



MACOMB TOWNSHIP ENGINEERING AND CONSTRUCTION STANDARDS

17.05 STANDARDS: FOR ENGINEERING DESIGN; FOR PREPARATION OF ENGINEERING PLANS AND SPECIFICATIONS; AND FOR CONSTRUCTION OF SITE IMPROVEMENTS

17.0501 General

- A. All plans submitted shall be on 24" x 36" white prints having blue or black lines and shall be neatly and accurately prepared. Judgement should be exercised in the design, layout, and presentation of proposed improvements.
- B. Engineering plans shall have a scale of one inch equals 50 feet horizontal. Profile views shall have a scale of one inch equals 50 feet horizontal and one inch equals five feet vertical.
- C. Any land development project requiring more than one sheet of plans must be submitted with a "General Plan" having a scale of 1" = 1—feet (or larger scale) showing the overall project layout (including building locations) and indicating the location of all site improvements proposed.
- D. Street names, lot or property lines, and property identification numbers shall be shown on all plans.
- E. Sewers in easements shall be located at least 2 feet away from parcel or lot boundary lines.
- F. Superimposed on a general plan of the site shall be contour lines of the project area, including the area at least 100 feet outside of the project area. Contour lines shall be shown at intervals as follows:
 - 1. Where the general slope of the land is one percent (1%) or less, the interval shall be one foot.
 - 2. Where the general slope of land is more than one percent (1%) but less than five percent (5%), the interval shall be two feet.
 - 3. Where the general slope of land is five percent (5%) or greater, the interval shall be five feet.

- G. Any underground or overhead public utilities shall be located in the road (public or private) right-of-way according to the schedule entitled "Standard Utility Locations" shown in Appendix "B".
- H. All sewers and those water mains having a diameter of 16" or greater shall be indicated in profiles. There shall be a separate profile view for each utility. However, it shall be the responsibility of the design engineer to ascertain that the depth of the storm sewer (or storm drain) does not interfere with the building service sewers crossing the storm sewer. Profiles shall indicate the size of pipe, class of pipe, slope of the utility, and control elevations of the utility. The existing and proposed grade lines shall be shown along the profile view of each utility.
- I. Elevations shall be based on U.S. Geological Survey datum. The Township Bench Marks shall be used where available and at least three bench marks shall be indicated on the plans for each 40 acres of the project site area.
- J. Finish grade elevations planned for each structure shall be indicated on either the plan view or the profile view.
- K. A copy of the site boundary survey with computed control lines indicated, or a copy of the computed plat, if applicable, shall be submitted with the engineering plans.
- L. Plans shall have all lettering a minimum height of one-tenth of an inch and be of such quality as to provide for a clear and legible micro-film record.
- M. All plans submitted shall bear the seal of the Registered Professional Engineer responsible for the design.
- N. The plans covering all of the required Site Improvements for a specifically designated area of the Developer's land shall be submitted as one package before any plan review shall commence.

17.0502 Site Grading and Drainagewater Collection and Disposal

- A. All sets of plans which include plans for storm sewers shall include the current Township Storm Sewer Detail Sheets which shall be considered an inseparable part of the plans when said plans are approved.
- B. A Site Grading and Drainagewater Collection and Disposal Plan is required for all Developments, except that if the building site is a site in a subdivision or other project for which a general site grading plan has been submitted and approved, no separate grading

plan or permit will be required. A rear yard (in the case of land subdivisions) or a general site enclosed storm drainage system shall be designed for all land development projects. If there are any upstream watershed drainage areas which need to be drained through the site under design consideration, sufficient capacity shall be provided to take fully developed upstream drainage into the system.

- C. Site grading for all building sites shall be reviewed to determine that proposed and/or actual site grading is proper and that drainage from land lying upstream is not obstructed and that downstream properties will not be adversely effected by runoff from the property under design consideration.

Before a Certificate of Occupancy for any building is issued, the Superintendent shall approve the final site grading and drainage for each building. The Superintendent may require that a survey, drawing, and certificate—done by a Registered Professional Engineer or Registered Land Surveyor—be furnished by the Developer indicating that the work has been done in conformity to the approved site grading and drainage plan. It shall be unlawful for any person to interfere with, modify, or obstruct the flow of drainagewater across any property in any manner different from the approved plan.

During periods of the year when weather conditions make site grading work unfeasible, a temporary Certificate of Occupancy may be issued, subject to the furnishing of a satisfactory bond, letter of credit, or cash deposit guaranteeing the completion of the work when weather conditions permit.

- D. The fall of the land away from any building shall be a minimum of six (6) inches in the first twenty-five (25) feet. From this elevation the land shall slope to a drainagewater collection swale at a minimum slope of one foot in one hundred feet (one percent).
- E. The maximum slope of the land for the site, except for transitional ramps between usable site areas, shall be seven (7) feet in one hundred feet (seven percent). The sodded ramp slopes shall be a maximum slope of one foot vertically and three feet horizontally.
- F. Adequate soil erosion and sedimentation control measures shall be specified on the plans—and followed during construction—to conform to the requirements of Michigan Act 347, P.A. of 1972, entitled, “Soil Erosion and Sedimentation Control Act of 1972.”
- G. All buildings having foundation drains shall direct the flow of drainagewater from such foundation drains into an enclosed conveyance pipe. No building permit for any building having a basement shall be issued unless the plans for such a building indicate building service sewer (drainagewater) with drainage to a storm sewer or storm drain. When the building service sewer (drainagewater) is planned to be connected to a storm sewer

located in the road right-of-way (R.O.W.), the Developer shall provide service extensions, for each lot, from the public sewer to a point located 12 feet outside of the R.O.W.; such service leads shall be installed prior to paving.

