



Washtenaw County, Michigan

ENGINEERING STANDARDS

April 12, 2017

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PREAMBLE

The promulgation of engineering standards is considered to be a significant responsibility of the Pittsfield Township Board of Trustees. The Board of Trustees believes that high uniform standards must be maintained in order to protect the citizens and businesses of the Township and to ensure that future Boards are not burdened with remedial and retroactive solutions. Quality planning and implementation are seen as priority and viable goals.

These standards have been adopted by the Pittsfield Township Board of Trustees and periodically revised as listed below.

Adopted August 14, 2013

Amended April 12, 2017

By

The Board of Trustees

For

PITTSFIELD CHARTER TOWNSHIP

This compilation of the Engineering Standards is printed by authority of Pittsfield Charter Township Board of Trustees and contains those standards printed herein, compiled with all amendments up to April 12, 2017.

Michelle L. Anzaldi, Clerk

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Chapter 1

PURPOSE OF STANDARDS

- 1.01** These standards are intended to:
- A. Provide a reasonable and proper basis for the design and construction of land improvements such as sanitary sewer, water facilities, stormwater management, grading, pavements, franchised utilities and public safety.
 - B. Establish uniformity in Township requirements.
 - C. Describe the required information prior to submittal of Engineering plans such that Engineering plans will be complete and in proper form when submitted, thereby reducing the Township's and applicant's time and expense in the review process.
 - D. Enable designers and applicants to estimate the cost of Township requirements as early in the development process as possible.
 - E. Provide accurate on-site and off-site information for each project that will become permanent public records of the Township.
- 1.02** These standards apply to all land improvements.
- 1.03** These standards are the minimum requirements necessary to promote public health, safety, and welfare within Pittsfield Charter Township. These standards are not intended to interfere in any manner with the application or enforcement of the laws of Pittsfield Charter Township, Washtenaw County, the State of Michigan, or the United States.
- 1.04** Deviations from these standards shall be approved by the Township Engineer or designee.

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Chapter 2

PLAN REQUIREMENTS FOR SITE PLANS AND ENGINEERING REVIEWS

2.01 General Requirements:

- A. All plans for land improvements shall be prepared on standard white prints with black lines, shall be drawn to an engineering scale, and shall be neatly and accurately prepared. Where more than one sheet is required to show the entire site, match lines shall be provided.
- B. Plans submitted for Planning Commission review shall consist of three (3) rolled sets at twenty-four (24) inch by thirty-six (36) inch, eleven (11) reduced sets at eleven (11) inch by seventeen (17) inch and one electronic copy in pdf format.
- C. All plans submitted for Engineering or Administrative review shall consist of three (3) rolled sets at twenty-four (24) inch by thirty-six (36) inch, four (4) reduced sets at eleven (11) inch by seventeen(17) inch and one electronic copy in pdf format. Plans submitted for review to outside agencies shall be date-stamped received by Pittsfield Charter Township at the time of the plan set submittal for Planning Commission review. The applicant shall be responsible for submitting the stamped plans to the appropriate outside reviewing agencies. All fees associated with outside agency reviews shall be the responsibility of the applicant and shall be paid to those agencies by the applicant.
- D. All plans shall be prepared by a professional engineer registered in the State of Michigan whose seal shall be affixed to the first sheet.
- E. Each sheet in a set of plans shall show the name and general description of the property; date; scale; north arrow; title of each sheet; and the name, address, and telephone number of the person or firm that prepared the sheet. Each sheet in a set shall be numbered consecutively, beginning with "Sheet 1" and shall have proper match lines or other keys to provide reasonable continuity and orientation. Sheets shall be ordered in the plan set to provide reasonable continuity.
- F. The north arrow shall be displayed on the right side of the sheet and the plan shall be oriented such that north is up or to the left.

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- G. The scales throughout the set of plans shall be standard engineering scales and shall be consistent throughout. The scale shall be no greater than 1 inch = 50 feet, except for area-wide maps.
- H. All elevations shall be based on the North American Vertical Datum 1988 (NAVD 88) and shall be noted as such.
- I. Overhead utility lines shall be identified and re-located underground.
- J. With each re-submittal, the preparer shall provide a written response of revisions made to the plans.

2.02 Information Required for Construction Plans:

- A. All information required for a preliminary and final site plans.
- B. Location and overall dimensions of existing structures and drives.
- C. The first sheet in each set shall be the title sheet and shall include, at a minimum:
 - 1. Site and zoning data.
 - 2. Sheet index with consecutively numbered sheets.
 - 3. All revision dates.
 - 4. Project name at the top of the sheet.
 - 5. Parcel Identification Number at the top of the sheet under the project name.
 - 6. Address of the site at the top of the sheet under the project name.
 - 7. Vicinity map.
 - 8. The name of the project and the Township identifying number (i.e. CSPA xx-xx) shall also be located in the lower right corner.
 - 9. Permit approval table listing all agencies requiring approval and the date approval is granted.
- D. A fire protection sheet shall be included which shows the following items and nothing else:
 - 1. Roads.

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2. Parking lots.
 3. Driveways.
 4. Buildings.
 5. Ingress/egress points.
 6. Building heights and uses.
 7. Water main.
 8. Domestic water service.
 9. Fire service lead.
 10. Hydrants.
 11. Post indicator valves (PIV).
 12. Fire department connections (FDC).
 13. Meter rooms.
 14. Township fire apparatus turning template with dimensions maneuvering site.
 15. Three hundred (300) feet hose lay lines.
 16. Fire lane no parking signs.
- E. A storm drainage narrative shall be included clearly and concisely describing the intended method of designing the storm drainage systems, including drainage areas, existing and proposed; detention or retention basins and discharge concepts; storm sewer and ditch design criteria; Washtenaw County Water Resources Commissioner development criteria; and downstream capacity limitations. The narrative should be interspersed with all associated computations as they are developed. The narrative should also be prepared on standard 8 ½-inch by 11-inch sheets dated, numbered and titled; and include the name, address and telephone number of the person or firm that prepared it. Maps of similar size portraying the concepts involved should also be included.
- F. Nonresidential site plans shall provide access throughout the site for the WB-50 design semi-truck and the Township T-2 Fire Apparatus. Plans shall include both templates maneuvering the site with the appropriate template detail. Templates may be obtained from the Township website.

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- G. A permanent benchmark shall be established for each project and be shown on the plans.
- H. Soil Erosion and Sedimentation Control Plan. Such plan shall be developed according to the Pittsfield Township Soil Erosion and Sedimentation Control Checklist.
- I. Proposed structures; addresses; distance between existing structures; finished floor elevations; basement floor elevations; finished grade elevations; indication of a walkout or a viewout; and sill elevations if a viewout.
- J. Phase I and/or Phase II environmental impact study, if site warrants. To be determined by the Township Engineer.
- K. Drives or street names; right-of-way or easement width; surface type and width; surface elevations; location and type of curbs; length and width of turning lanes; curve radii.
- L. Proposed parking areas – number and size of spaces; location of each space; type of surface; aisle width; angle of spaces; location of wheel stops and/or curbs, where applicable.
- M. Proposed fences or screens – location; height; type; typical details, including elevations and sections.
- N. Photometric Plan:
 - 1. The Photometric Plan shall be a scaled plan and shall show the layout of the entire site including:
 - a. Property Lines;
 - b. Roadways;
 - c. Driveways;
 - d. Parking Areas;
 - e. Sidewalks; and
 - f. Existing and Proposed Building Locations.
 - 2. The Photometric Plan shall also include the following minimum information:
 - a. Location of all site lights including:

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- i. Area lights;
 - ii. Driveway lights;
 - iii. Pedestrian lights;
 - iv. Building mounted lights;
 - v. Canopy lights;
 - vi. Sign lights; and
 - vii. Landscape lights.
- b. A Luminaire Schedule indicating:
- i. Type (“A”, “B”, “C”, etc.);
 - ii. Manufacturer;
 - iii. Model Number;
 - iv. Lamp Type;
 - v. Lumen output;
 - vi. Wattage;
 - vii. Number of Head; and
 - viii. I. E. S. photometric file number used for calculations for each luminaire.
- c. Mounting height for each luminaire.
- d. Photometric grid spacing shall be 20 feet x 20 feet maximum.
- e. Footcandle levels at all property lines.
- f. A Photometric Summary/Statistics Table indicating:
- i. Maximum, Minimum and Average footcandle levels; and
 - ii. Maximum-to Minimum and Average-to-Minimum ratios.

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3. Location and size of manholes.
 4. Profiles below their respective plan views.
 5. Design basis.
- R. Stormwater Management System:
1. Dimensions.
 2. Cross sections.
 3. Material type and size of storm sewers.
 4. Location and centerline elevations of swales or ditches.
 5. Inverts with direction and size annotated
 6. Direction of flow.
 7. Overflow route of surface drainage when the 10 year event is exceeded.
 8. Profiles of storm sewers.
 9. Culverts.
 10. Design basis.
- S. Proposed interior plumbing plans:
1. Location.
 2. Size.
 3. Material type of lines.
 4. Floor drains.
 5. Roof drains and their respective interconnectivity.
 6. Water lines.
 7. Domestic and fire.
 8. Size.
 9. Valving.

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10. Backflow prevention.
- T. Franchise Utilities Services (Electrical, Telephone, Cable, and Gas):
 1. Location of underground lines and surface equipment/cabinets.
- U. Private roads shall meet all requirements of Chapter 8 of these standards.
- V. All water, sanitary sewer, and storm drainage lines and appurtenances together with all streets, lot lines, and outlines of all existing and proposed buildings, shall be shown on one sheet in each construction set of plans.
- W. Evidence of approval by or letter of “no jurisdiction” by:
 1. Michigan Department of Environmental Quality – wetlands, lakes, streams, dams, floodplain.
 2. Michigan Department of Transportation.
 3. Washtenaw Country Road Commission.
 4. Washtenaw County Water Resources Commissioner’s office. For site plans not within the jurisdiction of the WCWRC, a review and technical approval of the stormwater management concepts shall be obtained.
 5. Washtenaw County Environmental Health – wells, septic systems.
 6. City of Ann Arbor.
- X. Proposed building and address numbers.
- Y. If a site plan is approved as a Drainage District, evidence that the Drainage District is established.
- Z. If off-site easements are required to connect to public utilities, evidence that the easement has been recorded.
- AA. Temporary Dewatering Plan, if requested by the Township Engineer. Specifications shall be integrated into the plans that address impacts on adjacent properties, wells and wetlands. The amount and location of flow at the discharge point and well abandonment plan shall also be shown on the plans.
- BB. A hydrogeological study, if requested by the Township Engineer, that investigates the fluctuation of groundwater and anticipated high groundwater elevations throughout the site.

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- CC. Current Township Specifications and Detail Sheets.
- DD. Design basis with supporting calculations for water and wastewater.
- EE. All design shall be consistent with chapters 3-14 of the Current Engineering Standards.

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Chapter 3

WATER MAINS

3.01 General:

- A. All construction shall be in accordance with the current “Pittsfield Township Water Main” specifications and details. Specifications and details must be included in the construction plans and are located on the Township’s webpage.
- B. All water mains shall be shown in plan and profile on standard twenty-four (24) inch by thirty-six (36) inch white prints having blue or black lines, and shall be neatly and accurately prepared to an engineering scale.
- C. A quantities table itemizing all proposed water mains shall be included.
- D. Water main location, size, length and all easements shall be shown on the plan view.
- E. Water main material, size, length, and appropriate controlled density backfill shall be shown in the profile view.
- F. The minimum horizontal separation between water main and any other utility shall be 10 feet. Outside the road right-of-way or road easement, the minimum horizontal separation between water main and trees shall be 10 feet. Inside the road right-of-way or road easement, the minimum horizontal separation shall be 4 feet.
- G. The minimum vertical separation between water main and any other utility shall be 18 inches at crossings. Top of pipe and bottom of pipe elevations shall be provided at each crossing.
- H. Compaction of trenches is required in roadway corridors, sidewalks and parking lots (Class II Granular Backfill at 95% compaction). Roadway corridors constitute front of house to front of house in residential developments. This note shall be included in the plans.
- I. Hydrant and post indicator valves (PIV) shall be shown graphically in plan and profile. The PIV shall be-placed outside the building collapse zone.
- J. Gate well and curb box locations shall be shown graphically in plan and profile.

