

# ENGINEERING DESIGN STANDARDS

## SECTION 2 - PLAN REQUIREMENTS

### 2.0 GENERAL

This standard establishes the minimum requirements for engineering plans for submittal to the Township.

Prior to starting any design, the design engineer is encouraged to make use of maps and information available at the Township and County offices. It shall be the responsibility of the design engineer to verify utility locations provided by the Township, Oakland County, or other agencies.

### 2.1 PLANS AND SPECIFICATIONS

#### A. GENERAL REQUIREMENTS:

1. The plans and specifications shall be prepared under the supervision of a Civil Engineer licensed in the State of Michigan and the plans shall be signed and sealed by that engineer.
2. Plans shall consist of a title sheet, plan and profile, project specific notes and details, and standard detail sheets.
3. Sheet size shall be 24" x 36" and shall be neatly and accurately prepared. Good engineering judgement should be exercised in the design layout, and presentation of the proposed improvements.
4. A minimum scale of 1" = 50' horizontal and 1" = 5' vertical for plan and profile sheets. Overall development, grading, and utility layout plans may be at 1" = 100' or other appropriate scale for showing the entire development on one sheet, where multiple sheets are required. Details specific to the project shall be drawn at an appropriate scale.

#### B. TITLE SHEET

A title sheet, or the first sheet of a set of plans, shall show the following:

1. Project Title.
2. Name, address, and phone number of proprietors.
3. Name, address, and phone number of designing engineer.
4. The seal and signature of engineer responsible for the project.
5. Location map drawn to an appropriate graphic scale, generally not greater than 1" = 100' nor smaller than 1" = 2000', with North indicator, showing location of project with respect to the surrounding area.
6. Reference benchmarks, established at intervals not greater than 1,200 feet and on U.S.G.S. Datum, convenient to the proposed construction. Each benchmark shall be noted with number, location, description, datum designation, and established elevation. A minimum two benchmarks shall be provided.
7. Name of the Township.
8. Legal description of the property.
9. Legend.
10. Plan completion date.

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11. Dates of submittals and revisions.
12. Sheet Index.
13. Quantity List of Public Improvements.
14. A note stating that the Contractor shall verify the location and elevation of existing utilities prior to construction.
15. A note stating that all Public Improvements construction shall have competent full-time inspection provided by or caused to be provided by the local unit of government.
16. A statement indicating that the design engineer has reviewed the Charter Township of Commerce Engineering Design Standards and other applicable ordinances and that the prepared work is in conformance with the standards and ordinances and the approved Site Plan. All exceptions must be indicated.

## C. SOIL EROSION AND SEDIMENTATION CONTROL PLANS

1. Can be incorporated with Drainage Area plan sheet or other appropriate construction plan and must meet the requirements of the Commerce Township Ordinance Chapter 18 Article V - Soil Erosion and Sedimentation Control.
2. All elevations shall be on U.S.G.S. datum.
3. As a minimum, plan sheets shall include:
  - a. North arrow and bar scale.
  - b. Existing topography and proposed ground contours at 2-foot intervals extending 100 feet past the boundary of the site. All existing ground elevations shall be shown to tenths of a foot.
  - c. Location, types and details of perimeter and on-site sediment and erosion control methods.
  - d. An erosion control and construction sequence schedule.
  - e. Location and details of mud mats; temporary stone access drives to keep vehicles from tracking mud off the site.
  - f. Location, dimensions, surface material and thickness, method of containment, and restoration of construction staging and equipment and material storage areas.
  - g. Temporary construction sediment basins (when indicated on the plans or required due to site conditions):
    - i. Location of basin.
    - ii. Calculations for the size of the basin and amount of sediment loading.
    - iii. Method and/or location of conveying site runoff to the basin and erosion control measures along drainage route.
    - iv. Location, cross-section, and details of access route to basin for periodic dredging and maintenance.
    - v. Maintenance schedule for removing accumulated sediment. Note indicating method and location of disposal of sediment basin soils.

