FINAL PLAN PREPARATION AND ENGINEERING CHECKLIST

CITY OF MIRAMAR
OFFICE OF OPERATIONAL SERVICES
ENGINEERING SERVICES

Project Name:_____

Developer:_____ Date:_____

Engineer:_____ Reviewed By:_____

Approved By:_____

General Details for Water, Sewer, Paving, Drainage and Pump Stations will be provided by the City. The design engineer shall not deviate from these in addition to providing special project-specific details, not covered by City standards.

A) ROADWAYS AND PAVEMENTS

APPROVED	DISAPPROVED		
_____	_____	1.	The full depth of all existing organic and deleterious material within the Right-of-Way and utility/drainage easements shall be removed. No material of FDOT Class A-5, A-7 or A-8 shall be allowed.
_____	_____	2.	Subgrade material supporting the roadway and shoulders shall have a minimum limerock bearing ratio (LBR) of 40. The stabilized subgrade shall be twelve (12) inches compacted to 98% of maximum dry density as per AASHTO-T-180.
_____	_____	3.	Limerock base course shall have a minimum limerock bearing ratio (LBR) of 100 and shall be a minimum of eight (8) inches thick, and originate from the Miami formation, having a minimum percentage of calcium and magnesium of 60. Base material shall be compacted to a density of not less than 98% of maximum dry density as determined by AASHTO-T-180 under all paved areas.
_____	_____	4.	All driveways shall be shown on proposed engineering plans.
_____	_____	5.	Prime coat shall be applied at a rate of 0.25 gallons per

square yard. Prime and tack coat for base shall conform to the requirements and specifications of Sections 300-1 through 300-7 of FDOT standards specifications.

_____ _____ 6. Asphalt Concrete:
a) Residential: The wearing surface shall be 1.5 inches of Type S3 applied in two (2) 3/4" lifts.
b) Non-Residential: The wearing surface shall be two (2) inches applied in two lifts. First lift to be 1-1/4" type S1. Second lift to be 3/4" Type S3.
Tack coat to be used between paving lifts.

_____ _____ 7. Base and sub-grade density tests shall be conducted for a maximum 7000 square feet of finished pavement.

_____ _____ 8. Laboratory proctor compaction tests (T-180) shall be performed on all material, sub-grade and base and any subsequent changes in materials. Limerock bearing ratios, sieve analysis and densities required by the contract documents shall be submitted to the City.

_____ _____ 9. All repairs to existing pavement shall receive saw-cut edges prior to relaying asphalt. Utility piping or wiring less than four (4) inches in diameter requires a Schedule 40 PVC casing pipe with sand backfills under paved areas only.

_____ _____ 10. Minimum longitudinal slope of pavement shall be 0.3%.

_____ _____ 11. Minimum transverse slope of pavement shall be at two percent (2%) for roadways and generally one percent (1%) for parking areas.

_____ _____ 12. Minimum road crown elevations shall meet or exceed elevations established by the 10-year flood criteria map of Broward County or the minimum road elevations permitted by SFWMD, whichever is higher.

_____ _____ 13. Concrete sidewalks shall be four (4) inches thick, except at driveways where they shall be six (6) inches thick. Sidewalk sub-grade shall be grubbed, completely demucked and compacted to 98% of maximum dry density as determined by AASHTO T-180. Open type

expansion joints shall be used. Sidewalk must be separate from the travel way and constructed in accordance with the FDOT Roadway and Traffic Designs Standards Index 310. Width of sidewalks shall be as follows:

Arterial Street:	6 feet wide
4 Lane Collector:	5 feet wide
2 Lane Collector:	5 feet wide
Local Street:	4 feet wide

_____ _____ 14. All existing control points and/or reference markers shall be raised to final grade. These points and reference markers shall be located and noted on the plat.

B) DRAINAGE SYSTEM

_____ _____ 1. Storm Drainage Design Calculation (use rational formula: 3 year, 1 hour design storm, minimum of 10 min and maximum of 15 minute time of concentration, Zone 10 for rainfall density). Tail water elevation shall be at design water level. Hydraulic grade line shall not exceed catch basin rim elevation for parking lots, no higher than one (1) foot below gutter for arterial streets, nor 0.5 feet for collector and local streets.