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- K. It is recognized that water mains and appurtenances to be constructed as part of a project may often need to be oversized in order to be properly integrated into the Township's system. The Township shall not bear the cost of such oversizing. The proprietor shall bear all costs and provide required easements.
- L. Water mains are to be designed within or adjacent to the road right-of-way. Back or side lot locations are exceptions for special applications or serviceability difficulties and shall be in a minimum 20 foot wide easement.
- M. Utilities which cross or parallel proposed water main shall be shown with corresponding structure numbers from previously constructed projects or the current Township GIS.
- N. Use of vertical bends shall be minimized.
- O. Two (2) 45 degree bends shall be used in lieu of one (1) 90 degree bend.
- P. No water mains or appurtenances should be constructed or allowed to remain under or within 20 feet of any building, footings, or structural improvements.
- Q. The developer shall submit the MDEQ Permit Application to the Township Engineer. The developer shall also submit a tabulation of water mains consisting of the size, location, type, and length. The Township will ensure proper submittal to the Michigan Department of Environmental Quality for their issuance of the required construction permit in conformance with Act 399, Public Acts of 1976, as amended.
- R. Shop drawings shall be submitted by the underground contractor for all water main and appurtenances that he or she will install. Shop drawings will consist of letters of certification for all pipe, and manufacturer's standard details or cut sheets for structures and appurtenances. Shop drawings must be approved prior to construction activity beginning.
- S. Hard copy and electronic record "as-built" plans shall be submitted by the developer and reviewed and approved by the Township Engineer after construction is complete. These plans shall show the location and elevations of all water mains and appurtenances per the Township's current requirements. The approved electronic "as-built" plans shall be in AutoCAD format.
- T. All water main materials and construction shall comply with the current Township Standard Specifications, Details, and Shop Drawing Checklist.

3.02 Sizes and Distribution:

- A. Each phase should be looped with a dual feed.

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- B. Water mains shall be extended to the property lines on all sides of the subject parcel. The location and phasing shall be approved by the Township Engineer.
- C. In general, water mains shall be looped and have minimum sizes as follows:
 - 1. Low Density Residential – 8-inch.
 - 2. Other Residential, Commercial and Industrial – 12-inch primary looping; 8-inch secondary.
 - 3. Major System Looping – 12-inch and larger.
 - 4. Section Line Infrastructure – 16-inch and larger.

3.03 Depth of Water Main:

- A. The typical depth of cover to top of pipe shall be 5.5 feet. Maximum allowable depth of water main is 7 feet, unless specifically approved by the Township Engineer. Vertical bends are highly discouraged and only allowed when approved by the Township Engineer. Where a vertical bend must be placed in a water main in order to pass under another utility, the length of the deep water main shall be kept to a minimum.

3.04 Easements:

- A. Easements shall be provided to Pittsfield Township for all public water mains. Water main easements shall be a minimum 20 feet wide and shown on the plan. These easements shall be prepared, executed and recorded by the developer prior to final acceptance of the project by Pittsfield Township. Easements shall be prepared in a form acceptable to Pittsfield Township.

3.05 Profile:

- A. Profiles shall be located below their respective plan view.
- B. The following information shall be shown on the water main profile:
 - 1. Continuous stationing in the plan and profile.
 - 2. All structures and hydrants uniquely numbered.
 - 3. Length of run between structures.
 - 4. Type and class of pipe between structures.
 - 5. Size of pipe between structures.

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6. Top of casting elevations of all structures.
7. Finished grade elevations of all hydrants.
8. Existing and proposed ground elevations along the route of the water main.
9. All existing and proposed utility crossings with top of pipe and bottom of pipe elevations.
10. Sand backfill areas compacted to 95% under the influence of pavement, shown graphically.

3.06 Testing:

- A. No water main installation or portion thereof shall have a leakage exceeding 0.092 gallons per inch diameter of pipe per 1,000 feet of length per hour at an internal pressure of 150 psi. This test shall be conducted for a minimum of two (2) hours and shall not be conducted until 30 days have elapsed since installation.
- B. All water main installations shall be disinfected in accordance with Michigan Department of Environmental Quality Standards.

3.07 Valves:

- A. Valves shall be located, at a minimum, as follows:
 1. Spacing 1,000 feet maximum.
 2. Four at every cross.
 3. Three at every tee.
 4. Not more than three hydrants between valves.
 5. Not more than three non-residential or multiple family residential buildings between valves.
 6. At locations sufficient to provide the Fire Department with accessible water even with one or more valves are shut off.
 7. At temporary dead ends (the water main shall be extended one pipe length past the gate well and include a temporary hydrant).
 8. On property/lot lines where possible.

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- 9. Valves shall be located outside of sidewalks or driveways. Valves must be located outside of all other pavement where possible.
- B. Valves shall be the same size as the water main on which they are installed. Allowable valve type shall be:

Valve Size, (inches)	Valve Type
8 -12	Resilient wedge gate valve
16 and larger	Determined by Utilities Department

- C. Gate wells are required on valves 8-inch and larger. Gate wells shall be precast, eccentric, watertight and have a minimum inside diameter as follows:

Valve Size (inches)	Diameter (feet) Line Valve	Diameter (feet) Valve w/Tee
8	5	6
12	5	6
16	6	6

- D. Clear openings in gate wells shall be a minimum of 24 inches.
- E. Post indicator valves (PIV) shall be located on all building fire service lines. They shall be at least 1.5 times the building height from the building. The domestic service shall be separately tapped and valved. Both the PIV and domestic service valve shall be located together. Three (3) feet separation shall be maintained between service lines.
- F. When connecting to an existing water main, a tapping sleeve and valve in wells are required unless connection to the existing water main can be made without interrupting service on the main as determined by the Pittsfield Utilities Department.

3.08 Hydrants:

- A. Hydrants shall be located such that all sides of buildings and structures will be within 300 feet of a hydrant and outside the collapse zone, but not closer than 50 feet. Measurements shall be made along the practical location of laying the fire hose.
- B. Hydrants should be located at intersections and major driveways.
- C. Hydrant leads should be 8-inch diameter. Hydrant leads may be 6-inch diameter where there is no reasonable intention for future extension and the lead is less than 10 feet from the water main.

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- D. Hydrants shall not be connected to the fire service lead.
- E. EJ 5BR250 with 24-inch barrel section hydrants shall be used. The hydrant shall have two pumper connections, one of which shall be equipped with a “Storz” adapter as specified in Chapter 11. Hydrants shall open left (counter clockwise). All hydrants shall be painted red. A “Storz” fitting shall be placed on the left nozzle when facing the hydrant.
- F. Hydrants shall be located 3 to 10 feet from the back of a curb.
- G. The center of the hydrant nozzle shall be 18.5 inches above the ground. Finished grade shall be provided on the plans.
- H. Hydrant outlets shall face the curb best approached by a fire apparatus. Final approval shall be by the Fire Marshal.
- I. For all buildings that require a fire department connection (FDC), one hydrant should be located within 50 feet from the building. The hydrant shall be dedicated to the FDC and not located on the fire service lead.
- J. In potential conflict areas, concrete filled 8-inch steel bollards shall be provided for protection of the hydrants. Bollards shall be painted yellow.
- K. Access to fire hydrants shall not be obstructed by landscaping, vehicular parking, trash containers, transformers, retaining walls, snow piles, ditches or any other obstructions.
- L. The Township Fire Marshal shall review and approve all hydrant locations.
- M. During the flushing of the water system and during acceptance testing, the entire hydrant head may be removed with approval from the Utilities Director.
- N. Temporary hydrants may be required for phased construction.
- O. Hydrants are required at all dead ends.
- P. Existing hydrants to be replaced shall be returned to the Pittsfield Township Utilities Department.

3.09 Joints:

- A. “Mega Lug” joint restraints are not allowed on any water main except as approved by the Township Engineer. All bell and spigot joints shall be push on. Concrete thrust blocks and locking gaskets shall also be used for joint restraint.

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- B. Petroleum resistant gaskets shall be used in areas where petroleum products have been stored or will be.

3.10 Water Services:

- A. House meter template shall be provided from Pittsfield Charter Township and installed by the homeowner’s contractor. Meters will be installed by PCT Utilities Department upon final inspection approval from PCT Plumbing Inspector.
- B. In residential developments, the service leads shall be brought to the property side of the public right-of-way and marked with a steel post painted blue. Curb stops and boxes shall be located at the ROW line with tails extending past the franchised utility easement. This will eliminate construction conflicts with gas, electric, phone and cable.
- C. Building wall, finish floor elevation, basement floor elevation (if any) and bottom of footing elevation shall be shown in profile of service leads for non-residential developments.
- D. All commercial and industrial service leads must be profiled below their respective plan views. This also includes fire service leads. The profile must show the location of PIV and service valves.
- E. No private services will be allowed from a 6 inch hydrant lead, fire suppression lead or a water main over 16 inches in diameter.

3.11 Meters:

- A. Two meters are allowed for each building. One shall be dedicated to the sprinkler system. Tie rods shall be used for non-residential sites.
- B. For non-single family homes, a water meter and service schematic shall be shown that includes the valves, meters, backflow preventers, and piping. The meter shall be in a heated, structurally sound room fully accessible from the building exterior or public common interior. It shall be located within 5 feet of the water service’s penetration of the exterior wall.
- C. The meter room for non-single family homes must:
 - 1. Be only one per building.
 - 2. Be fully heated.
 - 3. Have complete structural footings.

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4. Be fully accessible from the building exterior or public common interior within five (5) feet of the water service penetrations of the exterior wall.
 5. Be full height off the ground floor level.
 6. Contain appropriate meters, backflow preventers and control valves.
 7. Be clearly labeled on each ground floor plan or each building type.
- D. The meter room must be fully coordinated between:
1. Site civil engineer.
 2. Building mechanical engineer.
 3. Building architect.
- E. The location of Irrigation Meter Pits shall be shown.

3.12 Wells:

- A. When an existing building is connected to the water system, the water well must be abandoned.
- B. If water main is not available, a copy of the valid well permit from the Washtenaw County Health Department must be submitted prior to final approval.
- C. Any property serviced by Township water shall not install a water well for any purpose including irrigation. Should a well be existing, the well can continue to be used for irrigation purposes only. Upon any failure of well and its components, the well shall be abandoned per Washtenaw County Health Department standards.

3.13 Structure Schedule:

- A. A water main structure schedule shall be provided on the plans showing each hydrant and gate valve by structure number that includes:
 1. Casting type.
 2. Finished grade elevation/rim elevation.

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3.14 Materials:

- A. All water main pipe shall be Class 54 or PC 350 ductile iron, double cement lined. All joints shall be push on for all pipe appurtenances. Water main shall be polywrapped and include tracer wire consistent with Township standards.
- B. Service leads for 1-inch, 1-1/2-inch and 2-inch shall be Type K copper or blue polyethylene with tracer wire consistent with the current Township Shop Drawing Checklist. Service leads for 4-inch, 6-inch and 8-inch shall be Class 54 or PC 350 ductile iron, double cement lined. Each dwelling unit shall be served by a separate lead.

