.
3. MANHOLE COVERS MUST BE STAMPED "WEST MELBOURNE" FOR PUBLIC SYSTEM.
4. PRIVATE SEWER MUST BE STAMPED "PRIVATE".

STANDARD 4' MANHOLE
RING AND COVER
NOTES:
1. MANHOLE RING AND DOUBLE COVER TO HAVE A MIN. 30" CLEAR OPENING AND "O" RING TYPE SEAL, MANUFACTURED AT THE FOUNDRY.
2. MANHOLE RING AND COVER TO BE U.S. FOUNDRY AND MANUFACTURING Co. MODEL #230-AB-M OR APPROVED EQUAL.
3. MANHOLE COVERS MUST BE STAMPED "WEST MELBOURNE" FOR PUBLIC SYSTEM.
4. PRIVATE SEWER MUST BE STAMPED "PRIVATE".
STANDARD PRECAST STRUCTURE WALL JOINT CONNECTION

PARTIAL PROFILE VIEW

NOTES:
1. ALL MANHOLES SHALL BE CONSTRUCTED FOR H-20 LOADING TRAFFIC BEARING ACCORDING TO AASHTO.
2. MANHOLE COVERS >24" DIAMETER SHALL BE CONSTRUCTED OF TWO CONCENTRIC COVERS, REFER TO CITY DETAIL S-5B.
3. MANHOLES SHALL BE LINED AND COATED INTERIOR AND EXTERIOR WITH COAL TAR EPOXY PER SPECIFICATIONS.
4. MANHOLE INTERIORS SHALL BE LINED WITH HDPE OR FIBERGLASS FOR MANHOLES WITH FORCEMAIN INFLUENT MAINS.
NOTES:
1. ALL INTERCEPTORS TO BE CONSTRUCTED AND REINFORCED TO MEET H-20 LOADING.
2. DESIGN VOLUME AS REQUIRED, 750 GALLON MINIMUM, 1,250 GALLON MAXIMUM.
3. APPLY TWO COATS OF COAL TAR EPOXY INSIDE AND OUTSIDE OF INTERCEPTORS, WITH FIRST COAT COLOR RED AND SECOND COAT COLOR BLACK.
4. ALL GREASE TRAPS SHALL BE REGISTERED ONLINE THROUGH THE CITY’S FATS, OILS AND GREASE PROGRAM.
5. CLEANOUTS ARE REQUIRED ON BOTH IN-FLOW AND OUT-FLOW LINES WITHIN MAXIMUM 5' OF INTERCEPTOR
6. MANHOLE COVERS SHALL BE RAISED WITH CONCRETE GRADE RINGS.
WASTEWATER PUMP STATION NOTES

1. All hardware, miscellaneous metal parts and the like shall be type 304 stainless steel.
2. Provide one pipe support at the 90 degree bend at the top of the wet well. Provide intermediate supports if the unsupported pipe length between pump base and the upper support, or between supports exceeds 8’. Pipe supports shall be stainless steel.
3. Lift station site shall be graded so that water drains away from the lift station and valve vault.
4. Top of lift station shall be minimum of 1’ above 100 year flood elevation, and/or minimum of 18” above crown of road which ever is higher.
5. Concrete wet well, 6’ minimum diameter, shall be lined and coated with with city approved HDPE or fiberglass liner.
6. HDPE pipe for wet well discharge pipe through valve vault, joints shall be welded except when mechanical joints are used for plug valves, check valves, and the like.
7. Note on drawings that contractor will supply (7) seven master locks keyed to match city locks.
8. Pump motor leads and float leads shall be installed in separate conduits.
9. Bee’s wax shall be applied to the threads of the plugs on the conduit seal offs. The plugs will be shown to be removable prior to acceptance of the lift station by the city of West Melbourne.
10. Water meter and RPZ backflow Preventer for pump station service shall be above ground installation only.
11. During wet well installation, the city must witness and accept the dewatered excavation, rock placement and stabilized, wet well base placed and plumb, and elevation confirmed.
12. Site around the installation is to be graded to drain away from lift station facility.
13. Contractor shall deliver spare pump prior to final walk through.
WASTEWATER PUMP STATION CONSTRUCTION NOTES

1. ALL PENETRATIONS THROUGH LIFT STATION WALLS SHALL BE WATER AND GAS TIGHT, SEALED WITH A MATERIAL COMPATIBLE TO NON-SHRINK GROUT, SUCH AS EMECO OR AN APPROVED EQUIVALENT. GROUTING SHALL BE APPLIED TO INTERIOR AND EXTERIOR LINERS.

2. ELASTOMERIC JOINT SEALING BASE COMPOUND SHALL BE RAM-NEK OR CITY APPROVED EQUAL. JOINT SEALING SHALL BE WATER TIGHT AND INSTALLED ACCORDING TO ACCEPTABLE INDUSTRY STANDARDS.

3. ANCHOR BOLTS SHALL BE TYPE 304 STAINLESS "J" BOLTS SET 6" INTO CONCRETE. "J" BOLTS SHALL BE HOOKED UNDER REINFORCING STEEL. A 6" LAYER OF CONCRETE SHALL BE Poured AFTER THE CENTER LINE OF THE ACCESS COVER IS DETERMINED. CONTRACTOR SHALL SET ANCHOR BOLT LOCATIONS 13" OFF CENTER LINE OF ACCESS COVER. BASE SHALL BE GROUTED AT 1:1 SLOPE. SUMP SHALL BE SHAPED PER MANUFACTURER'S REQUIREMENTS.

4. MINIMUM CONCRETE THICKNESS FOR 6" DIAMETER LIFT STATIONS SHALL BE 8" FOR WALL, 12" FOR BASE, AND 10" FOR TOP SLAB. MINIMUM CONCRETE THICKNESS FOR 8" DIAMETER LIFT STATIONS SHALL BE 9" FOR WALL, 12" FOR BASE, AND 10" FOR TOP SLAB. MINIMUM CONCRETE THICKNESS FOR 10" DIAMETER LIFT STATIONS SHALL BE 10" FOR WALL, 15" FOR BASE, AND 12" FOR TOP SLAB. THICKER BOTTOM SLABS MAY BE REQUIRED FOR BUOYANCY.

5. DOORS ON WET WELL AND VALVE VAULTS SHALL BE GROUNDED WITH A COPPER GROUND ROD 25 OHMS OR LESS AND CONNECTION TO BE #4 BARE SOLID WIRE COPPER GROUND.

6. AGRU Sure Grip and HDPE LINERS SHALL BE INSTALLED TO THE UNDERSIDE OF TOP SLAB AND INTERIOR WALLS, RESPECTIVELY.

7. ANY INCOMING FORCE MAINS ARE TO HAVE HOPE PIPE INSTALLED AS A DROP WITH THE FLOW TO BE CHANNELED AWAY FROM PUMPS. LINE IS TO HAVE STAINLESS STEEL PIPE RESTRAINTS HOLDING LINE BACK.