- H. Drainagewater runoff from building roofs shall be piped to a point five (5) feet away from the outside walls of any building.
- I. The longitudinal grade of any drainage swale shall not be less than 0.4 feet per 100 feet (0.4%). The maximum distance drainagewater shall travel in a drainage swale without an intercepting yard catch basin shall be 350 feet. Not more than 100 feet of drainagewater travel shall be upstream of an angle point (deflection angle 45 degrees or greater) in the drainage swale. Planned final grade elevations shall be indicated on the plans at a maximum spacing of 50 feet.
- J. Where required by the Township Engineer, a four inch diameter open joint drainage pipe shall be provided for drainage with said pipe trench being backfilled entirely with pea gravel up to within four inches of the grade line of the swale.
- K. Stormwater runoff drainage systems shall be designed for a ten (10) year storm by means of the rational method formula: $Q=CIA$; where Q is the peak rate of runoff in a cubic feet per second, A is the area in acres, C is the coefficient of runoff for the drainage area, and I is the average rainfall intensity in inches per hour for a certain time of concentration. The rainfall intensity shall be determined by the formula $I=175/(25+T)$; where T is the time of concentration equal to the time required for a drop of water to run from the most remote point of the watershed to the point for which runoff is being estimated. The consulting engineer shall use judgement in arriving at proper imperviousness factors, but in general the following factors are acceptable minimums:
 - 1. Lawn areas—0.1
 - 2. Pavement and roof areas—0.9
 - 3. Overall area of single family subdivisions—0.35
 - 4. Overall area of multiple housing development—0.55
 - 5. Overall area of commercial development—0.90
 - 6. Overall area for industrial development—0.80

The Engineer shall submit a map outlining the various watershed drainage areas, including off site upstream areas which drain to each inlet point used for design. The map shall be accompanied by storm sewer design computation made on forms supplied by the Township Engineer. The minimum acceptable size of storm sewer downstream of any stormwater inlet structure is 12 inches in diameter.

For the design of storm sewers, use the Manning's formula for pipe sizing with an "N" factor of 0.013 for reinforced concrete and an "N" factor of 0.025 for corrugated metal pipe if corrugated metal pipe is allowed. Storm sewers shall be designed to provide a minimum velocity when flowing full of 2.5 feet per second. The maximum velocity of stormwater flow shall be ten feet per second.

In general, trunk storm sewers or any sewer that carries street drainagewater shall be located within a public street right-of-way. Where public storm sewers are located outside of public streets, they shall be placed in a recorded public utility easement that provides for access to the storm sewer for repairs, connections, and maintenance. The minimum acceptable width of easements for storm sewers shall be: 12 feet wide for sewers 21 inches and under in diameter; 20 feet for sewers 24 inches through 48 inches in diameter; and 30 feet wide for sewers over 48 inches in diameter: The sewer shall be placed with the middle third of the designated easement width.

- L. Where open drains are proposed for drainagewater disposal, the Manning's Formula shall be used for determination of flow depth and capacity. However, if the Township Engineer and/or the Michigan Department of Natural Resources deem it advisable, the Developer's Engineer may be required to furnish computations and plans showing the backwater curve for the open drain under fifty-year-flood-flow fully-developed upstream-watershed conditions.
- M. Where possible, provide a minimum of three feet of cover from the top of finish road or earth grade to the top of any storm sewer. In some cases it will be acceptable to allow the hydraulic gradient to be above the top of the sewer pipe. If this is the case, the design elevation of the hydraulic gradient profile shall be indicated on the sewer profile view, but hydraulic gradients shall not be less than 1 foot below the surface at any locations. However, hydraulic gradients shall be maintained within the pipe on any storm sewers considered to be trunk storm sewers.
- N. Access manholes shall be provided along the storm sewer at every change of pipe size, change of grade, or change of direction. However, the maximum spacing for storm sewer manholes shall be as follows:

<u>Diameter of Sewer</u>	<u>Absolute Maximum Manhole Spacing</u>
12" to 30"	350'
36" to 42"	400'
48" to 60"	500'
66" and larger	600'

NOTE: Height of Lo-Hed pipe shall be used as the criteria for manhole spacing.

Catch basin leads may tap directly into sewers 42 inches and larger, except that taps shall not be made into a precast manhole tee pipe section.

- O. Catch basins shall not be constructed over a main sewer line to replace manholes in street sewers or trunk sewers outside of streets. Moreover, a manhole normally shall not be used as a stormwater inlet structure. However, if a normal manhole location (outside of streets) coincides with a stormwater inlet structure location and at least 75% of the upstream stormwater inlet structures are catch basins (with sumps), the manhole may be used as a stormwater inlet structure by placing a catch basin cover on the manhole.

Not more than three upstream catch basins will be allowed to discharge into any catch basin.

- P. A prefabricated bar screen shall be installed on the end of all storm sewers 18 inches in diameter and larger which outlet into an open drain. Openings of the bar screen shall be no more than 6 inches on centers.