3.15 Jack and Bore and Directional Drill:

- A. Water main jacking and boring shall extend a minimum of 10 feet outside the edges of pavement. Length, size and invert of casing and pipe shall be shown at all bore locations. All materials and the method of installation shall be in accordance with the current Township Standard Earthwork Specifications. All casing pipes shall be grouted when all testing is complete unless otherwise directed by the Township Engineer.

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Chapter 4

SANITARY SEWERS

4.01 General:

- A. All construction shall be in accordance with the current “Pittsfield Township Sanitary Sewer” specifications and details. Current Township specifications and detail sheets must be included for the construction plans and are located on the Township’s website.
- B. All sanitary sewer shall be shown in plan and profile on standard twenty-four (24) inch by thirty-six (36) inch white prints having blue or black lines and shall be neatly and accurately prepared to an engineering scale.
- C. A quantities table itemizing all proposed sewer and manholes shall be included.
- D. Sewer location, material, size, length and requisite easements shall be shown on the plan and profile view.
- E. All utilities shall be shown which cross or parallel the proposed sewer.
- F. The minimum horizontal separation between sanitary sewer and any other utility shall be 10 feet. Outside the road right-of-way or road easement, the minimum horizontal separation between sanitary sewer and trees shall be 10 feet. Inside the road right-of-way or road easement, the minimum horizontal separation shall be 4 feet.
- G. The minimum vertical separation between sanitary sewer and any other utility shall be 18 inches. Top of pipe and bottom of pipe elevations shall be provided at each crossing in the profile.
- H. No sanitary sewers or appurtenances should be constructed or allowed to remain under or within 20 feet of structural improvements.
- I. Compaction of trenches is required in roadway corridors and parking lots (Class II Granular Backfill at 95% compaction). This note must be included in the plans and graphically shown in all profiles. Roadway corridors constitute front of house to front of house in residential developments. This note shall be included in the plans.

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- J. Sanitary sewers shall be designed within or adjacent to the road right-of-way with back or side lot locations an exception for special applications or serviceability difficulties.
- K. External grease traps shall be used for all new food service uses and be placed in the parking lot. A program proposal for continued maintenance and the title of the individual responsible for permanent grease trap maintenance shall be provided in the plans.
- L. Sanitary sewers shall be designed, at a minimum, according to the Recommended Standards for Wastewater Facilities (Ten State Standards, latest edition). The peak sanitary flows shall be designed using 100 gallons per capita per day multiplied by the appropriate peaking factor.
- M. For residential developments, design population factor should be at least 3.4 persons per dwelling unit.
- N. Minimum design velocity for sanitary sewers shall be 2 feet per second with the pipe flowing full. Maximum design velocities shall be 10 feet per second.
- O. The existing downstream sewer capacities shall be verified by the applicant to assure available capacity present for the proposed development.
- P. Sanitary sewer design calculations and a sanitary sewer service area map shall be included in the plans. Sewer design is subject to the review and approval of the Township Engineer.
- Q. Applicants shall submit the MDEQ Permit Application to the Township Engineer. The Township will insure proper submittal to the Michigan Department of Environmental Quality (MDEQ) for their issuance of the required construction permit in conformance with Part 41, Act 451, Public Act 1994, as amended.
- R. Shop drawings shall be submitted by the underground contractor for all sanitary sewers and appurtenances that will be installed. Shop drawings will consist of letters of certification for all pipe, manufacturer's standard details or cut sheets for structures and appurtenances, and a manhole component part list. Shop drawings must be approved prior to construction activity beginning.
- S. Hard copy and electronic record "as-built" plans shall be submitted by the developer and reviewed and approved by the Township Engineer after construction is complete. These plans shall show the as-built location and elevations of all sanitary sewers and appurtenances per the Township's current requirements. The approved electronic "as-built" plans shall be in AutoCAD format.

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- T. All sanitary sewer materials and construction shall comply with the current Township Standard Specifications, Details, and Shop Drawing Checklist.

4.02 Sizes and Distribution:

- A. Minimum 10-inch for public sanitary sewers.
- B. It is recognized that sanitary sewers and appurtenances to be constructed as part of a project may often need to be oversized in order to be properly integrated into the Township system. The Township shall not bear the cost of such oversizing. The proprietor shall bear all costs and obtain the associated easements.
- C. Sanitary sewers shall be extended to the property line on all sides of the subject parcel. The locations and phasing shall be approved by the Township Engineer.

4.03 Depth of Sewer:

- A. Minimum depth of cover to invert of pipe shall be 4.5 feet.
- B. Sewer leads shall be below bottom of footing.

4.04 Easements:

- A. Easements shall be provided to the Township for all public sanitary sewers. The easement width shall be a minimum two times the trench depth plus ten additional feet. The trench depth shall be the maximum sewer trench depth on a particular run of sewer. These easements shall be prepared, executed and recorded by the developer prior to final acceptance of the project by Pittsfield Township. Easements shall be prepared in a form acceptable to Pittsfield Township.

4.05 Profile:

- A. Profiles shall be located below the respective plan view.
- B. The following information shall be shown on the sanitary sewer profile:
 - 1. Continuous stationing in the plan and profile.
 - 2. All manholes, uniquely numbered.
 - 3. Length of run between manholes.
 - 4. Type of pipe between manholes.
 - 5. Size of pipe between manholes.

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6. Rim and invert elevations of all manholes.
7. Sewer slope.
8. Existing and proposed ground elevations along the route of the sanitary sewer.
9. All utility crossings with top of pipe and bottom of pipe elevations. (18 inch minimum clearance)
10. Sand backfill areas compacted to 95% under the influence of pavement, shown graphically.

4.06 Testing:

- A. All sewers shall be televised prior to air testing. DVD recordings shall be made and provided to the Township Engineer.
- B. No sewer installation or portion thereof shall lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe surface when tested at 3.0 pounds per square inch greater than back pressure. This test shall not be conducted until 30 days have elapsed after installation.
- C. Deflection Gauge (Mandrel): Mandrel testing shall take place to ensure the flexible pipe has been properly bedded and back-filled. The deflection test must be conducted no less than 30 days after installation of the final backfill. The maximum allowable deflection is 5 percent.

4.07 Storm/Ground Water Discharge:

- A. Downspouts, weep tile, footing drains, sump pump discharges, or any conduits that carry storm or ground water shall not be allowed to discharge into the sanitary sewer.

4.08 Grade:

- A. Both ground and invert elevations shall be provided at the end of each sewer line.

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- B. Minimum slopes shall be as follows:

Sewer Size, Inches	Slope, Percent
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08

4.09 Manholes:

- A. The location of each manhole shall be shown and labeled with a consecutive numbering system.
- B. Manholes shall be watertight, made of precast concrete, and have a minimum inside diameter of 48 inches.
- C. Clear openings in manholes shall be a minimum of 24 inches.
- D. The 0.8 diameter points shall be matched in sanitary sewer design.
- E. Internal drop manholes are required when the invert of the outlet pipe is 18 inches or more below the inlet pipe invert. Exterior drop connections are not accepted. Internal drop manholes shall have a minimum inside diameter of 60 inches.
- F. An allowance of 0.10 foot in grade shall be made for loss of head through each manhole.
- G. Monitoring manholes are required for all non-residential buildings. These manholes shall be located such that they are accessible by vehicle and approximately 20-30 feet from the building. Monitoring manholes are not required if a drop connection is used at the existing manhole. The proposed sanitary sewer will be considered a sewer lead if a drop connection is used.

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- H. Manhole spacing shall be maximized to provide as few manholes as is practical. Maximum manhole spacing shall be as follows:

Sewer Size, Inches	Manhole Spacing, Feet
10 to 21	350
24 and larger	400

- I. Manholes shall be located at:
 - 1. Changes of grade or direction.
 - 2. At change of pipe size.
 - 3. At junctions and at the end of the sewer.
 - 4. On property/lot lines where possible.
 - 5. In greenbelt areas and not in sidewalks or driveways.
- J. Flexible watertight joints are required for pipe connections to all manholes.
- K. A manhole bench shall be provided on each side of the flow channel, per Township detail.

4.10 Leads:

- A. Non-residential leads shall be a minimum diameter of 6-inch and have a minimum slope of 2%. Leads shall be SDR 26 PVC pipe.
- B. Residential service leads shall be 6 inches in diameter within the street right-of-way. The length of riser pipes should be shown in the profile, if applicable. Each dwelling unit shall be served by a separate lead.
- C. In non-residential and industrial areas, all service leads shall enter manholes. In residential areas, service leads shall be connected with wyes, where practical. The leads shall not enter the manhole against the flow. They shall enter approximately 12 inches above the manhole outlet invert.

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- D. In residential developments, service leads shall be brought to the center of the lot so that both the sewer service and the water service can be brought to the house in a benched common trench. This location will generally result in the least disruption to the property.
- E. In residential developments, the service leads shall be brought to the property side of the franchised utility easement that is adjacent to the public right-of-way and marked with a steel post painted green. This will eliminate construction conflicts with gas, electric, phone, and cable.
- F. Cleanouts shall be the same size as the sewer lead, and shall be located at all bends and distances greater than 75 feet.
- G. The location, type, length and slope shall be noted for each building service connection.
- H. All non-residential and industrial service leads must be profiled below their respective plan views. Building wall, finish floor elevation, basement floor elevation (if any) and bottom of footing elevation shall be shown in profile of service leads for non-residential developments.
- I. A sewer lead schedule shall be provided on the plans showing each lead with:
 - 1. Lead elevation at main.
 - 2. Riser height at main.
 - 3. Lead length to stub.
 - 4. Lead length from stub to building.
 - 5. Slope.
 - 6. Lowest building floor elevation.

4.11 Septic Tank:

- A. When an existing building is connected to the sewer system, the septic tank shall be pumped and abandoned per County standards.
- B. If sanitary sewer is not available, a copy of a valid septic tank permit from Washtenaw County Health Department must be submitted prior to final approval.

4.12 Pump Stations and Force Mains:

- A. Grinder pumps and pump stations are not permitted.

4.13 Structure Schedule:

- A. A sanitary sewer structure schedule shall be provided on the plans showing each manhole by number that includes:
 - 1. Casting type.
 - 2. Rim elevation.
 - 3. All invert elevations with size and direction.
 - 4. Depth.

4.14 Materials:

- A. Allowable types of sewer pipe are SDR 26 PVC for depths less than 15-feet. For depths greater than 15-feet, sewer pipe material will be determined by the Township engineer.

4.15 Jack and Bore:

- B. Sanitary sewer jacking and boring shall extend a minimum of 10 feet outside the edges of pavement. Length, size and invert of casing and pipe shall be shown at all bore locations. All materials and the method of installation shall be in accordance with the current Township Standard Earthwork Specifications. All casing pipes shall be grouted when all testing is complete unless otherwise directed by the Township Engineer.