8. EACH FOUNDATION PLATE FOR EACH PUMP SHALL BE RIGIDLY AND ACCURATELY ANCHORED INTO POSITION. ALL NECESSARY FOUNDATION BOLTS, PLATES, AND WASHERS SHALL BE FURNISHED BY THE PUMP MANUFACTURER FOR INSTALLATION BY THE DEVELOPER.

9. DISCHARGE PIPING SHALL BE H.D.P.E., DR11 BUTT FUSION WELDED WITH A FLANGED CONNECTION TO THE PUMP DISCHARGE AND VALVE VAULT. PROVIDE STAINLESS STEEL PIPE SUPPORTS WITHIN WET WELL. DISCHARGE PIPING SHALL HAVE A STAINLESS STEEL PIPE SUPPORT AS THE 90° ELBOW AND ADDITIONAL SUPPORTS SO THAT NO MORE THAN 8’ OF PIPE IS UNSUPPORTED.

10. ALL METAL COMPONENTS IN THE WET WELL SHALL BE 304 OR 316 STAINLESS STEEL. ALUMINUM FRAMES IN CONTACT WITH THE CONCRETE SHALL BE COATED WITH COAL TAR BITCHUMASTIC.

11. ALL DUCTILE IRON PIPE SHALL BE LINED WITH P-401 CERAMIC EPOXY WITH QUARTZ PIGMENT, AND ENCASED WITH POLYETHYLENE FILM PER ASTM A674 FOR UNDERGROUND INSTALLATIONS. DIP THAT IS NOT BURIED SHALL BE EPOXY COATED.

12. A LIFT STATION SHALL ONLY HAVE ONE INFLUENT LINE. IF MULTIPLE LINES ARE REQUIRED THEY SHALL BE TERMINATED IN A MANHOLE WITH A SINGLE PIPE GOING TO THE LIFT STATION.

13. WET WELL BALLAST SHALL BE DESIGNED BY THE ENGINEER WITH MINIMUM SAFETY FACTOR OF 1.10 ASSUMING WATER AT TOP OF EMPTY WELL AND SATURATED SOIL VERTICALLY ABOVE THE BASE EXTENSION.
WASTEWATER PUMP STATION AND VALVE VAULT

REFER TO CITY DETAIL LS-1 FOR NOTES

FLOW

WET WELL

ACCESS COVER

VALVE VAULT

PLAN VIEW

VALVE VAULT (REFER TO CITY DETAIL LS-1B)

CONTROL PANEL

SEAL CONDUIT INLET BETWEEN J-BOX AND PANEL WITH CHICO EXPLOSION PROOF CONDUIT SEALS

JUNCTION BOX

GRADE

6" ROCK SURFACE WITH WEED CONTROL FABRIC REFER TO CITY DETAIL LS-1C

WASTEWATER INFLUENT MAIN (FORCemain ONLY)

HIGH WATER ALARM MIN. 6" BELOW INFLUENT INVERT. 6" BETWEEN CONTROL FLOATS MIN. FLOATS MODEL 3900 MERCURY SWITCH LEVEL CONTROL LIQUID LEVEL (BOTH PUMPS OFF)

MIN. 6" COVER OVER PUMP TOPS

6" MIN. DIAMETER WET WELL

304 STAINLESS STEEL UPPER GUIDE BRACKETS

3" DIA. WATERTIGHT SLEEVE

STAINLESS STEEL HOOK FOR LIFT CABLE

STAINLESS STEEL CABLE HOLDER

TOP ELEVATION SHALL BE 12" ABOVE THE 100 YEAR FLOOD ELEVATION.

FORCemain DISCHARGE ELEVATION Varies

2" PVC VAULT DRAIN PIPE WITH TRAP

2) 4" MIN. H.D.P.E. DISCHARGE PIPE WITH STAINLESS STEEL PIPE STAND-OFF STRAPPING, PIPE SUPPORT AT 90° BEND, AND EVERY 8 FEET.

2) STAINLESS STEEL LIFTING BAILS

GROUT FILLETS PER PUMP MANUFACTURE.

ELEVATIONS:

WET WELL/VALUT TOP:
100 YEAR FLOOD ELEV:
ROAD CROWN ELEV:
FORCemain INVERT:
INFLUENT INVERT:
HIGH WATER ALARM:
BOTH PUMPS ON:
LEAD PUMP ON:
BOTH PUMPS OFF:
TOP OF MOTOR:
WET WELL FLOOR ELEV:

PROFILE VIEW

GROUT FILLET SLOPE TO DRAIN

FLOOR

VALVE VAULT (REFER TO CITY DETAIL LS-1B)

30" MIN.

PLUG VALVE

30" MIN.
PROFILE VIEW

REFER TO CITY DETAIL LS-1 FOR NOTES

WASTEWATER PUMP STATION WET WELL

PRECAST CONCRETE TOP LID #4 REBAR @4" OCEW

FLOW

WET WELL

VALVE VAULT

PRECAST CONCRETE BASE WITH #6 REBAR @12" OCEW DOUBLE MAT

UNDISTURBED DEWATERED EARTH

NOTE #3

CONCRETE GROUT - LEVEL BASE

NOTE #4

#57 STONE COMPACTED

6"

18" MIN.

NOTE #1

LAG PUMP START FLOAT

VARIABLES

WASTEWATER INFLUENT PIPE (FORCEMAIN ONLY)

NOTE #1

STAINLESS STEEL PIPE STAND-OFF STRAPPING

LEAD PUMP START FLOAT

ALL OFF LOW WATER FLOAT

NOTE #2

SLOPE 1:1

NOTE #6

2) STAINLESS STEEL PIPE STAND-OFF STRAPPING (TWIN PUMPS)

NOTE #13

BALLAST NOT SHOWN

NOTE #1

REFER TO CITY DETAIL LS-8

2) 3/8" STAINLESS STEEL LIFTING CHAIN (TWIN PUMPS)

NOTE #1

2) 4" Ø MIN. EFFLUENT PIPES NOTE #1

NOTE #9

1) 2" Ø PVC DRAIN PIPE FROM VALVE VAULT INTO WET WELL: SLOPE 1/8" PER FOOT. NOTE #1

REV:

DWG. NO.