- Q. In general, pavement type catch basins shall be located as follows:

1. At the radius return of street intersections. 150 feet maximum distance of drainage water travel is allowed around a corner without an intercepting catch basin.
2. At all low points in streets.
3. At intermediate points along the streets such that there is a maximum pavement drainage area per structure as follows:

- | | |
|------------------------------|------------------|
| a. Intercepting Catch Basins | 7,500 S.F./C.B. |
| b. Low Point Catch Basins | 10,000 S.F./C.B. |

- R. Yard type catch basins shall be provided at all low points in drainage swales. Provide intercepting yard type catch basins such that not more than 350 feet of swale drainage runs into any one catch basin other than a low point catch basin where 600 feet of drainage is allowed.
- S. Improved open drains may be permitted under special circumstances provided the Township Engineer has determined that the enclosure of such open drains would require a storm sewer 60 inches, or larger, in diameter. When open drains are used, the easement width shall be sufficient to accommodate a thirty (30) feet wide maintenance plateau (with a maximum slope of ten percent) on each side of the channel.
- T. The side slopes of open drains shall have a maximum slope of one (1) foot vertical to four (4) feet horizontal, except that a low flow channel may have side slopes of one (1) foot vertical to three (3) feet horizontal. Open drain side slopes shall have an established sod surfacing as soon as possible after construction. In any event, sufficient measures shall be taken to conform to the erosion and sedimentation control requirements of applicable state or local ordinances.
- U. An extension of the storm sewer system shall be provided to furnish an outlet for foundation drain services pipe for any buildings not otherwise serviced; such extensions shall have a minimum diameter of 8 inches.
- V. When, in the opinion of the Township Engineer and/or the Macomb County Drain Commissioner, there is inadequate drainagewater outlet capacity, the Developer may be required to install retention basins or reservoirs. If this solution is deemed appropriate by the Township Engineer, the storage capacity of such retention basin shall be rated in acre-feet and shall contain capacity equivalent to a minimum of 0.2 feet of water over the entire watershed area that drains into the retention basin. Discharge from the retention basin shall be at a controlled rate such that the entire capacity of the basin can be discharged in about forty-eight hours. Additional requirements for stormwater retention basins are as follows:
 - 1. The maximum design elevation for storage in the retention basin shall be at least three feet below the low point of the watershed area draining into the retention basin.
 - 2. The retention basin shall be completely fenced. The fence shall be six feet high chain link with three strands of barbed wire at the top. A suitable access roadway sixteen feet in width shall run from a hard surfaced roadway to an access gate in the retention basin. The access gate shall be a double-opening gate at least twelve feet in total width.

3. The side slopes of the basin shall be one foot vertical to four feet horizontal and the top of the slope shall be a minimum of four feet distant from the fenced enclosure.
4. The bottom of the basin shall have a minimum grade of one percent (1%) to a gutter line. The slope of the gutter line to the outlet shall have a minimum grade of one-half percent (0.5%).
5. The entire retention basin area must be seeded or sodded and the turf shall be fully established before the Township will consider taking over the retention basin for operation and maintenance.
6. Concrete rip-rap shall be provided at all pipe entrances to the basin. All pipe entering or leaving the basin shall have either a headwall or a flared-end-section at the end of the pipe.
7. An overflow system shall be provided. The overflow system shall consist of either a pipe having an invert at the design storage level elevation or a concrete spill-way with an invert 0.5 feet above the design storage elevation. The concrete spill-way shall extend from the inside bank slope to the outlet drain.
8. For basins with pumped outlets, a silt trap and bar screen shall be installed on the inlet pipe to the pump station. The screen clear opening shall be a maximum of two inches.
9. Pumping stations for de-watering of the retention basins shall include duplicate pumps with each pump capable of handling the design flow. The controls shall include a lead-pump start and stop, a lag-pump start and stop, an alternator for alternating the lead-lag pump, a high water alarm system with a light and a horn, and a safety all-pumps-off control. The control panel, pumps, and wet-well shall be installed inside of the fenced enclosure and the controls shall be installed in a suitable weather-proof and vandal-proof enclosure.

17.0503 Street and Parking Lot Paving

- A. All sets of plans which include plans for street and/or parking lot paving shall include the current Township Paving and/or Parking Lot Detail Sheets, which shall be considered an inseparable part of the plans when said plans are approved.

- B. Paving for all streets located within dedicated public road rights-of-way shall be designed and constructed in accordance with the currently adopted specifications of the Macomb County Department of Roads.
- C. Paving for all other streets and parking lots shall conform to the specifications of the Macomb County Department of Roads or the following specification, whichever is the more demanding requirement:
1. The compressive strength of concrete at 28 days after pouring shall be at least 4,000 pounds per square inch.
 2. Asphalt pavement shall consist of Michigan Department of State Highways Specifications 4:11 Bituminous Aggregate (260 lbs. per square yard) surfacing over an approved sub-base adequately designed for sufficient thickness (minimum of six inches) and type to be compatible with expected loading and sub-soil conditions.
 3. The thickness and widths of the street pavements (back to back of curbs) shall be as indicated in Appendix "C" of this Ordinance.
 4. Maximum allowable pavement grade shall be 7.00 percent for concrete pavement and 6.00 percent for asphalt pavement.
 5. Minimum allowable pavement grades shall be as follows:
 - a. Concrete pavement gutter grades—0.30%
 - b. Asphalt pavement gutter grades—0.50%
 - c. Concrete pavement surface grade to gutter line—1.00%
 - d. Asphalt pavement surface grade to gutter line—2.00%
 6. Whenever a change in the grade of 2% or more occurs, provide a vertical curve with a length determined (to the nearest 50 feet) by the following formula: $L=1/2(G1-G2)$; where L is the length in stations of 100 feet per each station and G1-G2 is the algebraic change of grade in percent.
 7. At all intersections allow for a minimum of 1% drop in elevation around the curb return.