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Chapter 5

STORMWATER MANAGEMENT

5.01 General:

- A. All construction shall be in accordance with the current “Pittsfield Township Storm Sewer” specifications and details. Specifications and details must be included with the construction plan and are located on the Township’s website.
- B. All stormwater systems shall be shown in plan and profile on standard twenty-four (24) inch by thirty-six (36) inch white prints having blue or black lines and shall be neatly and accurately prepared to an engineering scale.
- C. A quantities table itemizing all proposed storm sewer and manholes shall be included in the plans.
- D. Storm sewer location, material, size, length and all easements shall be shown on the plan and profile view.
- E. All utilities shall be shown which cross or parallel proposed storm sewer.
- F. The minimum horizontal separation between storm sewer and any other utility shall be 10 feet. Outside the road right-of-way or road easement, the minimum horizontal separation between storm sewer and trees shall be 10 feet. Inside the road right-of-way or road easement, the minimum horizontal separation shall be 4 feet.
- G. The minimum vertical separation between storm sewer and any other utility shall be 18 inches. Top of pipe and bottom of pipe elevation shall be provided at each crossing in the profile.
- H. No storm sewers or appurtenances should be constructed or allowed to remain under or within 20 feet of structural improvements. This does not pertain to edge drain or roof drains.
- I. Compaction of trenches is required in roadway corridors and parking lots (Class II Granular Backfill at 95% compaction). Roadway corridors constitute front of house to front of house in residential developments. This note shall be included in the plans.

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- J. Improved open drains may be permitted only if the road cross-section or proposed use so warrants.
- K. The 1% chance flood area elevation contour shall be provided on the plan. If no floodplain exists, a note shall be indicated on the plan.
- L. Sump pump discharge lines shall directly tie into the nearest catch basin. The sump pump discharge line shall include back flow prevention. Receiving manholes shall be constructed with 4-inch diameter stubs for future sump pump discharge line connection.
- M. Design calculations shall be submitted for:
 - 1. Storm sewers.
 - 2. Drainage ditches.
 - 3. Detention basins and retention basins.
 - 4. Restricted discharges.
- N. The applicant shall submit evidence that the storm drainage plan has been approved by the following agencies, if they have jurisdiction:
 - 1. Michigan Department of Transportation (MDOT).
 - 2. Michigan Department of Environmental Quality (MDEQ).
 - 3. Washtenaw County Road Commission (WCRC).
 - 4. Washtenaw County Water Resources Commissioner (WCWRC).
 - 5. City of Ann Arbor.
- O. Storm drainage systems shall be designed at a minimum, in accordance with current WCWRC's rules. The method for computing storm runoff shall be based on WCWRC's standards.
- P. Shop drawings shall be submitted by the underground contractor for all storm sewer and appurtenances that will be installed. Shop drawings will consist of letters of certification for all pipe, manufacturer's standard details or cut sheets for generic structures and appurtenances, and manhole component parts list. Shop drawings must be approved prior to construction activity beginning.
- Q. Hard copy and electronic "as-built" plans shall be submitted by the developer and reviewed by the Township Engineer after construction is complete. These plans

shall show the as-built location and elevation of all storm sewers and appurtenances per the Township’s current requirements. The approved electronic “as-built” plan shall be in AutoCAD format.

- R. All storm sewer materials and construction shall comply with the current Township Standard Specifications, Details, and Shop Drawing Checklist.

5.02 Sizes and Distribution:

- A. The minimum size for storm sewers shall be 12-inches in diameter. However, a sump pump lead or roof drain which accepts no direct surface runoff may be a minimum of 6-inches in diameter.
- B. Storm sewer design computations shall be submitted for review on a sewer design form/spreadsheet. These calculations shall also be provided on the plan set.

5.03 Depth of Sewer:

- A. Minimum depth of cover to top of pipe should be 3 feet, except in rear yards where minimum cover shall be 1 foot.
- B. The maximum depth to invert of any storm sewer shall not exceed the depth recommended by the manufacturer for each size and class of pipe.

5.04 Easements:

- A. All storm sewers must be located in a public right-of-way or an easement and shall be shown on the plan.
- B. Easements shall be provided to the appropriate authority for all storm sewers, storm drains and swales. These easements shall be prepared, executed and recorded by the developer prior to final acceptance within three (3) months after Township approval. Easements shall be prepared in a form acceptable to Pittsfield Township and the WCWRC.

5.05 Profile:

- A. A continuous stationed profile shall be provided for the storm sewer, through the detention basin and outlet structure.
- B. The following information shall be included in the storm sewer profile:
 - 1. Continuous stationing shall be provided in the plan and profile.
 - 2. All manholes, uniquely numbered.

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3. Length of run between manholes.
4. Type and class of pipe between manholes.
5. Size of pipe between manholes.
6. Rim and invert elevations of all manholes.
7. Storm sewer slope.
8. Hydraulic gradient line for the 10 year storm; maintained a minimum 2 feet below the top of all structures.
9. Existing and proposed ground elevation along the route of the storm sewer.
10. All utility crossings with top of pipe and bottom of pipe elevations. (18 inch minimum clearance)
11. Sand backfill areas compacted to 95% under the influence of pavement, shown graphically.

5.06 Grade:

- A. Sewer slopes shall provide a minimum flowing full velocity of 3 feet per second and maximum flowing full velocity of 10 feet per second.
- B. Where sufficient grade is available, storm sewers shall be constructed at a depth adequate to allow for gravity drainage of the building footing drains. Where grade is not available to allow for gravity drainage of the footing drains, a sump with pump shall be provided for each building with the pump discharge connected to the nearest catch basin or directed to an on-site improved open drain.

5.07 Structures:

- A. In residential developments, drainage structures shall be located at every other lot line, thus reducing the need for rear yard cross lot drainage swales.
- B. All manholes shall be watertight, made of precast concrete, and have a minimum inside diameter of 48 inches. Landings are required when the depth exceeds 20 feet.
- C. Manholes and catch basins shall be consecutively numbered.
- D. Clear openings in manholes shall be a minimum of 24 inches.

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- E. Maximum spacing between storm drainage structures shall be per current WCWRC standards.
- F. In general, street catch basins shall comply with the standards of the Washtenaw County Road Commission and shall be located as follows:
 - 1. At the radius return of street intersections. There should be a maximum distance of 150 feet along the street between a high point and a corner catch basin when drainage is required to traverse the corner. No drainage will be permitted to enter into the intersection.
 - 2. At all low points in streets.
 - 3. At intermediate points along the street such that there is a maximum distance of 400 feet along the street between a high point and a catch basin or from a previous intercepting catch basin.
 - 4. At each corner of intersections with public roads to prevent drainage from passing through the intersection.
- G. Storm drainage structures, other than manholes, shall meet the following minimum requirements:
 - 1. 24-inch diameter structures are permitted if the depth from rim to top of the bottom slab is less than 5 feet and the structure is at the head of a run. Structures with a depth greater than 5 feet shall have a minimum inside diameter of 4 feet.
 - 2. Clear openings in structures shall be a minimum of 24 inches.
 - 3. Sumps will be used only where specifically required; such as by the WCRC, WCWRC or prior to discharge to a wetland.
- H. Structures shall be located at:
 - 1. Changes in grade.
 - 2. Change in direction.
 - 3. Change in pipe size.
 - 4. At junctions.
 - 5. At the end of the sewer.

6. Every other rear lot corner where stormwater is drained or carried through a rear yard, such as a swale.

5.08 Service Leads:

- A. The location, type, length, and slope of building service connections shall be shown on the plan.

5.09 Detention/Retention:

- A. Stormwater capacity shall be provided for the temporary detention of stormwater runoff from the 100-year/24 hour storm event, the bankfull flood (2-year/24 hour storm event) and the first flush volume (the runoff from the first 1 inch of rain from the entire contributing watershed). Design shall be consistent with the WCWRC standards.
- B. Sediment forebays shall be provided at the inlet of all stormwater management facilities to provide energy dissipation and to trap incoming sediments. Forebays shall be designed per the current WCWRC rules.
- C. Method for stormwater detention include, but are not limited to, the following:
 1. Deep permanent lake/retention basin.
 2. Landscaped shallow dry detention basin.
 3. Underground storage.
 4. Low Impact Design (i. e. Bioswales, infiltration, etc.)
 5. Roof storage.
 6. Combination of the above.
- D. Discharge from the developed site shall not exceed the maximum rate of discharge which occurred on the undeveloped site.
- E. Deep permanent lakes/retention basins shall:
 1. Be at least 10 feet deep over 2/3 the surface area, or have mechanical aeration or supplemental well supply.
 2. Have in-water slopes not steeper than 1 vertical on 5 horizontal for the first 20 feet; and 1 vertical on 3 horizontal from there to the bottom.
 3. Not be closer than 20 feet from any structure at maximum elevation.

4. Have a discharge for both normal use and emergency use.
5. Have their retention calculated only above the outlet invert.
6. Where retention is required due to an insufficient outlet, the stormwater capacity design of the retention basin shall be consistent with the current WCWRC standards.

5.10 Stormwater Quality:

- A. A stormwater treatment device may be required prior to discharge from the site. New development will be reviewed on an individual basis.
- B. Means for delivery and maintenance of stormwater treatment structures shall be specified.

5.11 Structure Schedule:

- A. A storm sewer structure schedule shall be provided on the plans showing each manhole, catch basin, and end section by number that includes:
 1. Structure type.
 2. Casting type.
 3. Rim elevation.
 4. All invert elevations with size and direction.
 5. Depth.
 6. Sump (Yes or No).

5.12 Stormwater Management Maintenance Agreement:

- A. A stormwater management maintenance agreement, satisfactory to the Township, shall be executed by the property owner prior to the pre-construction meeting.

5.13 Materials:

- A. Allowable sewer pipe is reinforced concrete (C76-Class IV). Allowable culvert pipe is reinforced concrete or corrugated metal pipe (CMP). Allowable underground storage pipe is reinforced concrete or HDPE.

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Chapter 6

GRADING, DRAINAGE, AND EROSION CONTROL

6.01 General:

- A. Sufficient proposed grades shall be shown on the plans to ensure that:
 - 1. Drainage is adequately discharged off-site with proper retention/detention.
 - 2. No upstream drainage is restricted.
 - 3. Paving slopes are adequate.
 - 4. The site, in general, drains without standing water.
 - 5. Sight lines are not obstructed.
 - 6. Grades must be provided at least 100 feet off-site in all directions.
- B. The following elevations shall be shown on the plans:
 - 1. Finished floor grade.
 - 2. Hydrants.
 - 3. Structure rims.
 - 4. Centerline of ditch.
 - 5. Retaining walls.
- C. Proposed grading shall meet abutting property line elevations.
- D. Differentials in grade must incorporate a 4 horizontal to 1 vertical maximum slope to the abutting property line.
- E. Erosion control blankets may be required for slopes in excess of 4 horizontal to 1 vertical.

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- F. Easement from adjacent property owner will be required for any offsite grading. This document will need to be submitted prior to final engineering approval.
- G. Any wall separating a differential grade of more than 4 feet shall be considered a retaining wall. Design Engineer will be required to submit a retaining wall design to the Township Engineer along with a complete detail of the wall for a structural review.
- H. Where retaining walls with differences in grade on either side of the wall in excess of 4 feet are located closer than 2 feet to a walk, path, parking lot or driveway on the high side, such retaining wall shall be provided with railings that are constructed in accordance with the Michigan Building Code.
- I. Any face of a retaining wall shall have a minimum of 2 feet from the nearest property line. Easement from abutting parcels may be necessary.
- J. A single family lot shall be graded to drain away from the house to swales constructed along the lot lines. Swales shall discharge directly to a catch basin or other approved drainage course.
- K. Driveway locations shall be included in the grading plan to ensure driveways do not conflict with proposed drainage patterns.
- L. Grading plans shall take into account the natural features of the land as much as possible.
- M. No filling will be allowed within the floodplain of a river, stream, creek or lake unless under the terms of a permit granted by the MDEQ.
- N. The Owner shall certify that the as-built site grading and building setbacks conform to the Township's approved site and engineering drawings at the completion of the improvements. This certification shall be prepared by and bear the seal of a professional land surveyor licensed in the State of Michigan. The certification shall be submitted as directed on forms provided by the Township. The following conditions shall be noted:
 - 1. No certificate of occupancy will be granted until grading certificates are received and approved for each lot.
 - 2. After a grading certificate is submitted, funds may be withdrawn from the inspection escrow to have the Township Engineer spot-check grades at the Township's discretion. The stormwater basin grades may be verified at this time as well.