06/2020

2020

LS-1B
NOTES:
1. 1/4 TURN FULL FLOW PLUG VALVES
2. SUPPORTS FOR VALVES SHALL BE STAINLESS STEEL
3. ALL PENETRATIONS THROUGH VALVE VAULT WALLS SHALL BE WATER AND GAS TIGHT SEALED WITH A MATERIAL COMPATIBLE TO NON-SHRINK GROUT, SUCH AS EMECO OR AN APPROVED EQUIVALENT. GROUTING SHALL BE APPLIED TO INTERIOR AND EXTERIOR LINERS.
4. VAULTS SHALL BE SIZED TO ACCOMMODATE MINIMUM CLEARANCES.
5. ALL DUCTILE IRON PIPING SHALL BE PAINTED WITH TWO COATS OF EP214 EPOXYMastic TYPE 315.

REFER TO CITY DETAIL LS-1 FOR NOTES

WASTEWATER PUMP STATION VALVE VAULT

DRAWN: ELF
DATE: 06/2020
SCALE: NONE
REV: 2020
DWG. NO. LS-1C
WASTEWATER PUMP STATION SITE PLAN

NOTES:
1. GRADE SHALL SLOPE AWAY FROM WET WELL AND VALVE VAULT.
2. ADDITIONAL SCREENING AND VEGETATION MAY BE REQUIRED, REFERENCE PERMITS, PLATS AND DEVELOPMENT AGREEMENTS.
3. MAINTAIN POSITIVE DRAINAGE AWAY FROM LIFT STATION.
GRADER

BOTTOM OF EXCAVATION SHALL BE DRY FOR WET WELL CONSTRUCTION

OPTION No. 1

12" OF SUBGRADE MECHANICALLY COMPACTED TO 98% OF AASHTO T-180 DENSITY.

OPTION No. 2

SHEETING AND SHORING AS REQUIRED (TYPICAL)

12" MIN.

24" DEEP No. 57 STONE PLACED LEVELED AND MECHANICALLY SET.

3'-0" MIN.

UNDISTURBED MATERIAL

DEWATER A MINIMUM OF 3'-0" BELOW BOTTOM OF EXCAVATION.

PROFILE VIEW

NOTES:

1. CONTRACTOR SHALL PROVIDE CITY WITH 48 HOURS NOTICE PRIOR TO INSTALLING WET WELL.
2. CITY SHALL WITNESS DRY EXCAVATION, COMPACTION OR STONE PLACEMENT, AND WET WELL BOTTOM SET.
3. CONTRACTOR SHALL SHOW THAT THE BOTTOM IS SET LEVEL AND CONFIRM THAT THE WET WELL BOTTOM IS SET TO PROPER ELEVATION, BEFORE STARTING TO BACKFILL.
4. COMPACT SOIL AROUND WET WELL IN MAXIMUM 12" LIFTS TO 98% OF AASHTO T-180 DENSITY.
5. PROVIDE ALL COMPACTION TEST RESULTS TO CITY.
**NOTES:**

1. ENGINEER IS TO SUBMIT A DETAILED DRAWING SHOWING LOCATIONS OF ALL APPURTEANCES SPECIFIC TO EACH PROJECT TO SCALE, ORIENTATION OF ACCESS DRIVE AND APPURTEANCES MAY VARY FROM THAT INDICATED ON THIS DRAWING.
2. LIFT STATION SITE SHALL BE GRADED TO DIRECT STORMWATER RUN-OFF AWAY FROM THE STRUCTURES AND ELECTRICAL EQUIPMENT. GRADES SHALL BE SHOWN ON DRAWINGS.
3. THE ENTIRE LIFT STATION SITE ENCLOSURE SHALL BE COVERED WITH A 6" THICKNESS OF 3/4" TO 1" DIAMETER BEDDING ROCK OVER WEED CONTROL FABRIC.
4. DRIVEWAY SHALL BE INSTALLED TO WITHIN 6" (6 INCHES) OF WETWELL.
5. 6'-0" (SIX FOOT) TALL OPAQUE FENCE WITH DOUBLE LEAF GATE MUST BE CONSTRUCTED AROUND PERIMETER OF LIFT STATION.

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**PLAN VIEW**

<table>
<thead>
<tr>
<th>L.S. MIN AREA</th>
<th>WET WELL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>30' x 30'</td>
<td>6' I.D.</td>
</tr>
<tr>
<td>40' x 40'</td>
<td>8' I.D.</td>
</tr>
<tr>
<td>50' x 50'</td>
<td>10' I.D.</td>
</tr>
<tr>
<td>AS REQ'D</td>
<td>≥12' I.D.</td>
</tr>
</tbody>
</table>
NOTES:
1. CONDUIT AND SEAL-OFF SIZES DETERMINED BY SERVICE AND PUMP RATING.
2. GRC, PVC COATED OR ALUMINUM RIGID CONDUIT 18".
3. CONDUIT CONNECTED TO WET WELL MUST BE RIGID IF LOCATED LESS THAN 24" BELOW GRADE. PVC CONDUIT CAN ONLY BE USED AT DEPTHS GREATER THAN 24" BELOW GRADE.
4. FIELD DRILL MOUNTING AND WIRE HOLES, SEAL WATERTIGHT AFTER INSTALLATION.

SERVICE PEDESTAL
CONTROL PANEL
NOTES:
1. CONDUIT AND SEAL-OFF SIZES DETERMINED BY SERVICE AND PUMP RATING.
2. GRC, PVC COATED OR ALUMINUM RIGID CONDUIT 18".
3. CONDUIT CONNECTED TO WET WELL MUST BE RIGID IF LOCATED LESS THAN 24" BELOW GRADE. PVC CONDUIT CAN ONLY BE USED AT DEPTHS GREATER THAN 24" BELOW GRADE.
4. FIELD DRILL MOUNTING AND WIRE HOLES, SEAL WATERTIGHT AFTER INSTALLATION.

PLAN VIEW

UTILITY COMPANY ELECTRICAL METER INSTALLED 3'-0" MIN. HEIGHT ABOVE SLAB (CONTRACTOR LOCATE)

SWITCH DISCONNECT

ALARM LIGHT

LIGHTNING ARRESTER, FIELD MOUNTED BY ELECTRICIAN

3/4" HOSE BIB

3/4" GALV. RISER

SLEEVE REQUIRED AT ALL PENETRATIONS (TYPICAL)

J2-BOX

GROUND ROD

GROUND ROD

POST SET IN 12" DIAMETER CONCRETE (NOT SHOWN) TYPICAL

TO SERVICE LOCATION (VERIFY W/POWER CO.)