8. Center line curve data (radius, deflection angle, and total arc length) for all street pavement curves shall be indicated on the plans.
 9. The top of curb or the gutter grade elevations every 50 feet shall be indicated on the profile view for each street.
 10. The minimum sight distances for all roads shall be: 200 feet for local streets; 300 feet for collector streets.
 11. When street centerlines have a deflection of more than ten degrees, but less than seventy-five degrees, the centerline shall have a curve with a minimum radius of: 150 feet for local streets; 300 feet for collector streets. Between reverse curves, there shall be a tangent section of: 100 feet for local streets; 200 feet for collector streets. For deflections of 75 degrees or greater, the curvature requirements shall be determined by the Township Engineer.
- D. All street pavement in residential areas shall have mountable curbs. Where the pavement is a boulevard section, island curbs shall be 6-inch high roll curbs.
- E. A detail shall be indicated for all intersections, “eyebrows,” and cul-de-sacs. The detail shall show jointing and detailed pavement surface grades, including gutters and tops of curbs. The minimum scale of the detail shall be one inch equals thirty feet.
- F. At the end of a street that will be extended in the future, install a one foot header and standard road end barricade and sign.
- G. Where the Township Zoning Ordinance requires off-street parking, the design of the parking area shall conform to the requirements as follows:
1. All parking lot layouts shall be designed to meet the requirements of the Township Engineer and shall receive his written approval.
 2. All parking areas (other than driving lanes in residential parking lot areas) shall be paved with either 6 inches minimum thickness concrete or six inches minimum thickness of stone aggregate topped with 2-1/2 inches of bituminous concrete surface course. A six inch high concrete curb shall be placed around the entire perimeter (except for drive entrances) of the paved parking area. All driving lanes in residential parking lot areas (through parking bays) shall be concrete pavement—six inches minimum thickness and 24 feet minimum width.

3. When the area is to serve three (3) or more automobiles, the individual car spaces shall be marked by painted-on yellow stripes a minimum of 3" wide. The stripe shall extend from the front of the parking stall space to a distance of nineteen feet (if bumper blocks or curbs are proposed, the stripes shall extend sixteen feet from face of bumper block or face of curbs). The distance center to center of stripes, as measured perpendicular to the stripes shall be a minimum of ten feet.
4. The parking bays for residential areas shall have sixty-two feet wide bays. However, for a single bay, a car overhang of three feet will be assumed and the width between the face of curbs may be reduced to fifty-six (56) feet. Moreover, on the curb side of a multiple bay parking area, the three feet overhang may be assumed for the purposes of reducing the pavement width of the outside bay to fifty-nine (59) feet. Where the parking area is adjacent to the project boundary line, the face of curb shall be located at least six feet from such boundary line.
5. Parking lot layouts for other than residential areas shall be designed in accordance with general standards indicated on the Township Parking Lot Detail Sheet.
6. When sidewalks are provided adjacent to the parking area curbs where car overhangs occur, such walks shall be a minimum width of six feet as measured from the face of the curb.

17.0504 Water Supply and Distribution System

- A. All sets of plans which include plans for water mains shall include the current Township Water Main Detail Sheets which shall be considered an inseparable part of the plans when said plans are approved.
- B. All water mains shall be shown in a plan view. Water main, at location of crossings with other utilities or drains, and those water mains sixteen inches or larger in diameter shall also be shown on a profile view.
- C. The plan shall indicate the proposed finished grade elevations of all hydrants, gate wells, and/or other structures and, where a public main or hydrant is not located in a public street, shall show an easement for the main and hydrants. The easement shall extend a minimum of six feet each side of the main.
- D. The type capacities, location, and layout of a building service water supply pipe shall comply with all requirements of the Township Engineer, the Macomb County Health Department, and the State of Michigan. A building service water supply pipe shall be shown on the plans for each building in the project. Where water mains are planned along

the roadways, the building service water supply pipe for each lot shall be extended (by the Developer) across the roadways prior to paving. Each such service pipe shall be terminated with a curb stop and box that is located at a point 11 feet outside of the road right-of-way.

- E. The type of pipe and joints indicated on the plans shall be in accordance with the currently adopted Township Standards.
- F. All water mains shall be installed with a minimum cover of five (5) feet below finished grade. Where water mains must dip to pass under a storm sewer or sanitary sewer, the minimum acceptable clearance shall be eighteen (18) inches. At all open drain crossings, a five (5) feet minimum clearance between bottom of drain and top of water main shall be provided. The sections which are deeper than normal shall be kept to a minimum length by the use of vertical bends (maximum deflection allowed: 22-1/2 degrees) properly anchored.
- G. Water mains other than hydrant leads shall be eight (8) inches minimum in diameter. All single hydrant leads longer than one hundred (100) feet shall be eight (8) inches minimum diameter and shall be valved as a dead end main. Industrial minimum—12”.
- H. All valves, except hydrant valves, shall be installed in a standard gate well. Valves shall be located in the system such that not more than four (4) valves need to be turned off to isolate any individual section of water main. Moreover, sufficient valves shall be placed such that not more than thirty (30) dwelling units or service establishments shall be serviced within such section of water main that can be isolated. Where possible valves shall be located at street intersections five (5) feet from the intersecting street right-of-way line. All dead end mains shall be valved near the tee.
- I. Hydrants shall be installed along the water main at least every five hundred (500) feet. However, in no case shall any external part of any building be more than three hundred (300) feet from a hydrant. In commercial or industrial districts, additional hydrants may be required. Hydrants shall be installed at the ends of all dead-end water mains. When near a street intersection, hydrants shall be located a minimum of fifteen (15) feet from the intersecting street right-of-way line.
- J. On each side of all roads in new subdivision plats, a "12 foot wide easement for public utilities" shall be provided. For developments other than subdivisions, appropriate easements for water service curb stops shall be provided.