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- O. The submittal of plans to satisfy this chapter may be made as a part of the submittal under other chapters of these standards. In no way do the requirements of this chapter alter the requirements of the Pittsfield Soil Erosion and Sedimentation Control Ordinance. A separate and distinct procedure is called for therein.
 - P. No earth change activity may commence until a soil erosion control plan and application have been approved, a permit issued and the soil erosion control measures inspected and approved. All trees shown on the approved site plan as being saved shall be tagged and have a protective fence placed around them at the drip line.
 - Q. Grading plans shall be drawn with existing and proposed contour lines at one foot intervals. Spot elevations may be provided, but shall not substitute for contour lines.
 - R. Grading plans shall include the finished grade elevation for proposed hydrants. Rim elevations shall be provided for each storm structure, gate valve, and sanitary manhole.
 - S. Grading plans shall show all the changes on the site required to convert its predevelopment state to a completed development.
 - T. Proposed contour lines shall connect with existing contour lines within the site unless grading easements are obtained from adjacent property owners. A clear distinction shall be made between proposed and existing contours.
 - U. Proposed grades shall generally not exceed a slope of 1 on 4. If a slope greater than 1 on 4 is necessary, the surface shall be planted with a ground cover that is suitable for stabilizing the slope.
 - V. All graded areas shall be planted or otherwise protected from wind or water erosion within five (5) days after final grading. Other means of stabilization may be substituted for plantings in unique situations if approved by the Township Engineer. The plantings and other means of stabilization shall be properly maintained.
- 6.02** All contour lines and spot elevations shall be based on NAVD88.
- 6.03** Every parcel shall provide positive drainage that does not negatively impact adjacent parcels/lots.
- 6.04** The grade from a house to its adjacent street shall be not less than one percent (1%) and the proposed finished grade at the building shall not be less than twelve inches above the

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top of curb. The rear yard finished grade elevation shall be not be less than twelve inches above the 100 year flood elevation.

- 6.05** Roof downspouts and sump pump discharges shall be directed to the stormwater system.
- 6.06** Sheet flow may be allowed into a wetland if adequate plant material exists as a buffer.
- 6.07** The longitudinal grade of rear yard drainage shall not be less than two percent (2%).
- 6.08** The finished first floor and bottom of footing elevations, if applicable, shall be provided on the grading plan. For single family homes it is understood that these elevations may vary slightly during construction based on the actual location of the house on the lot and the house type. However, all proposed deviations shall be approved in advance of construction.
- 6.09** When applying for a building permit for a single family home in an area with an approved grading plan, the builder shall submit the following on a plot plan to the building department:
- A. North arrow.
 - B. Scale.
 - C. Name, address, and phone number of the applicant and the person or company who prepared the plan.
 - D. Site information for the lot or unit, including floor area ratio, lot coverage and net lot coverage.
 - E. Lot lines with dimensions and bearings.
 - F. Location and dimensions of all proposed structures and proposed setbacks from all property lines consistent with the Zoning Ordinance.
 - G. Street name and right-of-way width.
 - H. Location of existing water, sanitary and storm mains including manholes, structures, gatewells and hydrants within the vicinity of the site. Existing service lead stubs for each utility shall also be shown.
 - I. All proposed service leads for water, sanitary and storm with sizing shall be extended to the house. Proposed leads shall be differentiated by line type from existing leads.

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- J. All adjacent lots to the site shall be labeled with lot number and identified as either vacant or with an existing building. Proposed spot grades from adjacent lots under construction shall be shown consistent with the adjacent lot plot plan.
- K. The location and elevation of regulated 100-year Floodplain boundaries.
- L. Soil Erosion and Sedimentation Control measures.
- M. Existing and proposed elevations at the following locations as listed below in Items 1-2. NOTE: (The elevations along lot lines shall conform to the Township approved final plan. House finish grades may also be varied from the approved plan (+/- .5 foot) as long as acceptable grades away from the house are maintained per 6.04 of this chapter.
 - 1. Each lot corner (front and rear), side lot (at 50-foot intervals), and all high points and ridge lines shown to the nearest tenth of foot. Proposed drainage arrows should be shown to designate the direction of proposed flow.
 - 2. Whenever proposed swales (side or rear yard) for lot drainage are called for on the plan, swale elevations shall be required at the high point of the swale and at 50-foot intervals along the swale. The high point of the swale shall be a minimum of 0.50 feet below the proposed finish ground elevation of the house. Proposed drainage arrows should be shown to designate the direction of proposed flow. A minimum of 2% grade shall be maintained for all swales.

6.10 No grading is allowed within the floodplain boundary without an MDEQ Permit.

6.11 Finish floor, finish grade and top of footing elevations shall be provided and make sense in relation to each other.

6.12 Driveways:

- A. Show location and width for proposed drive (s).
- B. Number of drives shown is consistent with WCRC Permit.
- C. Maximum slope of driveways shall be 6%.
- D. The driveway shall not interfere with side or front yard drainage.
- E. Edge of drives shall be offset a minimum of three (3) feet from side lot line.

6.13 Retaining Walls:

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- A. Walls greater than four (4) feet in height shall require an engineering analysis from a structural engineer prior to issuance of a Building Permit. In addition, a separate permit from the Building Department will be necessary for construction of this wall.
 - B. Unless adjacent to a driveway or parking lot, walls less than four (4) feet of height will be considered landscape walls and do not require an engineering analysis.
 - C. Retaining walls (other than for decorative purposes) are generally unacceptable. Where absolutely necessary due to steep slopes, retaining walls should not exceed five (5) feet in height. Terraced retaining walls shall be separated by minimum of five (5) horizontal feet.
- 6.14** Pathways for any parcel on a main arterial road or as shown on the site plan, sidewalks and bike paths are required as designated on Non-Motorized Transportation Plan found in the Township Master Plan.
- 6.15** SESC Permit (necessary for lots/parcels that are within 500 feet of a lake/stream/pond/waters of the state or lots/parcels over one (1) acre disturbed that are outside of recent established subdivision covered under blanket SESC permit for the site) must be issued prior to issuance of Building Permit.
- 6.16** A building permit cannot be issued until a final acceptance letter has been issued for the Subdivision. The “Ready for Use” letter cannot be completed until all utility testing is complete, a walk-through of the site has been performed, and necessary financial guarantees posted.
- 6.17** Grading associated with detention and retention basins shall meet the following minimum requirements:
- A. No building may be closer than 20 feet from the 100-year high water elevation, measured horizontally.
 - B. In the above mentioned 20 feet, the maximum slope away from the buildings shall be 10%.
 - C. All slopes leading to the ponds shall be 1 vertical to 4 horizontal or flatter.
 - D. Various safety features for the prevention of vehicular and pedestrian entry into detention basins and retention ponds shall be considered such as:
 - 1. Large trees.
 - 2. Boulders.

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3. Berms.

4. Fences.

6.18 All material used for fill under structural improvements shall consist of readily compactable materials meeting the following minimum requirements:

- A. No inclusion of organic or other deleterious materials which may be subject to decay shall be permitted.
- B. All fill shall be free of ice or snow.
- C. No rock with a dimension greater than eight inches shall be buried within two (2) feet of finished grade or within two feet of a foundation base.

6.19 All areas of excavation and fill, exceeding two (2) feet, shall be shown on the plan.

6.20 All construction shall be in accordance with the current “Pittsfield Township Earthwork” specifications and “Soil Erosion and Sedimentation Control” notes.

6.21 Requirements for Residential Developments:

- A. Walk-out basements may be accepted with the approval of the Township.
- B. The longitudinal slope along a rear yard drainage easement shall be not less than 2.0%. Drainage between lots shall be in a swale located on the lot line.
- C. All grade point elevations shall be shown for each lot.
- D. The general direction of overland drainage in the rear yard shall be indicated on each lot with an arrow. High points shall be indicated.
- E. Overland drainage shall not cross from one lot onto another unless located within a drainage easement.
- F. The emergency overland drainage path shall be shown indicating the drainage characteristics of the site should the storm sewer system fail.
- G. High and low street grade points, slope direction (by arrow), and the location of all catch basin inlets and drainage ditches shall be shown on the grading plan.
- H. A maximum slope of 4 feet horizontal to 1 foot vertical shall not be exceeded for all terracing. The toe of slope shall be located outside of the rear and/or side lot line drainage easements.

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Chapter 6 – Grading, Drainage, and Erosion Control

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- I. Complete site grading plans shall be drawn to a maximum scale of 1" = 100' (e.g. 1" = 200' will not be accepted).
- J. Grading plans shall include details of typical lot grading and drainage patterns intended to be used.
- K. The grading plans shall show the existing elevation topography by contour lines. Topography on abutting property within 100 feet of the site boundary shall be shown.
- L. All elevations shall be on the North American Vertical Datum 1988 (NAVD 88).
- M. A detail of the typical lot drainage pattern shall be shown on the grading plan with all grade control points identified.
- N. In general, for streets with ditches and no curbs, elevation of the front lot line shall be at least 6 inches above the centerline of the road.
- O. Catch basins shall be placed in rear yard swales, at every second lot line, at low points per Section 5.07.A.
- P. Siltsack or other acceptable temporary measures shall be provided at rear yard catch basins to prevent sedimentation of storm sewers. The Owner shall be responsible for maintaining temporary erosion control devices.

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Chapter 7

PAVEMENT AND CURB

7.01 General:

- A. The applicant shall submit evidence that all approaches have been approved by the Washtenaw County Road Commission (WCRC), City of Ann Arbor, or the Michigan Department of Transportation (MDOT), for projects that fall under their jurisdiction.
- B. All parking lots and drives shall be paved and have curb.
- C. Parking lots and driveways shall have well-drained prepared subgrades. Adequate means of collecting and disposing of the drainage shall be provided.
- D. All parking lots shall conform to the most current specifications of the ADA, including accessible path and parking space requirements. The design engineer shall certify that the parking lot design meets the current ADA standards.
- E. All curbing shall be Portland cement concrete in accordance with the most recent MDOT standard specifications, type F4. Asphalt curbs are not permitted.
- F. Where drainage is intended to run along the curb, integral curb and gutter shall be used.
- G. Any road improvements in the Washtenaw County right-of-way are subject to the review and approval of the WCRC. A permit must be secured from the WCRC for construction.
- H. Any road improvements in the MDOT right-of-way are subject to the review and approval of MDOT. A permit must be secured from MDOT for construction.
- I. Any road improvements in the City of Ann Arbor right-of-way are subject to the review and approval of the City of Ann Arbor. A permit must be secured from the City of Ann for construction.
- J. Cross-sections of all proposed pavement improvements must be shown on the plans with thicknesses and materials clearly indicated.
- K. Concrete curb and gutter will be required for all parking lot construction. An appropriate detail shall be provided. Underground storm sewers will be installed

with all paving, which requires concrete curb and gutter. The stormwater runoff from all proposed site development will be collected and conveyed by means of storm sewers to approved points of discharge.