REAR PROFILE VIEW

SERVICE PEDESTAL CONTROL PANEL
FLOW

SADDLE TO BE ATTACHED AT THE 10 OR 2 O’CLOCK POSITION

45°

TYPE "K" COPPER PIPE OR CTS POLLY

CORPORATION COMPRESSION TYPE CONNECTION OUTLET

DOUBLE STRAPPED BRONZE TAPPING SADDLE FOR D.I.P. AND P.V.C MAINS. CLAM SHELL FOR CLASS PIPE

NOTE:
- LONG SIDE SERVICES REQUIRE COPPER OR CTS POLLY SERVICE LINE TO BE INSTALLED THROUGH A POLYTUBE CASING INSTALLED UNDER THE ROAD

METER TO BE FURNISHED AND INSTALLED BY CITY

CITY INSTALLED METER

ANGLE VALVE

VALVE

BACKFLOW PREVENTER ASSEMBLY

BRASS BALL VALVE (TYP)

3/4" HOSE BIB

12" MIN. 30" MAX.

5 1/2" MIN.

ALL PIPING TO BE SLEEVED BETWEEN PIPE AND CONCRETE (TYPICAL)

#4@6" O.C.E.W

3/4" TO SERVICE PEDESTAL

FLOW

GRADE

CONCRETE PAD SHALL BE A MINIMUM OF 2 FEET WIDE AND CENTERED ON PIPING

PROFILE VIEW

NOTES:
1. TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY THE CITY OF WEST MELBOURNE WATER AND SEWER ADMINISTRATOR.
2. BACKFLOW PREVENTER AND ASSOCIATED PIPING TO BE TESTED BEFORE BEING TURNED OVER TO CITY FOR MAINTENANCE. COPY OF TEST TO BE SUBMITTED TO CITY OF WEST MELBOURNE.
3. ALL PIPING AND FITTINGS SHALL BE SWEATED COPPER OR THREADED BRASS FROM TAP TO PEDESTAL.
4. CONCRETE PAD SHALL BE A MINIMUM OF 2 FEET WIDE AND CENTERED ON PIPING. ALL PIPING SHALL BE SLEEVED BETWEEN PIPE AND CONCRETE.
5. BACKFLOW PREVENTER, PIPING AND HOSE BIB SHALL BE PAINTED BLUE.

ASSEMBLY TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!
NOTES:
1. ALL PIPING AND FITTINGS SHALL BE DUCTILE IRON WITH P-140 CERAMIC EPOXY WITH QUARTZ PIGMENT.
PLAN VIEW

NOTE:
1. AGRU SURE GRIP LINER REQUIRED.
2. VENT OPENING SHALL BE CENTERED ON THE BACK SIDE OF THE LID TO ALLOW FOR MAXIMUM OPENING SPACE.
3. ALL WET WELLS AND VAULTS SHALL BE CONSTRUCTION FOR H-20 TRAFFIC LOAD BEARING PER AASHTO.
PLAN VIEW

NOTE:
1. AGRU SURE GRIP LINER REQUIRED.
2. VENT OPENING SHALL BE CENTERED ON THE BACK SIDE OF THE LID TO ALLOW FOR MAXIMUM OPENING SPACE.
3. ALL WET WELLS AND VAULTS SHALL BE CONSTRUCTION FOR H-20 TRAFFIC LOAD BEARING PER AASHTO.
PARTIAL PROFILE VIEW

NOTES:

1. ALL WET WELLS, MANHOLES, GREASE TRAPS, AND VAULTS SHALL BE CONSTRUCTED TO MEET H-20 TRAFFIC LOAD BEARING PER AASHTO.
NOTES:
1. MAIN DISCONNECT IN NEMA 3R STAINLESS STEEL ENCLOSURE WITH LIGHTNING ARRESTER.
   OUTSIDE HANDLE SHALL BE LOCKABLE IN "ON" POSITION.
2. CROUSE-HINDS AR1048-S22 AJA (100AMP) OR AR2048-S22 AJA (200AMP) EMERGENCY GENERATOR RECEPTACLE. (NOT SHOWN)
3. STAINLESS STEEL RAINSHIELD.
4. EMERGENCY GENERATOR RECEPTACLE.
5. 3000 PSI 12" DIAMETER x 3'0" DEEP MINIMUM CONCRETE SHALL BE PLACED AGAINST UNDISTURBED SOIL.
6. POCKET FOR CLIPBOARD.
7. MINIMUM SIZE 30" X 30" X 10" CONTROL PANEL
8. MOUNTING HARDWARE SHALL BE TYPE 316 STAINLESS STEEL OR BETTER.
9. TELEMETRY UNIT BY DATA FLOW.
**PARTIAL PROFILE VIEW**

- **TYPICAL WASTEWATER PUMP STATION**
- **CONTROL PANEL (480V, 3Ø)**

- **Note:** These items are replaced with an external-mounted 7.5kVA XFRD for stations with gensets and (2) 1P 20A circuit breakers are added.
PARTIAL PROFILE VIEW

TYPICAL WASTEWATER
PUMP STATION (230V, 3Ø)
EXTERNAL TCU
PARTIAL PROFILE VIEW

TYPICAL WASTEWATER PUMP STATION (230V,3Ø)
INTERNAL TCU
1. ALL HARDWARE, CONNECTORS, MISCELLANEOUS METAL PARTS AND THE LIKE SHALL BE TYPE 304 STAINLESS STEEL.
2. FORCE MAIN SHALL BE PVC C900 CLASS 200, HDPE DR11 (200 PSI) OR DUCTILE IRON PRESSURE CLASS 200 LINED WITH P-401 CERAMIC EPOXY WITH QUARTZ PIGMENT AND POLYETHYLENE ENCASEMENT.
3. VALVES ON FORCE MAIN SHALL BE LINE SIZED PLUG VALVES, EXCEPT A GATE VALVE MAY BE USED AT A TAPPING SLEEVE.
4. ISOLATION PLUG VALVES SHALL BE INSTALLED AT NOT MORE THAN 1000' INTERVALS.
5. FORCE MAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TRENCH DETAILS T-1 THROUGH T-7.
6. ALL FORCE MAINS WITHIN THE RIGHT OF WAY SHALL BE 4" MINIMUM.
7. FORCE MAIN VERTICAL PIPE OFFSETS REQUIRE AN AIR RELIEF VALVE.
8. NO 90 DEGREE BENDS SHALL BE USED ON FORcemains.
9. FORcemains SHALL BE PRESSURE TESTED TO 150 PSI FOR TWO HOURS.
10. ALL VALVES SHALL BE MARKED WITH THE "V" IN CURB AND PAINTED GREEN FOR SANITARY SEWER.
PROFILE VIEW

NOTES:
1. P.V.C. OR D.I.P. EXTENSIONS MAY BE USED ON VALVE BOX INSTALLATION.
2. THE ACTUATION NUT FOR DEEPER VALVES SHALL BE EXTENDED TO COME UP TO A DEPTH OF 2 FEET MINIMUM AND 4 FEET MAXIMUM BELOW FINISHED GRADE.
3. VALVE TO BE 1/4 TURN FULL FLOW.
PROFILE VIEW

NOTES:
1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.
2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 4.0 FEET.
3. AIR RELIEF VALVE MUST BE PLASTIC OR STAINLESS STEEL MANUFACTURED BY A.R.I. OR APPROVED EQUAL.
NOTES:

1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.
2. AIR RELIEF VALVE MUST BE PLASTIC OR STAINLESS STEEL MANUFACTURED BY A.R.I. OR APPROVED EQUAL.
3. ABOVE DETAIL APPLIES TO A 2" ARV, FOR LARGER ARVS, PIPE DIAMETER AND VALVES SHALL BE EQUAL TO THE SIZE OF THE ARV.
4. ALL PIPING, VALVES, AND APPURTENANCES TO BE 316 STAINLESS STEEL EXCEPT WHERE SPECIFIED OTHERWISE.
5. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE. GREEN ENCLOSURE FOR SEWAGE.
6. GUARD POSTS SHALL BE REQUIRED WHEN NOT PROTECTED BY 6" CURB, MIN. OF TWO GUARD POSTS.