_____ _____ 2. No catch basins or junction boxes shall be located in driveways.

_____ _____ 3. All storm drain junction boxes shall be located in the swale and include an inlet-type cover.

_____ _____ 4. Minimum size of drain pipe shall be 15 inches diameter.

_____ _____ 5. All drain pipes in City's R/W shall be Reinforced Concrete Pipe as specified in FDOT Standard Specification for Road and Bridge Construction (Latest Edition) Sections 430 and 449.

_____ _____ 6. High Density Polyethylene Pipe (HDPE) Class II or Polypropylene Pipe (PP) may be used in private land development, with the exception of outfalls and interconnect pipes. HDPE shall be limited to pipe sizes

up to 24” in diameter and installation depth of less than 6’ measured from bottom of pipe. PP shall be limited to pipe sizes up to 36” in diameter and installation depth of less than 7’ measured from bottom of pipe

_____ _____ 7. Swales shall have a transverse slope greater than six percent (6%) between edge of pavement and right-of-way line.

_____ _____ 8. A topographic survey shall be provided which includes elevations on a 100-foot grid carried to 100 feet beyond property boundaries, and spot elevations on any improvements and site-specific landmarks.

_____ _____ 9. Pipe utility easements shall be greater than or equal to 20 feet wide, including between buildings (depending on pipe size, type and depth).

_____ _____ 10. Drainage structures to be cleaned prior to City acceptance if located within public rights-of-way.

_____ _____ 11. The maximum distance for flow in a curb and gutter to the point of removal for any roadway shall be 400 feet.

_____ _____ 12. Stormwater maintenance access structures shall be spaced as follows:

for 15” diameter pipe – max. spacing is 100’
for 18” diameter pipe – max. spacing is 300’
for 24” – 36” diameter pipe – max. spacing is 400’
for 42” or greater diameter pipe – max. spacing is 500’

C) WATER SUPPLY SYSTEM

_____ _____ 1. The water supply system shall conform with the City’s Water Distribution Master Plan.

_____ _____ 2. Fire flow calculations shall be submitted based upon 2005 ISO requirements and shall be certified by a Professional Engineer registered with the State of Florida.

_____ _____ 3. Looped water mains shall be located within residential

right-of-ways and min. 20-foot wide utility easements. Minimum pipe diameter shall be six (6) inches. Materials shall be as follows:

_____ _____ a) Fittings: Mechanical joint ductile iron only unless otherwise noted. Fittings to conform to ANSI/AWWA C110/A21.10. Mechanical joints shall conform to ANSI/AWWA C111/A21.11.4.

_____ _____ b) Ductile Iron Pipe (DIP): Shall conform to ANSI/AWWA C151/A21.51. Minimum thickness class shall be Class 51 Ductile Iron. Push-on joints shall conform to ANSI/AWWA C111/A21.11. Gaskets shall be neoprene. The lining shall be cement mortar conforming to ANSI/AWWA C104/A21.4 and outside coating of either coal tar epoxy or asphalt shall be applied. Polyethylene wrap shall be installed where required. All water mains 6" or above must be DIP.

_____ _____ c) Polyvinyl Chloride Pipe (PVC): Shall be a Dimension Ratio of 18 (DR-18) with cast iron pipe. O.D.'s shall conform to ANSI/AWWA C900. Water main PVC shall be impregnated with blue pigment.

_____ _____ d) Deflection: PVC and DI pipe shall be deflected no more than one half of the manufacturer's recommendation.

_____ _____ 4. Pipe Restraint: All fittings and pipe joints requiring to be restrained shall use Megalug restrainer as follows:

JOINT	RESTRAINT
Push on PVC	EBAA Iron Series 2800 Harness
Push on DIP	TR-Flex by US Pipe or Flex Ring by American or EBAA Iron Series 1700 Megalug
Fittings with DIP	EBAA Iron Series 1100 Megalug
Fittings with PVC	EBAA Iron Series 2800 Megalug

_____ _____ 5. Detector tape shall be laid 18 inches below final grade for all water lines. A 14-gauge multi-strand wire shall be attached to all PVC water mains to facilitate location. An

extra four (4) feet of wire shall be provided at all blow offs and hydrants, etc. The wire shall be laid clear of valves. The wire shall be tested for continuity at the pressure test.