- L. Edge drains will be required for all paving improvements according to WCRC guidelines.
- M. Soil borings must be taken and analyzed by a professional engineering firm qualified to do such work at the locations of all proposed roads. The Township may request copies of the report. It is recommended that a soils investigation be done and a report prepared for all areas where pavement is proposed.
- N. Sufficient proposed grades must be shown on the plan to clearly show the drainage patterns.
- O. Passing lanes, acceleration lanes/tapers and deceleration lanes/tapers will be required according to WCRC guidelines.
- P. Minimum general paving slopes:
 - 1. Asphalt: 1.0%
 - 2. Concrete: 0.5%
- Q. Maximum general paving slopes:
 - 1. Road/Approaches: 6.0%
 - 2. Parking Lots and Sidewalks/Pathways: 5.0%

7.02 Typical Road Cross-Sections:

- A. The following minimum thickness requirements are based on adequate subgrade, subgrade drainage and average live loads. Each site must be examined individually and additional pavement thickness and/or base requirements may be necessary.
 - 1. Residential, commercial, office, industrial, private roadways and sidewalks/pathways:
 - (a) Cross-sections shall follow the guidelines provided in Chapter 8 of these standards.

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2. Parking lots:
 - (a) Cross-section shall match the WCRC Typical Rural, Local & Residential Bituminous Section or the WCRC Typical Rural, Local & Residential Concrete Section. Concrete curb and gutter is required for all areas.
3. Loading/unloading areas, if required by the Township, shall have 8” thick non-reinforced concrete over 4” of compacted Granular Material Class II.

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Chapter 8

PRIVATE ROADS

8.01 Intent:

- A. It is the intent of these standards to permit access to the interior of certain sections within the township by private roads which permit unobstructed, safe and continuous vehicle access in a manner that will promote and protect the public health, safety, and welfare and ensure that law enforcement, fire and emergency services can safely and quickly enter and exit private property at all times.
- B. It is further the intent of this standard to ensure that private roads are maintained and repaired by the private property owners who own and use the road.
- C. The procedures, standards and specifications set forth herein are determined to be the minimum procedures, and specifications necessary to meet the intention of these standards.

8.02 Definitions:

- A. The following words, terms and phrases, when used with these standards, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:
- B. *Easement* means the right of an owner of property, by reason of such ownership, to use the property of another for purposes of ingress, egress, utilities, drainage and similar uses. In the context of this chapter, private road easements shall be designated for purposes of vehicle ingress and egress.
- C. *Lot* means a parcel of land or real estate.
- D. *Private road* means an area of land which is privately owned, has not been dedicated to public use other than access by emergency and public safety vehicles, is maintained by its private owners, and provides vehicular access to more than one lot, unless otherwise specified herein.

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- E. For purposes of this chapter, private roads shall be further defined and classified as follows:
 - 1. Class I private roads shall be paved and shall meet one or more of the following criteria:
 - a. Serves ten or more dwellings, parcels or lots, or has a reasonably foreseeable potential to be extended in the future to serve a total of ten or more dwellings, parcels or lots. The potential shall be based upon the amount of acreage serviced and the potential buildable parcels.
 - b. Connects with or has a reasonably foreseeable potential to be extended at a future time to connect with another public or private road.
 - c. Has a length of more than 1,000 feet, measured on the roadway centerline from the right-of-way of the public road it intersects to either another intersecting roadway or center of a cul-de-sac.
 - 2. Class II private roads are those which do not meet the criteria for Class I roads as specified in subsection (a)(1) of this section, but which do exceed the criteria for Class III roads as specified in subsection (a)(3) of this section.
 - 3. Class III private roads are those which will serve no more than four dwellings, parcels or lots.
- F. *Public street or right-of-way* means a public or dedicated right-of-way which affords the principal means of vehicular access to abutting property, and which is under public ownership or control.

8.03 General Access and Permit Requirements:

- A. Every lot in the township that is improved with a building shall comply with Section 12.02 Access to a Public Street of the Zoning Ordinance.

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- B. No person shall construct, alter, or extend a private road without compliance with this chapter and obtaining a permit as hereinafter provided.
- C. All lots which have been improved with a building prior to the date of adoption of the ordinance from which this section is derived shall comply with the provisions of this chapter, if the township board, by resolution, determines that such compliance is necessary to protect and promote the public health, safety and welfare in accordance with the purposes set forth in Section 8.01.

8.04 Application for permit; requirements:

- A. Applications for permits shall be delivered to the township zoning administrator and filed with the clerk and shall consist of the following information:
 - 1. *Class I or II private road.*
 - a. Each application for a Class I or II private road shall be accompanied by completed plans prepared and sealed by a civil engineer registered in the State of Michigan, which includes the information contained herein. Where the required information is incorporated in the overall site plan of a development, separate road plans shall not be required.
 - b. The application and plans for a Class I or II road shall include the following information:
 - (1) The names and addresses of the dwelling, lot or parcel owners to be served by the private road.
 - (2) A vicinity map of a minimum scale of one inch equals 2,000 feet, showing the location of the private road in the township, any access roads and cross streets, road names, a scale and a north arrow.
 - (3) Existing topography at one-foot contour intervals for the portions of the site sufficient to determine drainage from the private road easement to a suitable stormwater outlet.

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- (4) Proposed improvements, including, but not limited to, roads, utilities and ditches, shown in plan and profile indicating all materials, grades, dimensions and bearings in compliance with the standards set forth in Section 8.05. The plans shall also show all existing and proposed grades, the location of all existing and proposed drainage facilities, the location of existing and/or proposed utilities and structures, other structures, physical or natural conditions existing adjacent to such improvements, and any connections to existing public and private roads.
- (5) Soil borings within the proposed route of the road. Tree coverage and wetland areas within 100 feet of either side of the proposed route.
- (6) The location of existing buildings on the lots or parcels being served or intended to be served by the private road as well as any existing building or structures in or adjacent to any proposed road easement.
- (7) The existing or proposed location of private utilities and easements, such as gas, telephone, and electric.
- (8) A complete statement of all the terms and conditions of the proposed road easement, including copies of all agreements or intended agreements regarding the maintenance and improvements of the right-of-way and roadway. Furthermore, said maintenance agreements shall be in such form as to be recordable with the county register of deeds and shall specifically address the liability and responsibility of the parties to said agreement to maintain the private road pursuant to the specifications of this section, including, but not limited to, the responsibility of removing snow from said private roads. The recorded statement which runs with the land shall also inform subsequent purchasers that the road is private and may never be maintained or accepted by the county road commission.

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2. *Class III private road.*

- a. Each application for a Class III private road shall be accompanied by completed plans prepared and sealed by civil engineer registered in the State of Michigan, which include the information contained herein. Where the required information is incorporated in the overall site plan of a development, separate road plans shall not be required.
- b. The application and plans for a Class III road shall include the following information:
 - (1) The names and addresses of the lot or parcel owners to be served by the private road.
 - (2) A vicinity map of a minimum scale of one inch equals 2,000 feet showing the location of the private road in the township, any access roads and cross streets, road names, and a north arrow.
 - (3) The location of existing buildings with existing and proposed grades in sufficient detail to depict drainage patterns. Existing utilities, storm drains, ditches, and swales crossing the road easement or adjacent to the easement shall be shown on the sketch plan.
 - (4) The relationship of the proposed road to an existing public roadway right-of-way which will serve as access for the private road.
 - (5) The location of the proposed road and turnaround within the easement together with proposed drainage and grading.
 - (6) The proposed roadway materials, thickness, and width and the type of underlying soil.
 - (7) A complete statement of all the terms and conditions of the proposed road easement, including copies of all agreements or intended agreements regarding the maintenance and

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improvements of the right-of-way and roadway.

Furthermore, said maintenance agreements shall be in such form as to be recordable with the county register of deeds and shall specifically address the liability and responsibility of the parties to said agreement to maintain the private road pursuant to the specifications of this section, including, but not limited to, the responsibility of removing snow from said private roads. The recorded statement which runs with the land shall also inform subsequent purchases that the road is private and may never be maintained or accepted by the county road commission.

8.05 Design standards:

- A. In addition to the standards and specifications set forth in the schedule of minimum requirements and specifications in subsection (b) of this section, all private roads shall meet the following additional minimum requirements and specifications:
1. The roadway surface and cul-de-sac area shall be centered in the right-of-way.
 2. The connection between the private road and the public road shall conform to the standards and specifications of the County Road Commission. Where a Class II road connects to a paved county road, the Class II road shall have a paved approach. The applicant shall obtain a road permit issued by the Road Commission prior to approval by the Township Board.
 3. Underground crossroad drainage shall be provided where the proposed road crosses a stream or other drainage course. Necessary culverts and erosion treatments shall be provided in accordance with the specifications of the Washtenaw County Road Commission and/or Washtenaw County Water Resources Commissioner.
 4. The private road easement and road shall be adequately drained so as to prevent flooding or erosion of the roadway, avoid adverse impacts to adjacent properties, and respect natural drainage patterns, to the extent possible. Ditches shall be located within the private road easement.

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Connection to roadside ditches within public road rights-of-way shall be approved by the county road commission prior to the issuance of a permit.

5. Private road signs shall be designated with the word "private" and shall be erected and maintained in accordance with the Michigan Manual of Uniform Traffic Control Devices.
6. The road easement shall provide for ingress, egress, drainage, and installation and maintenance of public and private utilities.
7. The private road shall be subject to all other township, county and state permits and regulations.

- B. The following schedule of minimum requirements and specifications for private streets and roads shall apply:

MINIMUM REQUIREMENTS AND SPECIFICATIONS FOR PRIVATE STREETS AND ROADS

	Class I Private Roads	Class II Private Roads	Class III Private Roads
Easement width	55 feet	55 feet	30 feet
Subbase	Depth will vary depending upon native soil types. Spread to a minimum width sufficient to extend to the front slope of the roadside ditch	Same as Class I	Same as Class I
Gravel base and/or surface	10 inches of 21AA limestone; compacted in two equal courses (see Private Road Cross Section in Appendix)	Same as Class I, except 12 inches of 21AA limestone compacted in two equal parts shall be required to a width of 24 feet.	Same as Class II except 16 feet wide

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Pavement	Pavement of five (5) inches of hot mix asphalt, applied in three (3) lifts; 2-inch base course, 1.5-inch leveling course, and 1.5-inch top course. Mix design and binder requirements shall be consistent with current approved Washtenaw County Road Commission standards. In lieu of hot mix asphalt, seven (7) inches of MDOT P1 concrete, or approved equal, may be used. (see Private Road Cross Section in Appendix)	Not applicable	Not applicable
Turnaround area:			
Cul-de-sac	75-foot radius right-of-way, 50-foot radius roadway surface	Same as Class I	Same as Class I
T Type	Not permitted	May be substituted for cul-de-sac subject to review and recommendation by Township Engineer and Fire Marshall.	Same as Class II
Ditches:			
	Ditching with a minimum grade of one half of one percent (0.5%). Grades of less than four percent (4.0%) shall be stabilized with sod. Grades steeper than four percent (4.0%) shall be stabilized with rip-rap. Front and back slopes shall be one (1) on four (4) or flatter.	Same as Class I	Ditches shall be of sufficient width, depth, and grades to provide for adequate and positive drainage

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Roadway grades:			
Minimum	0.5%	0.5%	0.5%
Maximum	6.0%	6.0%	6.0%
Roadway curves:			
Horizontal, minimum	175-foot radius*	Same as Class I	Same as Class I
Vertical, minimum	100 feet long for changes in gradient of 2% or more	Same as Class I	Same as Class I
Miscellaneous:			
Curb and gutter	MDOT F4 curb shall be used with Class I roads.		
Sidewalks	May be required in accordance with Chapter 28 Streets and Sidewalks of the General Code of Ordinances.		
*Low volume residential roads	<p>At low volume residential streets or roads, the following horizontal curve radii may be considered by the Township Engineer:</p> <ul style="list-style-type: none"> • 100' – 175': The plan must demonstrate adequate fire apparatus turning movements, must demonstrate adequate sight stopping distance per MDOT standards, and indicate no parking within 50' of curve on inside radius. • 75' – 100': All requirements stated above, plus an eyebrow must be designed utilizing an outside radius of 35 feet to provide additional pavement and may be no greater than 90 degrees. 		