17.0505 Wastewater Collection and Disposal System

- A. All sets of plans which include plans for sanitary sewers shall include the current Township Sanitary Sewer Detail Sheets which shall be considered an inseparable part of the plans when said plans are approved.
- B. For every sanitary sewer project, there shall be indicated on the profile view (near the downstream end of the sewer) a manhole with a 12” deep manhole sump to be used for testing for infiltration. No sanitary sewer section having an infiltration rate, or an exfiltration rate, of more than 250 gallons per inch of pipe diameter per mile of pipe per 24-hour period shall be approved for connection to the Township Sanitary Sewer System.
- C. The minimum allowable size for public sanitary sewers shall be ten (10) inches diameter. The minimum size of building service sewer (wastewater) shall be six (6) inches diameter, except that a single mobile home dwelling unit may have a four (4) inch building service sewer (wastewater). However, a minimum of six inch building service sewer shall be provided for a building containing from one to twelve dwelling units (or equivalent); a minimum of eight inch building service sewer shall be provided for a building containing from thirteen to one hundred dwelling units (or equivalent).
- D. The following table of acceptable slopes for sanitary sewers shall be adhered to:

<u>Sewer Size</u>	<u>Minimum Slope</u>	<u>Maximum Slope</u>
4”	2.00%	
6”	1.00%	
8”	0.40%	
10”	0.30%	4.0%
12”	0.22%	3.0%
15”	0.15%	2.0%
18”	0.12%	1.5%
21”	0.10%	1.3%
24”	0.08%	1.2%

- E. Sanitary sewage force mains shall be designed for a minimum velocity of two (2) feet per second and a maximum velocity of twelve (12) feet per second, unless otherwise approved. Force mains shall be shown in a profile view with grades and elevations indicated thereon. An air relief and cleanout assembly manhole shall be provided at high

points. Access (cleanout assembly) manholes shall be provided along the force main at least every 600 feet.

F. A building service sewer shall be indicated on the plans for each building in the project. Where sanitary sewers are planned along roadways, the building service sewers shall be extended (by the Developer) for each lot to a terminus that is located 12 feet outside of the road right-of-way; such building service sewers shall be extended across the road right-of-way prior to paving.

G. Manholes shall be provided along all sanitary sewers (8" and larger) at:

1. Points of horizontal deflection;
2. Points where the size of sewer is changed;
3. Points where the slope of the sewer is changed;
4. At junctions with other sewer lines;
5. At the upstream terminus of a sewer run; and
6. Along the sanitary sewer at other locations such that the maximum spacing between manholes shall not exceed the following:
 - a. For 8" through 21" diameter 350 feet
 - b. For 24" and larger diameter 400 feet

H. At manholes where size of sewer changes, match 0.8 diameter elevation points of inlet and outlet sewer. At horizontal deflections in the sanitary sewer greater than 45 degrees, a minimum of 0.10 feet additional adjustment in grade elevation shall be provided to allow for loss of head. However, additional elevation adjustments may be made when conditions allow same; provided that, when the invert of any inlet sewer is more than 18" above the outlet sewer, a drop assembly shall be provided.

I. In general, sanitary sewers shall be located within a public street right-of-way. Sanitary sewers shall not be located within rear lot line easements, except in extremely unusual circumstances as determined by the Township Engineer. Where public sanitary sewers are located outside of public streets, they shall be placed in a recorded public utility easement that provides for unlimited access to the sanitary sewer for repairs, connections, and maintenance. The minimum acceptable width of easements for public

sanitary sewers shall be 20 feet wide; except that, if adjacent and parallel to the public street, it may be reduced to 12 feet wide. The sanitary sewer shall be located within the middle third of the above designated easement width.

- J. The sanitary sewers shall be designed to have a minimum depth from finish grade elevation to top of sewer of eight and one-half (8.5) feet at local control points or nine (9) feet at locations where the sewer grade is parallel to the road grade. The sewer shall be designed deep enough to serve a standard depth basement for the type of building for which the land is zoned.
- K. Each wye or terminus of building service sewer shall be plugged with an infiltration-proof plug having a joint similar to those of the main sewer.
- L. The type of pipe and joints for sanitary sewers shall be in accordance with currently adopted Township Standards.

17.0506 Other Site Improvements and Borrow Pits

A. Sidewalks and Driveways

1. Sidewalks shall have a minimum thickness of 4 inches in pedestrian only areas and a minimum of 6 inches in areas where vehicular traffic will cross the walk.
2. The width of the walk shall be a minimum of 5 feet for public walks and a minimum of 3 feet for other than public walks and are subject to review and approval by the Township.
3. Driveways shall be a minimum of 6 inches thick. However, where loads heavier than standard automobile loads are anticipated, the minimum thickness should be 7 inches.
4. Construction joints with a half inch premoled expansion filler shall be placed at maximum intervals of 50 feet. Contraction joints shall be placed at maximum intervals of five feet, or equal to the width of walk, whichever is greater.
5. Sidewalks shall be constructed along a planned longitudinal grade line. The maximum longitudinal slope shall be 6%. The transverse slope of the sidewalk shall be a minimum of 2% (1/4 inch per foot) and a maximum of 6% (3/4 of an inch per foot).

6. Concrete for sidewalks and driveways shall have a 28 day compressive strength of at least 3,000 pounds per square inch.