_____ _____ 6. Isolation valves shall be mechanical joint type only, which meet the requirements of ANSI/AWWA C509, and the mechanical joint shall conform to ANSI/AWWA C111/A1.11. The interior lining shall be epoxy in accordance with AWWA C550 and an exterior coating of epoxy shall be applied. Both shall have a 40 mil dry film thickness (DFT). Valves shall adhere to the following:

Isolation valves less than or equal to 18 inches shall be resilient wedge gate valves and be of the following makes:

1. Pratt
2. Dezurik
3. Clow

_____ _____ 7. Valves shall be located such that interruption to service can be isolated within more than one block of residential or commercial service; maximum isolation shall be 800 feet of pipe for residential and 500 feet for commercial. Valves shall be located at tees and extension to right-of-way lanes.

_____ _____ 8. Valve box shall be U.S. Foundry Model #7500 and shall be painted blue with the designation “Water”.

_____ _____ 9. A 24" x 24" x 6" concrete collar with a continuous #4 reinforced bar shall be cast around every valve box in both paved and unpaved areas.

_____ _____ 10. All valves shall have a brass ID marker embedded in the collar. The marker shall indicate the size and type of valve, as well, the direction and number of turns needed to open the valve, and the type of service line (i.e., WM, FM, RM). Example: 8" R.S.G.V. 15 T.O.L. W.M.

_____ _____ 11. Fire hydrants shall be located no less than six (6) and no more than ten (10) feet from the edge of the pavement of the adjacent roadway, no less than five (5) feet from any physical feature which may obstruct

access or view of any hydrant unless otherwise approved by CMPWUD. Guard posts around fire hydrants are required when hydrants are placed within six (6) feet of all driveways, turn radius, or parking areas. The hydrant shall receive a factory coat of epoxy traffic (yellow) with a 40 mil DFT.

_____ _____ 12. Hydrostatic test pressure for leakage shall be at 150 psi for 2 hours. Test pressure shall not vary more than 5 psi in accordance with AWWA C600-93. Maximum allowable leakage shall be calculated as follows:

$$L = \frac{SD(P)^{0.5}}{148{,}000}, \qquad \text{AWWA C600-05}$$

L = allowable leakage gallon per minute
S = length in linear feet
D = nominal pipe diameter in inches
P = pressure in psi

Maximum length of test pipe section shall be 2000 feet. Re-pumping of line during pressure test is not allowed.

_____ _____ 13. Depth of Cover:

a) Minimum water main cover shall be 36 inches for PVC and 30 inches for DIP.

b) Minimum service line cover shall be 24 inches and sleeved under paved areas with schedule 40 PVC conduit. Sleeve is to be plugged with elastomeric caulk and located in sand bedding.

_____ _____ 14. Bacteriological testing shall be in accordance with AWWA/ANSI C651-05. Maximum distance between sampling points shall be as follows:

- Transmission Mains: Every 1500 feet
- Branch Mains: Every 1000 feet
- Isolated Mains: Less than 1000 feet: 2 sample points; Greater than 1000 feet: 3 sample points
- Maximum distance between sampling points shall not exceed 1200 feet

The City shall be reimbursed for the cost of collecting and processing the bacteriological samples.

_____ _____ 15. City to be advised in writing at least 48 hours prior to the following:

- Wet Connections
- Pressure Tests
- Filling/Flushing
- Chlorination
- Bacteriological Samples

D) SEWER COLLECTION SYSTEM

_____ _____ 1. Adjust slope of the gravity sewer to eliminate all manhole drops. When a standard slope results in a tie-in connection between two (2) and four (4) feet above the manhole invert, standard slopes of branch sewers shall be adjusted to eliminate the need for a drop.

_____ _____ 2. All gravity sewer profiles shall include but not be limited to the following:

- length of pipe, pipe materials
- slope of the pipe
- invert and rim elevation of the manholes
- water main crossings
- storm drain crossings
- force main crossings
- separation distance between sewer mains and any crossings, including inverts and top of pipe elevations of crossings.

_____ _____ 3. Gravity pipe shall be PVC SDR-35. Minimum diameter shall be eight (8) inches for mains and six (6) inches for laterals. Slopes shall be in accordance with the current “Ten States” Standards.