8.06 Permit approval procedure:

- A. Application shall be submitted to the Township Department of Utilities and Municipal Services.
- B. The Township Engineer shall report in writing to the board as to whether or not the proposed private road conforms to the standards and specifications of this section. Said report may include any suggested conditions to be attached to the

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permit which, in the township engineer's judgment, are necessary to achieve the intent of this chapter.

- C. The Township shall consider the application, the township engineer's report and all other relevant information in determining whether to grant the permit application. If the information submitted by the applicant does not establish that the proposed private road will conform to the standards and specifications of this section, the Township shall not grant the permit. The Township shall impose such conditions on the approval of the permit as it deems necessary to achieve the intent and objectives of these standards, which may include, but need not be limited to, conditions suggested by the Township Engineer. The breach of any such condition proposed by the Township shall automatically invalidate the permit.
- D. As a condition to the granting of any permit under this section, the Township shall require that the applicant deposit with the Township a performance guarantee in accordance with the provisions set forth in Section 3.09 Performance Guarantee of the Zoning Ordinance.
- E. Upon receipt of the required deposit and predetermined fees and approval of the applicant by the Township, the Township Zoning Administrator shall issue the permit pursuant to the terms established by the Township approving the application.
- F. Only the Township shall have the authority to approve or deny applications for permits. No other permit issued by any Township official or other governmental body or official shall be a substitute for a permit.

8.07 Inspection:

- A. All work shall be performed in accordance with the current Michigan Department of Transportation Standard Specifications for Construction. All required improvements shall be inspected by the Township Engineer at various stages of construction. The Township Engineer shall make a final inspection upon completion of construction and shall report the results of the final inspection to the Township in writing. The applicant's engineer shall certify to the Township Engineer, before the final inspection and report thereon are made, that the required improvements were made in accordance with this chapter and all

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approved plans. A letter of completion by the Township Engineer shall be delivered to the Township Clerk, and the applicant. The costs of inspection, including compensation of the Township Engineer, shall be paid by the applicant prior to the issuance of the certificate of completion.

8.08 Expiration of approval of permits:

- A. A permit shall be valid for a period of one year from the date of issuance. Extensions of up to six months may be granted by the Township. If the required improvements have not been completed upon the expiration of the one-year period or the longer period of time, then the permit shall be void and of no force and effort and all deposits shall be forfeited to the Township.

8.09 Recording of easements:

- A. The easement, including all agreements as identified in Section 8.04, shall be recorded in the office of the register of deeds for the County prior to the issuance of the certificate of completion.

8.10 Certificates of Occupancy:

- A. No certificate of occupancy shall be issued for any building on a lot subject to the provisions of this section until all work is completed. A certificate of occupancy may be issued prior to the issuance of a certificate of completion, upon recommendation by the Township Engineer, and upon deposit with the Township of a sum of money, certified check, or bank letter of credit in an amount sufficient to guarantee completion of the remaining required improvements.

8.11 Variances:

- A. When there are practical difficulties or unnecessary hardships in the way of carrying out the strict letter of this chapter, such as topographical and other physical characteristics of a parcel, the Township Board shall have the power to vary or modify the application of the provisions of this section so that the intent and purpose of the section shall be observed and public safety secured. Any applicant may apply for a variance from any provision of this section by filing an application for variance with the Township.

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- B. The Township Board shall hold a public hearing upon such application within 45 days from its filing. The Township Clerk shall give notice of the hearing to the owners of all property abutting and/or having access for ingress and egress of traffic by means of the private road described in the variance application, as well as law enforcement, fire and emergency service officials known by the Clerk to serve such property. The notice shall be mailed to each such party and published in a newspaper of general circulation in the Township not later than twenty days prior to the hearing. Any party may appear and comment at the hearing in person or by agent or by attorney. The Township Board shall keep a record of said hearing.

- C. The Township Board may attach reasonable conditions in granting any variance from any provision of this section, and the breach of any conditions or the failure of any application to comply with the conditions shall void the variance. The provisions of this section are intended, in part, to enable variances to be granted and conditions attached to the variance to facilitate the upgrading of prior nonconforming rights-of-way and private roads to the standards of this section, in a reasonably practical manner, including, but not limited to, such rights-of-way and private roads as have been established, recorded, constructed, or maintained prior to the date of adoption of the ordinance from which this section is derived, which cannot be brought into conformity with this chapter without unnecessary hardship or practical difficulty due to soil conditions, topographical considerations, or other factors.

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Chapter 9

SIDEWALKS/PATHWAYS

9.01 General:

- A. All sidewalks/pathways shall conform to the most current AASHTO requirements and the specifications of the ADA.
- B. Sidewalks/pathways shall be required along the frontage of the proposed improvements. They will be in the right-of-way and 1 foot from the ultimate right-of-way line.
- C. Cross-sections shall meet WCRC guidelines.
- D. Proposed grades must be shown along the property line, driveways, and intermittent locations along the length of the walk.
- E. Any structures, hydrants, poles, etc., which exist along the alignment of the walk, must be adjusted or relocated at the expense and coordination of the owner.
- F. Sidewalks shall be at least 4 inches thick, except at driveways where they shall be at least 6 inches thick. Sidewalks shall be laid on a minimum 4 inches of sand base or approved equal.
- G. All sidewalks shall be designed and constructed to meet current ADA standards. The ramp shall have at least the same width as its sidewalk approach. The upper and lower ends of the ramp shall have the same elevation as the adjacent sidewalk and pavement surfaces.
- H. In general, sidewalks shall be located within the street rights-of-way, one foot from and parallel to the future right-of-way line. Exceptions will be made to accommodate existing conditions such as trees, utility poles and appurtenances, and distance to curbs.
- I. Pedestrian paths located outside street rights-of-way may be constructed of materials other than Portland Cement Concrete, with approval of the Township Engineer.
- J. No downspout or sump pump discharge drainage shall be permitted to flow over any concrete sidewalk.

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- K. The design engineer shall certify that all sidewalks/pathways meet current ADA standards.
- L. Where sidewalks intersect pavement at approaches, drives and parking lots, the sidewalk shall be carried through.

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Chapter 10

DRIVEWAYS

- 10.01** A driveway which intersects a paved street shall be paved for a minimum distance of 50 feet from the pavement edge of the road, even if the remainder of the drive is not to be paved. Single-family residential lots shall not be subject to this requirement.
- 10.02** Driveway slopes shall provide a smooth, uninterrupted movement of traffic from the street to the site. The slope shall be low enough to prevent undercarriage drag or vehicle bouncing, in order to permit safe entry and exit when the drive surface is wet. The minimum slope shall be 1% and the maximum slope shall be 6%.
- 10.03** Curve radii at drive intersections with streets shall be large enough to permit smooth, uninterrupted movement of traffic between the site and street.
- A. On County roads, the standards of the Washtenaw County Road Commission shall apply.
 - B. On State trunklines the standards of the Michigan Department of Transportation shall apply.
 - C. On City of Ann Arbor roads, the standards of the City of Ann Arbor standards shall apply.
 - D. On all other roads, driveway intersection radii shall generally meet County Road Commission standards unless the nature and speed of traffic on the road justify a lesser standard.
- 10.04** The angle of the driveway intersection with the street shall be 90 degrees unless a directional one-way flow of traffic is intended, in which case the angle of deflection from the street to the drive shall not be less than 45 degrees.
- 10.05** Driveways shall be constructed of a minimum 6 inches of concrete over 4 inches of sand.
- 10.06** Driveways shall be designed to accommodate existing and future sidewalks. These sidewalks shall be ADA compliant.
- 10.07** Where sidewalks intersect driveways, the sidewalk shall be carried through.

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Chapter 11

FRANCHISED UTILITIES

(ELECTRIC, TELEPHONE, GAS AND CABLE)

- 11.01** All procedures, design and construction of utilities shall be in conformance with the requirements of the supplying utility company.
- 11.02** Plans of all proposed utilities, whether or not in public easements, shall be submitted by the utility company to Pittsfield Township for review. Pittsfield Township will issue a construction permit to the utility company when its' plans are approved.
- 11.03** All existing and proposed utility information, including lines, poles and surface equipment shall be shown on the final site plan.
- 11.04** Surface equipment shall be located so as not to interfere with traffic flow, parking, building access, fire hydrants, or Fire Department connections.
- 11.05** Electrical, telephone, gas, and cable may not share a common trench with sewer and water mains and shall maintain a minimum of 10 feet of separation from them.

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Chapter 12

FIRE PROTECTION AND PREVENTION

12.01 Access:

- A. In addition to the standards in Section 10.04 the following shall apply:
1. All roads, lanes or drives required for emergency access shall be posted as required by NFPA 1141, Sections 3-1.8 & 3-2.3 with the following exceptions:
 - a. Entryways and main drives shall be posted with signs reading “No Standing – Fire Lane”.
 - b. Main drives adjacent and parallel to structures shall be posted with signs reading “No Standing – Fire Lane” or “No Parking – Fire Lane” on the side adjacent to the building and the opposite side shall be posted with signs reading “No Stopping – Standing – Parking – Fire Lane”. Parking shall be prohibited on one side of all main driveways.
 - c. Paved areas on the sides and rear of buildings which are less than thirty (30) feet wide shall be posted “No Parking – Fire Lane”.
 - d. Signs shall be installed with their faces perpendicular to the roadway, six feet, eight inches (6’-8”) high, facing the direction of travel, and shall be located so that at least one sign is clearly readable from any location on the posted road, lane or drive. Signs shall be two sided, where applicable.
- B. Landscaping or other obstructions shall not be placed around any structure, hydrant, Fire Department Connection (FDC), Post Indicator Valve (PIV) or other emergency equipment in a manner so as to impair or impede the visibility of, or accessibility to said equipment for emergency operations.
- C. A 10% maximum slope shall be maintained within twenty (20) feet of the building. (i. e. 2 feet in 20 feet).
- D. Provide a minimum of three sided access for buildings of irregular shape. Determination of compliance shall be determined by the Fire Marshal to all non-single family residential buildings.

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- E. Grass pavers generally are not permitted for access unless, in the opinion of the Planning Commission, their use is prudent and feasible.
- F. Building overhangs or extensions must provide 12 feet of clearance in order to prevent a fire apparatus obstruction. Overhang clearance shall be noted on the site plan.
- G. Fire lanes shall be a minimum of 22-feet wide.
- H. In multi-family residential buildings in which there are units with no front vehicular access to driveways, access ways must be extended along both sides of the building extending 35 feet beyond the furthest structural component of the building, including porch overhang.
- I. Site plans shall provide more than one (1) point of access to the site. Access points must be approved by the Fire Marshal.
- J. Emergency access routes must be capable of handling the weight of the fire apparatus and must be twenty two (22) feet wide. The surface shall be approved by the Fire Marshal. All emergency access routes must be approved by the Fire Marshal.
- K. Emergency only access roads must be clearly marked by signage stating, “Emergency Access Only” at entrance points and “No Parking, Fire Lane” every 75 feet along the road as designated by the Fire Marshal or his/her designee. Entrance points must discourage non-emergency traffic while not impeding emergency apparatus.
- L. Emergency access roads are preferred to encircle the structure(s). Dead-end emergency access roads must provide a cul-de-sac or hammer head type turn-around approved by the Fire Marshal. The Fire Marshal may exempt the turn around depending on circumstances (i. e. length).
- M. Ingress/egress gates, barricades or obstructions must provide approved Fire Department “Knox Boxes/Knox Locks” for entry.