VENTED ARV ENCLOSURE (SEE NOTE 5)

2" SEWER AIR RELEASE VALVE (316 STAINLESS STEEL)

2" STAINLESS STEEL BALL VALVE

PVC PIPE

COVER END WITH S.S. SCREEN MESH

1' MIN.

FDOT #57 STONE

2" CORP STOP STAINLESS STEEL

2" STAINLESS STEEL NIPPLE

2" STAINLESS STEEL SADDLE TAP WITH 2 STRAPS FORD MODEL FS1-XXX

SEWER AIR OR COMBINATION AIR/VACUUM VALVE ABOVE GRADE
WATER DETAILS - GENERAL NOTES:

1. ALL WATER METERS AND RPZ BACKFLOW ASSEMBLIES SHALL BE ABOVE GROUND INSTALLATIONS, UNLESS APPROVED IN WRITING IN ADVANCE OF CONSTRUCTION. SINGLE FAMILY RESIDENTIAL SERVICES ARE THE ONLY CASE WHERE IN GROUND METER BOXES ARE REQUIRED.
2. WATERLINE SHALL BE PVC C900 OR C905 CLASS 200, HDPE DR11 (200 PSI) OR DUCTILE IRON PRESSURE CLASS 200 CEMENT LINED.
3. WATER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TRENCH DETAILS T-1 THROUGH T-7.
4. WATER MAINS SHALL BE 8" MINIMUM.
5. WATER SERVICE AND DDCV CONNECTIONS SHALL BE VALVED SO THAT EACH MAY BE ISOLATED AND NOT AFFECT FLOW TO THE OTHER.
6. ALL MASTER METER INSTALLATIONS SHALL HAVE A 4" TAP AND VALVE, AND 4" PIPE TO METER LOCATION, THEN REDUCED TO ENGINEER DESIGNED WATER SERVICE LINE SIZE.
7. ALL NEW WATER LINES SHALL BE CLEANED WITH PIG OR CLEANING BALL PRIOR TO TESTING.
8. POTABLE WATER SHALL NOT BE USED FOR IRRIGATION. IRRIGATION WATER SHALL BE SUPPLIED BY AN ON-SITE WELL, IF RECLAIMED WATER IS NOT AVAILABLE.
9. SERVICE LINE CROSSING UNDER PAVEMENT SHALL BE SLEEVED, ENDS OF SLEEVES TERMINATING UNDER PAVEMENT SHALL BE GROUT SEALED.

ALL MATERIALS FOR PUBLIC AND PRIVATE WATER SYSTEM INSTALLATION SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO INSTALLATION. PROVIDE 48 HOUR NOTICE TO THE CITY TO SCHEDULE INSPECTIONS OF MATERIAL AND INSTALLATIONS.

CONSTRUCTION HOLD POINTS FOR CITY INSPECTION:

1. OBSERVE CONNECTIONS TO, AND REMOVAL/ABANDONMENT OF EXISTING WATER MAIN SYSTEM.
2. REVIEW CONTRACTOR’S PROPOSAL FOR MAINTAINING WATER FLOW DURING CONSTRUCTION.
3. INTERMITTENTLY OBSERVE CONSTRUCTION OF PIPING.
4. OBSERVE PRESSURE TEST.
5. OBSERVE DISINFECTION AND BACTERIOLOGICAL TESTING.
BELOW GRADE METERS FOR SINGLE FAMILY RESIDENTIAL ONLY. ALL OTHER INSTALLATIONS SEE DETAIL W-2B

CURBSTOP, METER AND DUAL CHECK SET UP TO BE CENTERED IN METER BOX

APPROVED METER BOX TO BE FURNISHED BY CITY

DUAL CHECK VALVE, UPRIGHT IN BOX

TO HOUSE OR BACKFLOW PREVENTER

NOTCH SO BOX WILL NOT SIT ON SERVICELINE (TYP.)

CURB STOP COCK WITH LOCKING NUT

12" MAX. 5" MIN. 8" MAX.

3/4" OR 1" METER AND DUAL CHECK VALVE TO BE FURNISHED AND INSTALLED BY CITY

POLY AWWA C901 MINIMUM 1" TO METER BOX

CORPORATION COMPRESSION TYPE CONNECTION OUTLET

DOUBLE STRAPRED BRONZE TAPPING SADDLE FOR D.I.P. AND P.V.C MAINS OR BRONZE CLAM SHELL FOR CLASS PIPE.

EXISTING WATER MAIN

MINIMUM 1" SERVICE TAP

SADDLE TO BE ATTACHED AT THE 10 OR 2 O'CLOCK POSITION

45° - 60°

FLOW

NOTES:
1. LONG SIDE SERVICES REQUIRE POLY SERVICE LINE TO BE INSTALLED THROUGH A POLYTUBE CASING INSTALLED UNDER THE ROAD
2. ALL TAPS SHALL BE 1" OR 2".
3. PIPE CAN BECTS POLY PIPE
4. SLEEVE SERVICE UNDER PAVEMENT

PROFILE VIEW

RESIDENTIAL WATER CONNECTIONS
MARKED "WATER" CAST IRON 2 PIECE VALVE BOX AND LID

TO METER OR R.P. ASSEMBLY

GRADE

24"x24"x6" CONC. PAD WITH #4 REBAR @ 6" O.C.E.W IN UNPAVED AREAS

BRASS 45° BEND
2" CLOSE BRASS NIPPLE (TYP)
2" CORP. STOP

EXISTING WATER MAIN

2" SERVICE TAP

DOUBLE STRAPPED BRONZE TAPPING SADDLE FOR D.I.P AND PVC MAINS BRONZE CLAM SHELL FOR CLASS PIPE

BRASS 90° BEND

VALVE BOX SHALL NOT REST ON BRASS PIPE, LEAVE MIN. 2" CLEARANCE

2" RESILIENT SEATED SQUARE NUT GATE VALVE WITH FEMALE THREADED ENDS

2" CLOSE BRASS NIPPLE

SADDLE TO BE ATTACHED AT THE 10 OR 2 O'CLOCK POSITION

PROFILE VIEW

NOTES:
1. ALL FITTINGS AND PIPES TO BE THREADED BRASS.
2. LONG SIDE SERVICES REQUIRE SERVICE LINES TO BE INSTALLED IN SLEEVES UNDER THE ROADWAY.
3. PIPE CAN BE 2" CTS POLY PIPE BEYOND GATE VALVE.
4. SLEEVE SERVICE UNDER PAVEMENT.