B. Other Public Utilities

1. Unless otherwise approved by the Township Engineer, the installation of public utilities other than Township sanitary sewers, water mains, or storm sewers shall not be started until the finished grade has been established. The utility company's contractor shall be required to restore the ground to the finished grade. The drainagewater swales shall be restored to a workable condition at least as good as existed prior to construction. Furthermore, all land and/or other physical features affected by the construction of the public utility shall be restored to a condition at least as good as that existing at the time construction was begun.

C. Borrow Pits

1. Borrow pits may be allowed within a land development, provided the procedure and regulations cited below are complied with.
 - a. No borrow pits may be dug within 50 feet of a building for which a building permit has already been issued.
 - b. As part of the land development's engineering plan submittal, the Developer's Engineer shall indicate the proposed elevations, depths, widths, lengths, slopes, and locations of any borrow pits proposed for the land development. The only acceptable locations for borrow pits are as follows:
 - (1) In Subdivision Developments—within the rear 30 feet of any lot, but not within 5 feet of any public utilities.
 - (2) In Developments other than Subdivisions—any area more than 5 feet from proposed building, pavement (including streets, parking lots, and sidewalks), and/or public utilities.
 - c. Borrow pits shall be fully described in Building and Use Restrictions to be recorded with the land development plat, to run with the land, so as to describe each lot therein affected by the borrow pit with the further restrictive covenant: "No structures, such as but not limited to houses, accessory buildings, or inground pools, shall be constructed on areas of certain lots unless footings for the same are placed on undisturbed soil, or to the satisfaction of the Macomb Township Building Department."

- d. Borrow pit side-slopes shall not be steeper than 71 degrees from the horizontal plane (i.e., not steeper than 3 feet vertically for each foot horizontally); nonetheless, the Developer and his Contractor are responsible for complying with OSHA requirements.
- e. Borrow pits may not be excavated deeper than 8 feet below original undisturbed ground elevation.
- f. Borrow pits shall be backfilled with clean earth (i.e., free from any debris, building materials, trees, etc.) as soon as possible after excavation.
- g. When a borrow pit that is more than 5 feet deep is left open for more than 10 days, the Developer shall install a 5 foot high fence completely around the borrow pit and maintain such fence until the borrow pit is filled in.
- h. No building permit shall be issued for any building within the land development until the following requirements are fulfilled:
 - (1) All borrow pits within the development are filled to within 2 feet of original grade.
 - (2) The Developer has furnished a certification from his Engineer indicating (a) actual elevations, depths, widths, slopes, and lengths as excavated; and (b) that all borrow pits in the development are backfilled to within 2 feet of original grade.
- i. When the requirements of above paragraphs “h(1)” and “h(2)” have been fulfilled, building permits may be issued for buildings on sites not affected by a borrow pit. However, on those sites affected by a borrow pit, a building permit will not be issued until the Township Engineer has been furnished representative compaction tests for said building site, indicating that the complete borrow pit has been backfilled in layers (no greater than 12 inches deep) of earth fill compacted to a density that is at least 80 percent as dense as the maximum obtainable density for such backfill material. The soil borings and compaction tests shall be performed under the direction of the Township Engineer. A site will be considered “affected by a borrow pit” if a borrow pit existed on the subdivision lot or if a borrow pit is constructed within 30 feet of a building on a non-subdivision site.

17.0507 Construction and Construction Inspections

- A. All work covered under a Permit for Construction of Site Improvements shall be performed according to the approved plans and specifications and in accordance with the requirements of this Ordinance. By making an application for a Permit for Construction of Site Improvements, the Developer grants the Township the right to perform inspection of any work covered under the permit and the Developer shall correct, at his expense, any work which is discovered to be done in conflict with the approved plans and specifications or in conflict with the requirements of this Ordinance.
- B. The Developer shall pay a fee to cover all costs of inspection of work covered under the Permit for Construction of Site Improvements. The basis of the fee to be paid the Township shall be the actual cost to the Township plus an administration and overhead expense in the amount of 20% of such cost. Actual cost, as used herein, shall be considered the actual gross payroll or contract cost per hour times the number of hours expended.
- C. The fee for construction inspection as determined above shall be deducted from the amount of the construction inspection deposit paid upon application for a Permit for Construction as set forth in Appendix "A". If the fee so determined exceeds the amount of the deposit, the Developer shall make up such deficiency in deposit by paying forthwith, upon discovery, an additional deposit to cover the cost of inspection until the job is completed and approved.
- D. The Township reserves the right to inspect all work covered under the Permit for Construction of Site Improvements and intends to provide detailed inspection for all of the following:
 - 1. All of those types of construction where detailed inspection requirements are covered on the Township Sewer and Water Ordinance;
 - 2. All sanitary sewers (public or private) including connections thereto;
 - 3. All water supply pipe (public or private) including connections thereto;
 - 4. All open and enclosed storm drains (public or private) including connections thereto, except in the case of those storm sewers considered private storm sewers in mobile home parks that do not receive drainagewater from premises other than the mobile home park site;

5. All site grading for any site;
6. All sidewalk and driveway construction installed outside of those rights-of-way that are dedicated to the Department of Roads; and
7. All street and/or parking lot pavement installed outside of those rights-of-way that are dedicated to the Macomb County Department of Roads.

The Township will provide inspection sufficient to verify compliance with requirements of Township Ordinances for all private storm sewers, sidewalks, driveways, street pavements, and/or parking lot pavements. The Developer shall provide competent construction inspectors for detailed inspection for same in: mobile home parks; multiple residential developments, except condominiums; motels; institutional and governmental developments, including schools and colleges; assembly halls, churches, hospitals, and convalescent homes; all commercial developments, including stores, shops, offices, and all industrial developments.