_____ _____ 4. Clean-outs shall be provided and brought to final grade at the property or easement line for all sewer laterals. Clean-outs shall not be located in driveways. One six (6) inch diameter clean out shall be installed for each

single or double residential service connection. A commercial connection will be reviewed by the City Engineer or his designee.

_____ _____ 5. Manholes shall be precast in accordance with ASTM-C-476, minimum thickness shall be eight (8) inches. A minimum six (6) inch base extension outside the wall of the manhole is required. Manholes shall not be located at or close to final grade low points.

_____ _____ 6. Provide a minimum six (6) inch bed of washed 3/4 inch rock for all sub-aqueous gravity sewer pipes.

_____ _____ 7. Two coats of Cooper Black No. 775 Epoxy Tar Coating, first red, second one black, shall be applied to the inside of all manholes and shall be applied in accordance with the manufacturer's specifications (8 mils per coat). One coat of black Cooper Black No. 775 Epoxy Tar Coating shall be applied to the outside of the manhole. The interior coats shall be applied after sewer lamping of lines. The application of each coat shall be an inspection and shall be scheduled a minimum of 48 hours prior to testing.

_____ _____ 8. The installed sewers shall undergo television inspection at two (2) times. The first shall be prior to the final acceptance by the City and the other shall be just prior to the release of the one-year maintenance bond.

E) LANDSCAPING AND IRRIGATION

_____ _____ 1. Landscaping within utility drainage easements shall be limited to non-root invasive species as determined by the Community Development Department.

_____ _____ 2. No berms or perimeter fencing shall be permitted within utility easements.

_____ _____ 3. No potable water shall be permitted for irrigation. Reuse water shall be used for irrigation if capacity is available and the supply is readily accessible.

_____ _____ 4. Placement of trees shall comply with minimum clear zone widths, as outlined in Section III of FDOT's

"Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways".

F) PROPERTY GRADING

_____ _____ 1. For drainage purposes, all naturally vegetated areas shall slope at 0.6% min.

_____ _____ 2. Minimum finished first floor elevation shall be twelve (12) inches above the Federal Flood Insurance Rate Map (FIRM) base flood plain elevation or 18 inches above the adjacent road crown, whichever is higher.

_____ _____ 3. A minimum of six (6) elevations shall be given for each residential lot; one at each corner, one at the middle of each side lot line, and wherever there is a break in drainage direction. Additional elevations for commercial and industrial property shall be divided as necessary.

_____ _____ 4. Drainage flow directions shall be noted on each lot with drainage arrows.

_____ _____ 5. Control points located in concrete or asphalt shall be raised to final grade.

_____ _____ 6. Piped private yard drainage shall not be interconnected with any public systems.

G) METERS AND ACCESSORIES

_____ _____ 1. Meter valves shall be in accordance with ASTM B-62 latest version.

a) Ford angle meter valve, Catalog #V63-444W-1"
Ford angle meter valve, Catalog #FV63-777W-2"
Ford angle meter valve, Branch #UV63-42W-1"
b) Ford residential dual check valves, Catalog #HHCA31-23 5/8 x 3/4.
c) Ford stainless steel insert stiffeners for plastic pipe, 3F1100-4 for 1" tube or #FB110-7 for 2: tube.
d) Ford Curb stop meter valve KV43-341W-NL 5/8"-1" meter, FV43-777W-NL 1.5" or 2" meter

_____ _____ 2. Radio read meters are required, in all new subdivisions as manufactured by Sensus Technologies (supplied by City).

_____ _____ 3. Water meter to be located at property line in front side of building (property side of sidewalk). The meter box to be set at final grade.

_____ _____ 4. Water meter boxes shall be purchased by developer.

_____ _____ 5. Service saddle shall be Ford Model FC202. Service saddle to be epoxy coated.

_____ _____ 6. Service pipe shall be polyethylene. Minimum service line cover shall be 24 inches and sleeved under paved areas with both ends sealed with elastomeric caulk and laid in sand bedding. Service pipe material shall be Phillips 66 Driscopipe 5100. Service trench shall be back filled with clean sand only.

_____ _____ 7. Corporation stops on mains for all 2-inch or less service connections shall be Ford Ballcorp, Catalog #FB-1100 or Mueller P-25028.