COMMERCIAL WATER CONNECTIONS (2" SERVICE TAP)
FLOW

TRACE WIRE
NOT SHOWN

UNPAVED
AREAS

PAVED
AREAS

CENTERLINE RISER PIPE

MATCH EXISTING
FINISHED SURFACE

2" ASPHALT

ROADWAY BASE

CAST IRON 2 PIECE VALVE BOX
WITH "WATER" ON LID
SET TOP OF VALVE BOX TO FINISHED GRADE

GRADE

24"x24"x6" CONC. PAD
WITH #4 REBAR @ 6" O.C.E.W
IN UNPAVED AREAS

4" RESILIENT SEAT GATE VALVE WITH
VALVE BOX, INSTALL PER DETAIL W-4

3/4" TEST PLUG

EXISTING WATER MAIN

MASTER METER SERVICE TAP
NEW INSTALLATIONS
SHALL BE M.J. TEE AND VALVE

STAINLESS STEEL SLEEVED
TAPPING VALVE WITH DUCTILE
IRON FLANGE AND 3/4" TEST
PLUG

EXTEND 4" LINE TO METER LOCATION
TO MASTER METER WITH
RPZ ASSEMBLY

RESTRAINED MECHANICAL
JOINT; END CAP REDUCER TO
METER LINE SIZE

PROFILE VIEW

NOTES:
1. BLUE POST DELINEATORS IF REQUIRED WILL BE SUPPLIED BY CITY.
FLOW

BRASS BALL VALVE

BRASS BALL VALVE

NOTE #2

12" MAX.

12" MIN.
30" MAX.

ALL PIPING TO BE SLEEVED BETWEEN PIPE AND CONCRETE (TYPICAL BOTH ENDS)

4" MIN.

6" MIN. CONCRETE PAD WITH #4 REBAR @12" OC EW

GRADE

CONCRETE PAD SHALL BE A MINIMUM OF 2 FEET WIDE AND CENTERED ON PIPING

NOTE #1

FLOW

FROM WATER METER

PROFILE VIEW

NOTES:
1. ALL PIPING AND FITTINGS SHALL BE THREADED BRASS FROM THE POINT WHERE THE 90° BEND MEETS WITH CUSTOMER'S SERVICE LINE.
2. ALL COMMERCIAL METERS SHALL BE ABOVE GROUND UNLESS PRE-APPROVED IN ADVANCE BY THE CITY

TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT. BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER.

BACKFLOW ASSEMBLY TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!

TYPICAL 3/4" TO 1" R.P. ASSEMBLY INSTALLATION

West Melbourne FLORIDA

DRAWN: ELF
DATE: 06/2020
SCALE: NONE
REV: 2020
DWG. NO. W-2A
FLOW

END OF CITY RESPONSIBILITY

START OF CUSTOMER RESPONSIBILITY

METER FURNISHED BY CITY

2-BRASS BALL VALVES (REFER TO NOTE #2) TO BE PURCHASED AS PART OF THE R.P. ASSEMBLY

ANGLE BALL VALVE WITH LOCKING WING AND METER FLANGE

ANGLE CURB STOP WITH METER FLANGE

NOTE #1

LOCATE WIRE

ALL PIPING TO BE SLEEVED BETWEEN PIPE AND CONCRETE (TYPICAL BOTH ENDS)

6" MIN.

GRADE

12" MIN. 30" MAX.

4" MIN. CONCRETE PAD WITH #4 REBAR @ 6" O.C.E.W

CONCRETE PAD SHALL BE A MINIMUM OF 2 FEET WIDE AND CENTERED ON PIPING

BRASS 90°

FROM WATER MAIN

FLOW

PROFILE VIEW

METER FURNISHED BY CITY

NOTES:

1. ALL PIPING AND FITTINGS SHALL BE THREADED BRASS, TO THE POINT WHERE THE 90° BEND MEETS THE CUSTOMER’S SERVICE LINE UNDERGROUND (EXCEPTION FOR ANGLED BALL VALVE WITH METER FLANGE).

2. ALL COMMERCIAL METERS SHALL BE ABOVE GROUND UNLESS PRE-APPROVED PRIOR TO CONSTRUCTION BY THE CITY

3. TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT. BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER

4. ASSEMBLY TO BE PRIMED AND PAINTED BLUE. SEE APPROVED PRODUCTS LIST FOR APPROVED PAINT.

5. ANGLE BALL VALVE FOR 3/4" OR 1" METERS SHALL BE FIP INLET X METER COUPLING OUTLET. ANGLE BALL VALVE FOR 2" METERS SHALL BE FIP INLET X METER FLANGE

BACKFLOW ASSEMBLY TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER’S INSTRUCTIONS!
NOTES:
1. ALL PIPING ABOVE GROUND SHALL BE FLANGED DUCTILE IRON
2. CONSTRUCT ISOLATION VALVE AND VALVE BOX WITH WATER STAMPED ON COVER. CITY POINT OF ACCEPTANCE

TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT. BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER.

DEVICES TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!
FLOW

GATE VALVE

GATE VALVE

GATE VALVE

PIPE SUPPORT
(6 REQUIRED)

6" MIN.

4" MIN.

12" MIN.

30" MAX.

GRADE

6" MIN.

ALL PIPING TO BE SLEEVED BETWEEN PIPE AND CONCRETE (TYPICAL BOTH ENDS)

30" MIN.

4" MIN. CONCRETE PAD
WITH #6 REBAR @ 10" O.C.E.W

CONCRETE PAD CENTERED ON PIPING

PROFILE VIEW

RESTRAINED JOINT (TYP)
MJ X MJ 90° BEND

FLOW

FLOW

TEST COCKS

24" MIN.

24" MIN. CLEARANCE

24" MIN.

24" MIN. CLEARANCE

12" MIN.

12" MIN.

CONCRETE PAD CENTERED ON PIPING

PLAN VIEW

NOTES:
1. ALL PIPING ABOVE GROUND SHALL BE FLANGED DUCTILE IRON, PAINTED BLUE

TYPE OF BACKFLOW ASSEMBLY TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT. BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER.