In the above noted instances where the Township is not to provide detailed inspection, the amount of the deposit for construction inspection will be reduced to 10% of the regular deposit indicated in Appendix "A".

8. All borrow pit excavation and backfilling. The expense for the inspection of the borrow pit excavation and backfilling may include soil borings, density-compaction tests, laboratory analysis, and/or engineering consultation expenses.

APPENDIX “B” OF MACOMB TOWNSHIP ORDINANCE 17

SCHEDULE OF STANDARD UTILITY LOCATIONS

**EXISTING AND NEW STREETS LOCATION
OF UTILITIES FROM CENTERLINE (1)**

SUBJECT UTILITY	60'	60'	86'	86'	120'
	ROW	ROW	ROW	ROW	ROW
	(21'	(28'	(36'	(44'	(58'
	Pvmt	Pvmt	Pvmt	Pvmt	Pvmt
	with	with	with	with	with
	curbs)	curbs)	curbs)	curbs)	curbs)
	(2)	(2)	(2)	(2)	(2)
Sanitary Sewer (3)	22 L	22 L	35 L	35 L	42 L
Storm Sewer	16 L	17 L	27 L	27 L	34 L
Gas	16 R	18 R	27 R	31 R	34 R
Hydrants	20 R	20 R	26 R	28 R	36 R
Water Main	22 R	22 R	24 R	26 R	42 R
Second Sanitary Sewer (3)	--	--	35 R	36 R	66 R
Second Water Main (or Storm Drain)	--	--	--	--	52 L
DE – MBT (Underground)	--	--	--	--	52 R
DE – MBT (Overhead)	31 R	31 R	44 R	44 R	61 L/R
Curb Radius at Intersections	35'	20'	25'	25'	30'

Notes:

(1) “L” means Left; “R” means Right. In some existing streets where one or more of the utilities have been installed in a location other than described above, the location of remaining proposed utilities shall be determined by the Township Engineer with the concurrence of the Road Commission when appropriate. Where, in the opinion of the Township Engineer, these locations are not desirable or possible, suitable adjustments may be made.

(2) This is not a categorically approved width of pavement, but only an allowance assumed for purposes of this schedule.

(3) Sanitary sewers may be installed in twelve feet wide easements adjacent to street rights-of-way in lieu of these locations if approved by the Township Engineer—in this event, the storm sewer location for 60’ R.O.W. (28’ Pavement) may be moved to 19’ L.



ENGINEERING AND CONSTRUCTION STANDARDS AMENDMENT
MACOMB TOWNSHIP, MACOMB COUNTY, MICHIGAN
FEBRUARY 8, 1995

RE: RETENTION BASIN DESIGN

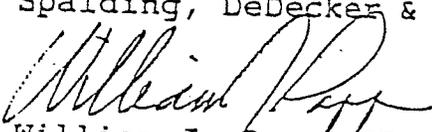
There are two changes to the Engineering and Construction Standards for Macomb Township site improvements which received Township Board approval at its February 8, 1995 meeting. These changes affect the Division 4 Engineering and Construction Standards referenced in Section 14-121 of Article III Land Development Improvements of Chapter 14 Planning, of the Macomb Township Code of Ordinances. The changes are described as follows:

1. The storage capacity of retention basins was required to be equivalent to a minimum of 0.2 feet of water over the watershed area contributing to the basin. The storage capacity of retention basins is now required to be equivalent to a minimum of 2-inches of water over the watershed area.
2. The maximum design high water elevation for storage in retention basins is currently required to be at least 3 feet below the low point of the watershed area. An option to this requirement is as follows: The design hydraulic gradient (HGL) of the storm sewer shall be 1 foot or greater below the ground surface elevation above the pipe. The starting elevation for the HGL computations shall be the greater of: 1) the 2/3 depth elevation of the design retention basin volume, or 2) the highest 8/10 diameter point elevation of the basin inlet pipe(s). In any event the lowest catch basin surface elevation shall be greater than the design water surface elevation of the retention basin. The HGL shall be plotted on the storm sewer system profiles.

If you have any questions or comments please call.

Very truly yours,

Spalding, DeDecker & Associates, Inc.


William J. Popp, PE

WJP/JN/lb



Engineering & Surveying Excellence
Since 1954

Re: Engineering Plan Review and Approval
Land Development Ordinance formally known as
Ordinance No. 17 and now called Chapter 14,
Article III of the Macomb Township Code of Ordinances

To facilitate the process of reviewing engineering plans submitted to Spalding, DeDecker for proposed projects in Macomb Township, it is hereby requested that the Developer make application for Engineering Plan Review on forms furnished by the Township's Water and Sewer Department.

As part of this application, three copies (1 set for the Water & Sewer Department and 2 sets for the Township Consulting Engineer) of completed plans for approval shall be submitted and shall bear the following signed statement by the Developer's Engineer:

"I hereby certify that I have read the Township's Land Development Ordinance (and its related Engineering and Construction Standards), and I have prepared these plans in complete conformity with the requirements of said Ordinance."

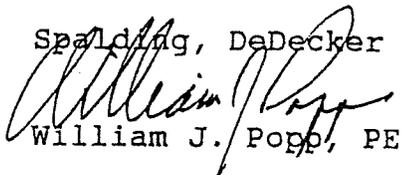
Signature of Developer's Engineer

Type Name of Developer's Engineer and P.E. Number

This is necessary to assure that each project can be handled expeditiously as possible and needless delays can be avoided in approving your plans.

Sincerely,

Spalding, DeDecker & Associates, Inc.