12.02 Alarm Systems:

- A. Alarm systems must be installed according to NFPA 72.

12.03 Annunciator Panels:

- A. The Annunciator Panel for the alarm/suppression systems must be located just inside of the main entrance and visible from the main entrance. Zone locations

with legends must be available and placed inside of the Knox Box, or in the annunciation panel, at the discretion of the Fire Marshal.

12.04 Applicable Codes:

- A. Fire protection and prevention for sites and structures shall be designed, constructed and maintained in accordance with the provisions of the International Fire Code, as adopted, the Fire Prevention Standards of the National Fire Prevention Association (NFPA), as adopted by reference, the Building Code of Pittsfield Charter Township, these Engineering Standards and other applicable ordinances.

12.05 Dry or Wet Hydrants:

- A. Hydrant placement shall be measured as “hose-laying distance” from Fire apparatus. Hose-laying distance is the distance the fire apparatus travels along approved access routes between hydrants or from a hydrant to the structure.
- B. No commercial, industrial, or multiple residential area shall be more than 300 feet from a hydrant or approved water supply. Adequate water supply shall be determined by NFPA 1142 or the Authority Having Jurisdiction (AHJ).
- C. In single-family residential areas consisting of five (5) or more homes, an adequate water supply must be considered and recommended by the AHJ and approved by the Township Board.
- D. Dry hydrants shall be at least three (3) feet, but no further than six (6) feet, from the back of the curb or road edge. Height of hook-up point shall be 18.5 inches.
- E. Hydrant location shall be determined by the Fire Marshal, Township Engineer and Utilities Director. Hydrants should not be located in the collapse zone of a building.
- F. Hydrants shall be protected by curbs, bollards, guard rail, or other acceptable methods if determined to be in a hazardous location.
- G. Additional hydrants may be required depending on the type of hazard or use to protect the structure and/or contents.
- H. Hydrants must meet Pittsfield Charter Township Fire and Utility Department specifications. All fire hydrants shall have two pumper connections, one of which shall be equipped with a “Storz” adaptor as specified below. All hydrants shall be painted red.

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- I. Site plans shall note water sources including all dimensions of ponds, rivers, and accessibility, which a minimum of 2 feet below the 50 year drought level, as determined by a registered Engineer.
- J. Dry hydrants, underground water storage tanks or static water supplies must be in compliance with all applicable referenced codes in the Pittsfield Charter Township Fire Department.
- K. Hydrants and Fire Department Connections shall be unobstructed from posts, fences, vehicles, plantings, trash storage or other materials. A clear space of three (3) feet shall be maintained unless otherwise approved by the Fire Marshal. Hydrants shall have a minimum of 15 feet clear area in the direction of the nozzles.

12.06 Fire Department Connections:

- A. Fire Department Connections (FDC) shall be located in a location approved by the Fire Department.
- B. Fire Department Connections shall be located so that firefighters and fire apparatus can make immediate access. Obstructions such as fences, bushes, trees, walls, electrical transformers, dumpsters, vehicles, gas meters, or other similar objects shall not be permitted for new or existing installations. There shall be 15 feet of clearance around FDC's.
- C. Fire Department Connections shall not be located near electrical transformers or any form of electricity.
- D. Buildings with multiple FDC's that have separate sprinkle suppression systems or zones must have strobe/horn warning devices located above them at the roof line indicating which system has triggered an alarm.
- E. Fire Department connections, where provided, shall be a four (4) inch "Storz" connector and shall be within fifty (50) feet of a public fire hydrant. Said connector shall be a "Hydra-Storz Adapter" manufactured by Harrington, RLS Model, or an approved equivalent. The Fire Department connection shall be a minimum of 15 horizontal feet from any gas or electric service and clearly visible from the adjacent roadway or driveway. A sign shall be placed overhead of the connection station "FDC" with a red arrow pointing downward in a size and location acceptable to the Fire Marshal.
- F. All structures, except one and two family dwellings built under use group R-3, shall be equipped with a "Knox Box" key storage unit. The location and number of the key storage units shall be determined by the Pittsfield Township Fire Marshal.

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- G. Trash and debris at construction sites shall be disposed of in an environmentally sound manner.

12.07 Knox Box/Locks:

- A. Where required. Where access to or within a structure or area is restricted because of secured openings or where immediate access is necessary for life – safety of fire-fighting purposes, the Fire Marshal is authorized to require a key box to be installed in an approved location. The key box shall be of an approved type and shall contain keys to gain necessary access as required by the Fire Marshal. Knox Locks shall be installed on gates or similar barriers as required by the Fire Marshal.
- B. Knox Box Contents:
 - 1. Access keys, Fobs, Cards, etc.
 - 2. Emergency contact information.
 - 3. Elevator & Firemen Keys.
 - 4. Hazardous materials information.
- C. The main office of each building shall have the following:
 - 1. “As Built” fire protection plans.
 - 2. Access keys, Fobs, Cards, etc.
 - 3. Emergency contact information.
 - 4. Elevator and Firemen Keys.
 - 5. Liquid run off information.
 - 6. Hazardous materials information.
 - 7. Firefighter Right-Know.
 - 8. Tunnel Information.
 - 9. Stairwell locations.

12.08 Radio Coverage in Building:

- A. In some large buildings, radio communications are inadequate due to the construction materials or design of the building. Therefore, on new buildings or major renovations radio repeaters/amplifiers may be requested.

12.09 Signage:

- A. Location of “Fire Lane-No Parking”, “Fire Lane No Standing”, “Emergency Access Only”, “Authorized Parking Only”, type signs shall be designated by the Fire Marshal or his designee. They shall be spaced 75 feet apart.
- B. Fire Department road/parking type signage shall be 12” by 18” and meet the adopted International Fire Code and National Fire Protection Association Life Safety Codes.
- C. Curb, asphalt or cement painting may be required in fire lanes or authorized parking areas. (red or yellow paint)
- D. Fire Department Connections shall be marked with signage approved by the Fire Marshal or his designee.
- E. Red signs with white lettering shall be placed on fire suppression access doors. (3/4” minimum letters)
- F. Signage shall be provided to mechanical, electrical, elevator, and HVAC rooms.
- G. Exit routing signs shall be placed throughout the building and approved by the Fire Marshal and Building Official in accordance with applicable codes NFPA 101.

12.10 Stand Pipes:

- A. Stand pipe hose connections are required in buildings with extensive corridors or long travel distances. These hose connections are required in single-story buildings as well as in multi-story buildings. Single-story hose connections shall be located towards the center of the building as to accommodate shorter hose lays for firefighting. Multi-story buildings shall have hose connections located in stairwells to accommodate shorter hose lays in upper levels of buildings. The hose connections shall be 2 ½” diameter with 2 ½” to 1 ½” reducer caps provided. The Fire Marshal shall determine exact location and number of standpipe hose connections.

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12.11 Site Plans:

- A. The fire protection sheet must show an overall exterior foot print of the building and grounds that include: roads, parking areas, ingress/egress (building & property), hydrants, water mains, post indicator valves (PIV) (PIV), Fire Department Connections, gas, electric, hazardous storage, water supplies, etc. Site plans shall show interior layouts that include: ingress/egress, fire suppression equipment, mechanical rooms, electrical rooms, roof access, attic access, hazardous material rooms, Annunciator panels, Knox Box, elevators, standpipes, hose outlets, etc.

12.12 Evacuation Plan:

- A. Location Evacuation Plan shall be placed throughout the building to assist with ingress/egress (“You Are Here” type signage).

12.13 Sprinkler Systems:

- A. All buildings are required to have fire suppression systems installed per NFPA 13.
- B. Building sprinkler systems or other approved fire suppression systems shall be required in accordance with the current Building Code in use by Pittsfield Township.

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Chapter 13

NOISE

Upon request of the Township, applicants shall conduct noise impact assessments consistent with EPA document Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety dated March 1974.

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Chapter 14

PEDESTRIAN CROSSINGS

- 14.01 Pedestrian road crossings shall be built per the standards of the authority having jurisdiction and the ADA.
- 14.02 Midblock crossings may be required by the Township to facilitate reasonable connectivity to existing and future non-motorized facilities per the Non-Motorized Transportation Plan found in the Township Masterplan.
- 14.03 Where applicable, midblock crossings shall include rectangular rapid flashing beacon assemblies, a mast arm hung down lit pedestrian crossing sign and a center lane refuge island. Rectangular rapid flashing beacon poles, mast arms, meters and all associated equipment shall be painted black. The location of the meter (if applicable) and associated equipment shall be coordinated with the Township Engineer and the Director of Municipal Services to ensure that the crossing is consistent with the intended visual aesthetic of the surrounding area.

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Chapter 15

CONSTRUCTION REQUIREMENTS

14.01 General Requirements:

A. Payment of Fees

1. All fees, bonds, escrows and connection costs (e.g. benefit charges, trunk line and transmission charges, tap fees and the inspection fee deposit [see below], etc.) must be paid prior to the scheduling of a pre-construction meeting.

B. Insurance

1. Certificates in accordance with the General Requirements and Procedures section of this document shall be submitted to and approved by the Township prior to scheduling a preconstruction meeting.

C. Inspection Fee Deposit

1. The inspection fee deposit shall be based upon the contract amount as follows:

Utilities and Private Road Cost Estimate	Permit Fee
0 to \$50,000	\$10,000
\$50,001 to \$200,000	13% but not less than \$15,000
Over \$200,001	10% but not less than \$30,000

D. Final Acceptance

1. Final Acceptance shall not occur until all homes are built. Prior to the preconstruction meeting, a performance guarantee shall be required in accordance with Section 3.09 of the Zoning Ordinance.

E. Preconstruction Meeting

A preconstruction meeting shall be held prior to the start of all construction. Prior to scheduling a preconstruction meeting, the Proprietor shall deliver all necessary permits and fees to the Township, as stated above. Preconstruction meeting requests must be made at least 10

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business days prior to the date of the proposed meeting. Additionally, the owner should request the meeting time at least 10 days prior to start of work. The Proprietor, Project Managers, Underground and General Contractors, Design Engineers, Township Staff, and the Township Engineer must be in attendance at the preconstruction meeting.

F. Inspection

1. All underground utilities, private roads, bike path, sidewalks, driveway approaches, stormwater facilities, soil erosion control, and any other work designated at the preconstruction meeting must be inspected by the Township Engineer. Grading may be spot checked by the Township Engineer at the Township's request. 72-hour notice is required (not including weekends or holidays) to schedule inspection prior to construction. This applies for construction start, and any time work is suspended for two days or more, contact the Township Engineer.
2. Any work installed without inspection will not be accepted by the Township and will not be allowed to connect to the system.

G. Trench Backfill Testing

1. All trench density testing shall be provided by the Owner through their Design Engineer or an independent testing company to verify the compaction requirements as required by the approved plans and specifications. This report shall be signed and sealed by a registered State of Michigan Design Engineer and submitted to the Township Engineer.

H. Shop Drawings

1. Shop drawings shall be furnished to the Township Engineer. Shop drawings shall be reviewed and approved by the Township Engineer prior to construction.

I. Final Inspections and Acceptance

1. Prior to final acceptance for use and maintenance by the Township, final inspections and all necessary tests of the system must be completed. Any portions of the work found to be unacceptable shall be repaired or replaced prior to acceptance.
2. Prior to final completion, a two-year maintenance and guarantee bond in the amount equal to the cost of the improvements shall be posted with the Township by the Proprietor.

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3. Final acceptance will not be made until all improvements on the site have been completed.
- J. The Contractor shall comply with current OSHA, MIOSHA and confined space regulations.

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