ASSEMBLY TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!

3", 4", 6" OR 8" PARALLEL BACKFLOW ASSEMBLY
NOTES:
1. ALL PIPING ABOVE GROUND SHALL BE FLANGED DUCTILE IRON, PAINTED BLUE

TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT.
BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER AS NOTED.

ASSEMBLIES TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!

COMBINATION MASTER METER AND BACKFLOW PREVENTER
BY-PASS WATER METER & BACKFLOW ASSEMBLY NOT SHOWN FOR CLARITY.

CONCRETE PAD SHALL BE A MINIMUM OF 2 FEET WIDE OR 4 TIMES THE DIAMETER OF THE PIPE AND CENTERED ON PIPING

#6 REBAR @ 10" O.C.E.W

ALL PIPING TO BE SLEEVED BETWEEN PIPE AND CONCRETE (TYPICAL BOTH ENDS)

6" MIN.
30" MAX.
30" MIN.

PROFILE VIEW

FROM WATER MAIN

RESTRAINED JOINT (TYP) MJ X MJ 90° BEND

GATE VALVE AND VALVE BOX

PIPE SUPPORT

GRADE

FLOW

CONCRETE PAD

12" MIN.

PLAN VIEW

FLOW

BALL VALVE

3/4" WATER METER

DOUBLE CHECK BACKFLOW PREVENTER

TEST COCKS

TEST COCKS

FLOW

NOTES:
1. ALL PIPING ABOVE GROUND SHALL BE FLANGED DUCTILE IRON
2. 1/2" PRE-FORMED JOINT MATERIAL TO BE PLACED BETWEEN PIPE & CONC. OR PIPE SLEEVE.
3. CONSTRUCT ISOLATION VALVE AND VALVE BOX WITH WATER STAMPED ON COVER. CITY POINT OF ACCEPTANCE

TYPE OF BACKFLOW PREVENTER TO BE BASED ON DEGREE OF HAZARD. THIS IS TO BE DETERMINED BY CITY OF WEST MELBOURNE PUBLIC WORKS DEPT. BACKFLOW PREVENTER & ASSOCIATED PIPING TO BE MAINTAINED BY CUSTOMER.

ASSEMBLIES TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER'S INSTRUCTIONS!
PROFILE VIEW

NOTES:
1. P.V.C. OR D.I.P. EXTENSIONS MAY BE USED ON VALVE BOX INSTALLATION.
2. THE ACTUATION NUT FOR DEEPER VALVES SHALL BE EXTENDED TO COME UP TO A MAX DEPTH OF 4 FEET BELOW FINISHED GRADE.
PROFILE VIEW

NOTES:

1. PVC OR D.I.P. EXTENSIONS MAY BE USED ON VALVE BOX INSTALLATION.
2. THE ACTUATION NUT FOR DEEPER VALVES SHALL BE EXTENDED TO COME UP TO A MAX DEPTH OF 4 FEET BELOW FINISHED GRADE.
NOTES:
1. AUTOMATIC FLUSHING DEVICE SHALL BE SHUT OFF UNTIL MAIN LINE HAS BEEN UNDERGONE A BACTERIOLOGIC TEST.
2. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.
3. 1" POLYETHYLENE TUBING C.T.S. AWWA C901
4. INSTALL IN LANDSCAPING AREA. DO NOT INSTALL IN DRIVEWAY OR SIDEWALK.
5. CONTRACTOR TO CONFIRM BOX AND DISCHARGE LOCATION PRIOR TO INSTALLATION.
6. PROVIDE SUBMITTALS OF ALL COMPONENTS FOR APPROVAL.
NOTES:
1. THE MAIN VALVE SHALL BE LOCKED IN THE CLOSED POSITION AND OPERATED BY CITY PERSONNEL ONLY. IF NO VALVE IS PROVIDED, MAINTAIN PHYSICAL SEPARATION UNTIL D.E.P. LETTER OF CLEARANCE IS RECEIVED AND UTILITY APPROVES CONNECTION.
2. USE AT POINTS OF FILLING. ALL OTHER LOCATIONS PROPOSED FOR CONNECTION TO EXISTING MAINS MUST REMAIN ISOLATED UNTIL D.E.P. LETTER IS OBTAINED.
3. 1" DIAMETER JUMPER MAY BE USED FOR UP TO 180 LF OF PIPE EXTENSION.
4. ALL RPZ BACK FLOW ASSEMBLIES MUST BE TESTED AND RESULTS SENT TO THE VILLAGE PRIOR TO INSTALLATION.
5. ALL PIPES AND APPURTEINENCES TO BE 2" FOR NEW MAINS UP TO 8" FOR MAINS OVER 8", ALL PIPES AND APPURTEINENCES TO BE SIZED AND DESIGNED BY THE ENGINEER OF RECORD.

ASSEMBLIES TO BE INSTALLED IN STRICT ACCORDANCE TO MANUFACTURER’S INSTRUCTIONS!

TEMPORARY JUMPER CONNECTION
NOTES:

1. PROVIDE ANOTHER GATE VALVE ON THE FIRE HYDRANT SERVICE ASSEMBLY, IDENTICAL TO THE ONE SHOWN ABOVE, IF DISTANCE FROM THE VALVE AT THE TEE IS EQUAL TO OR GREATER THAN 20 FT TO THE FIRE HYDRANT.

2. FOR SINGLE-FAMILY RESIDENTIAL ZONING DISTRICTS, THE MAXIMUM DISTANCE BETWEEN HYDRANTS SHALL BE 400 FEET.

3. FIRE HYDRANTS SHALL BE IN ACCORDANCE WITH AWWA C-502 AND SHALL HAVE BRONZE TO BRONZE MAIN SEAT THREADING SURFACES. ACCEPTABLE MANUFACTURERS OF FIRE HYDRANTS SHALL BE MUELLER, AMERICAN DARLING, OR CITY-APPROVED EQUIVALENT.

4. NEW FIRE HYDRANTS SHALL BE POSITIONED NO MORE THAN 8 FEET NOR LESS THAN 3 FEET OFF THE EDGE OF PAVEMENT. THE CENTER LINE OF THE STEAMER CONNECTION (4 1/2") SHALL BE POSITIONED BETWEEN 18"-24" ABOVE FINISH GRADE.

5. A SIX-INCH M.J. HYDRANT CONNECTION SHALL BE PROVIDED USING A HYDRANT VALVE ANCHORING TEE WITH INTEGRALLY CAST STANDARD M.J. GLAND ON SIX-INCH PLAIN END BRANCH.