William J. Popp, PE

WJP/JN/dmk

cc: Macomb Township Water & Sewer Department



MACOMB TOWNSHIP

54111 BROUGHTON ROAD • MACOMB, MI 48042 • 586-992-0710

March 31, 2014

SUPERVISOR

Janet I. Dunn

CLERK

Michael D. Koehs, CMC

TREASURER

Karen M. Goodhue

TRUSTEES

Dino F. Bucci, Jr.

Clifford W. Freitas

Roger M. Krzeminski

Nancy J. Nevers

To: All Design Engineers/Surveyors Doing Business in Macomb Township

Reference: Macomb Township Datum Conversion

Dear Design Engineer/Surveyor:

Effective April 1, 2014, Macomb Township will adopt NAVD 88 as the Township's datum for use on all projects moving forward.

There are several projects that have been submitted the Township and are currently in the detailed engineering plan review phase. We will leave it to the design engineer/surveyor's discretion as to whether they will convert their engineering plans to NAVD 88 datum. NGVD 29 datum will be accepted for projects currently in review ONLY. Any new engineering plans submitted to the Township for approval as of April 1, 2014 shall be on NAVD 88 datum.

All plot plans and grade certificates submitted to the Township for approval shall use the datum that was used on the approved development plans. All plot plans being submitted to the Township for approval for parcels without a previously approved development plan shall be on the NAVD 88 datum as of April 1, 2014. For these types of plot plans which have been submitted to the Township but not yet approved; we will leave it to the design engineer/surveyor's discretion as to whether they will convert their plot plans to NAVD 88 datum. NGVD 29 datum will be accepted for these plot plans currently in review ONLY.

Please contact Crystal Kozak with Anderson, Eckstein and Westrick for updated benchmark information as needed. Crystal can be reached at (586)726-1234 or ckozak@aewinc.com.

If you have any questions regarding this matter, please contact my office at (586) 992-0710, ext. 2275.

Sincerely,

Macomb Township

James L. Van Tiflin, PE
Township Engineer

**TOWNSHIP OF MACOMB
COUNTY OF MACOMB
STATE OF MICHIGAN**

**RESOLUTION AMENDING THE MACOMB TOWNSHIP
ENGINEERING AND CONSTRUCTION STANDARDS**

At a regular meeting of the Macomb Township Board of Trustees that was called to order by Supervisor Janet I. Dunn on Wednesday, May 28, 2014 at 7:00 p.m., the following resolution was offered:

Whereas, the Macomb Township Board of Trustees previously adopted an ordinance amendment authorizing the Township Engineer to publish and periodically update standards for engineering design, preparation of engineering plans and specifications, and for construction of site improvements ("Engineering and Construction Standards"); and

Whereas, the Township Engineer wants to update the Engineering and Construction Standards set forth in Section 17.0502 (V) 2 and 3 and have the Macomb Township Board of Trustees approve the amended standards; and

Whereas, the Macomb Township Board of Trustees wishes to approve the amended Engineering and Construction Standards proposed by the Township Engineer as set forth below;

Now, Therefore, Be It Resolved, that the Macomb Township Board of Trustees approves the following amendment to the Engineering and Construction Standards set forth in Section 17.0502 (V) 2 and 3 relating to storm water retention basins:

Section 17.0502 (V)

.
.
.

~~2. For safety purposes and to minimize erosion, retention basin side slopes shall be a minimum of one (1') foot vertical to twenty (20') feet horizontal (1:20) and a maximum of one (1') foot vertical to four (4') feet horizontal (1:4).~~

A minimum 10' wide maintenance area shall be provided around the entire perimeter of the retention basin. This maintenance area will be considered part of the retention basin facility and shall be located completely within the property or easement area designated for the retention basin. The maintenance area shall have a grass surface (except for the access drive) with a cross slope no greater than 7% and be clear of landscaping, fencing and other materials that may hinder maintenance of the retention basin.

A minimum 16' wide paved access drive shall be provided from a public road to the retention basin to facilitate maintenance. This access drive shall extend onsite as necessary to provide direct access to retention basin facilities such as outlet structures, pump stations, etc. An adequate maintenance vehicle turnaround shall also be provided for access drives longer than 150'.

3. All retention basins having side slopes steeper than one (1') foot vertical to six (6') feet horizontal (1:6) will be permitted only with the installation of a six (6') foot high fence completely surrounding the retention facility including the required maintenance area. The fence shall be a commercial-grade decorative aluminum (simulated wrought iron) type and shall be powder coated with an earthen tone color (black, brown, beige, or green). All aluminum extrusions for posts, pickets and rails shall have an alloy and temper designation of 35,000-psi strength aluminum alloy 6005-T5 or better. Fences in areas of low public visibility may request approval of a commercial grade, vinyl coated chain link fence from the Planning Commission. Minimum sixteen (16') foot wide matching double opening gates shall be provided where the paved access drive enters the retention basin facility. Retention basin fencing shall not be located within setback or clear vision areas adjacent to public roadways or private drives and any utility easements.

Motion by BUCCI, seconded by FREITAS, that the resolution be adopted:

AYES: Members: BUCCI, DUNN, FREITAS, GOODHUE, KOEHS, KRZEMINSKI, NEVERS

NAYS: Members: None

ABSENT: Members: None

Certification of Clerk

This is to certify that the foregoing is a true and complete copy of a resolution offered and adopted by the Macomb Township Board of Trustees at a regular meeting held on Wednesday, May 28, 2014.

Signed:



Michael D. Koehs, Macomb Township Clerk
54111 Broughton Road, Macomb, MI 48042

RESOLUTION PASSED.