6. FIRE HYDRANTS SHALL BE LOCATED WITHIN 100 FEET OF ANY FIRE DEPARTMENT CONNECTION ON THE SAME SIDE OF THE ROADWAY AND POSITIONED SO THAT WHEN IN USE, THE ROADWAY WILL NOT BE BLOCKED BY FIRE DEPARTMENT APPARATUS OR EQUIPMENT.

7. LANDSCAPING, OR ANY OTHER OBSTRUCTION, SHALL NOT BE LOCATED WITHIN 7.5 FEET TO THE FRONT AND SIDES OR 4.5 FEET TO THE REAR OF ANY FIRE HYDRANT OR FIRE DEPARTMENT CONNECTION.

8. APPLY FOOD GRADE ANTI-CEASE LUBRICANT TO HYDRANT CAPS (GREASE IS NOT PERMITTED).

9. WHEN NO CURB EXISTS, PLACE HYDRANT 8' FROM EDGE OF PAVEMENT BUT INSIDE THE RIGHT-OF-WAY FOR STREET INSTALLATIONS.

10. IN PARKING LOT INSTALLATIONS, HYDRANTS SHALL BE INSTALLED BEHIND CURBS OR PROTECTED BY TWO STEEL GUARD POST (BOLLARDS).

11. FIRE HYDRANTS SHALL BE FACTORY PAINTED SAFETY RED.

12. PROVIDE BLUE RAISED REFLECTOR IN ROAD.
### THRUST REstrained TABLE FOR DUCTILE IRON PIPE

**MINIMUM LENGTH (FT) OF PIPE TO BE RESTRAINED FOR EACH SIDE OF FITTING(S)**

<table>
<thead>
<tr>
<th>FITTINGS</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-6&quot;</td>
</tr>
<tr>
<td>90 BEND</td>
<td>44(51)</td>
</tr>
<tr>
<td>45 BEND</td>
<td>18(21)</td>
</tr>
<tr>
<td>22.5 BEND</td>
<td>9(11)</td>
</tr>
<tr>
<td>11.25 BEND</td>
<td>5(6)</td>
</tr>
<tr>
<td>BRANCH OF TEE</td>
<td>42(59)</td>
</tr>
<tr>
<td>DEAD END</td>
<td>92(131)</td>
</tr>
</tbody>
</table>

### THRUST REstrained TABLE FOR P.V.C. PIPE

**MINIMUM LENGTH (FT) OF PIPE TO BE RESTRAINED FOR EACH SIDE OF FITTING(S)**

|  | PIPE SIZE |
|  | 4"      | 6"      | 8"      | 10"     | 12"     | 16"     | 20"     | 24"     | 30"     |
| 90 BEND | 58      | 82      | 107     | 128     | 149     | 189     | 227     | 262     | 309     |
| 45 BEND | 24      | 34      | 45      | 53      | 62      | 78      | 93      | 108     | 128     |
| 22.5 BEND | 12   | 16      | 22      | 26      | 30      | 36      | 45      | 53      | 62      |
| 11.25 BEND | 5     | 8       | 11      | 12      | 15      | 19      | 23      | 26      | 31      |
| BRANCH OF TEE | 58    | 95      | 130     | 163     | 196     | 257     | 315     | 371     | 448     |
| DEAD END | 90      | 128     | 166     | 201     | 235     | 298     | 359     | 419     | 500     |

**NOTES:**

1. All fittings shall be restrained joint type unless otherwise indicated.
2. Install full length joints with total length equal to, or greater than, the length shown in the table.
3. Where two or more fittings are together, use fitting which yields greatest length of restrained pipe.
4. In-line valves outside the limits of restrained joints from other fittings need not be restrained unless otherwise indicated.
5. Length of restrained joint piping for reducers, reducing tees and vertical position fittings shall be designed on an individual basis, with design calculations for each being submitted for review.
6. Lengths shown in the table have been calculated in accordance with the procedure outlined in "Thrust Restraint Design for Ductile Iron Pipe" as published by DIPRA, with the following assumptions:
   - Working Pressure: 70 P.S.I.
   - Design Pressure: 150 P.S.I.
   - Soil Designation: Sand-Silt
   - Laying Condition: Type-2
7. For pipe encased in polyethylene, use values given in parentheses, or increase the given value by a factor of 1.2.
8. Deflection of pipe is not an allowable substitute for fittings shown on the plans.
NOTES:

1. ALL FITTING AND PIPES TO BE THREADED BRASS OR CTS POLY.
2. THE VERTICAL OFFSET BLOWOFF DETAIL SHOULD BE USED AT EACH LOCATION
   THE VERTICAL OFFSET OF THE WATERLINE TO CLEAR ANOTHER PIPELINE
   EXCEEDS 3'-0". IT SHOULD BE LOCATED ON THE HIGH SIDE OF THE OFFSET
   PIPING TO BLEED AIR FROM THE WATER LINE.
3. TAP SHOULD BE MADE AT THE 12 O'CLOCK POSITION OR AS CLOSE TO THAT AS
   PRACTICAL.
4. VALVE BOX AND METER BOX SHALL NOT REST ON PIPING.
5. LOCATE VALVE IN METER BOX IN LANDSCAPED AREA. PRE-APPROVAL IS
   REQUIRED FOR LOCATIONS WITHIN PAVED AREA. DO NOT LOCATE IN A
   DRIVEWAY.
NOTES:
1. CONTRACTOR CAN INSTALL SIDE ACTUATED RIGHT ANGLE GEAR REDUCTION GATE VALVE IN LIEU OF STD. GATE VALVE.
2. SUFFICIENT COVER SHALL BE PROVIDED TO HAVE MINIMUM 18" BURY DEPTH FOR TOP OF OPERATING NUT.
NOTES:

1. APPROVED FOR POTABLE SYSTEMS ONLY.
2. ABOVE DETAIL APPLIES TO A 2" ARV. FOR LARGER ARVS, PIPE DIAMETER AND VALVES SHALL BE EQUAL TO THE SIZE OF THE ARV.
3. ALL PIPING, VALVES AND APPURTENANCES TO BE BRASS OR 316 S.S. EXCEPT WHERE SPECIFIED OTHERWISE.
4. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE. BLUE ENCLOSURE FOR POTABLE WATER.
5. MIN OF TWO GUARD POSTS SHALL BE REQUIRED WHEN NOT PROTECTED BY 6" CURB.

2" AIR VALVES
ABOVE GRADE FOR POTABLE WATER
CONSTRUCT VALVE AND BLOW OFF ASSEMBLY PER DETAIL W-5A OR AUTO FLUSH PER DETAIL W-5B PER CITY REQUIREMENTS

END OF PHASE WORK

WATER MAIN

CONSTRUCT VALVE AND HYDRANT ASSEMBLY PER DETAIL W-7 LOCATED BEHIND PROJECTED CURB AS REQUIRED

LOCATE VALVES AT FITTINGS (TYP)