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- vi. Location and detail of basin outlet filter.
  - vii. Location and elevation of sodded emergency spillway.
  - viii. Location and detail of temporary security fencing.
  - ix. Cross-section of basin side slopes, top of bank/basin bottom elevations, inlet/outlet elevations, and water surface elevation/depth of storage.
  - x. Plan or description for the removal of the temporary basin and restoration of the affected area once permanent control devices and stabilization are in place.
4. The following Erosion Control Standard Notes" shall be placed on the soil erosion and sediment control plans:
- a. All erosion and sedimentation control work shall conform to the current standards and specifications of the Oakland County Water Resources Commissioner and the Charter Township of Commerce.
  - b. Daily inspections shall be made by the Contractor for effectiveness of erosion and sedimentation control measures. Any necessary repairs shall be performed without delay.
  - c. Erosion and any sedimentation from work on this site shall be contained within the work area and not allowed to collect on any off-site areas or in waterways. Waterways include both natural and man-made open ditches, streams, storm drains, lakes, ponds and wetlands.
  - d. The Contractor shall apply temporary erosion and sedimentation control measures as directed on these plans and where otherwise required by the work. The Contractor shall remove temporary measures as soon as permanent stabilization of slopes, ditches, and other changes have been accomplished.
  - e. Soil erosion control practices will be established in early stages of construction by the Contractor. Sediment Control Practices will be applied as a perimeter defense against any transporting of dirt off the work area.
  - f. The Contractor shall protect and preserve off-site natural vegetation.
  - g. Protect all existing trees, including their branches and roots, from damage due to this work unless specifically identified for removal.
  - h. Stabilization of all disturbed areas shall be established using the appropriate vegetation within 5 days of completion of final grading.
  - i. The Contractor shall sweep the existing streets surrounding the project site as needed.
  - j. The Contractor shall be responsible for dust control and shall provide all equipment and material to keep dust in check at all times. The Contractor shall respond immediately to any and all complaints.
  - k. The Contractor shall be responsible for obtaining the NPDES permit and ensuring compliance with all applicable permit regulations, including but not limited to, inspection, restoration and record keeping requirements. Reports from the Certified Storm Water Operator shall be made available to the Township.

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- I. The Contractor shall be responsible for obtaining and complying with the conditions of the Soil Erosion and Sedimentation Permit from the Charter Township of Commerce.

## D. GRADING PLANS

1. Scale of sheets shall be at least 1" = 50' except for an overall plan showing entire site for a multi sheet set.
2. All elevations shall be on U.S.G.S. datum.
3. As a minimum, plan sheets shall include:
  - a. North arrow and bar scale.
  - b. Existing topography and ground contours at 2-foot intervals extending 100 feet past the boundary of the site. All existing ground elevations shall be shown to tenths of a foot.
  - c. Centerline of street stationing with centerline or top-of-curb elevations at 50-foot intervals.
  - d. Existing and proposed ground elevations shall be provided at all lot corners along the boundaries of the development and 50-foot intervals along all site boundary lines.
  - e. Street names, street widths, subdivision names, lot numbers and dimensions, and permanent parcel numbers and dimensions for all unplatted parcels for the site and adjacent properties.
  - f. Floodplain contour line, where applicable.
  - g. Wetland limits, where applicable, and the contact information for the consultant that flagged the wetland limits.
  - h. All proposed and existing storm drainage facilities, storm sewers, manholes, catch basins and inlets including rim and end section finish grades, and all existing and proposed utility structures (i.e., sanitary manholes, hydrants, etc.) with rim or finished grade elevations and invert elevations to one hundredths of a foot.
  - i. All existing and proposed easements.
  - j. Proposed top of curb or shoulder elevation opposite each front lot corner to hundredths of a foot.
  - k. Finish house grades are to be placed in rectangular boxes drawn to dimensions comparable to a typical house to be built in the development. A box shall be placed on each proposed lot according to the front yard setback. Indicate walkouts (w/o) on rectangle box.
  - l. Proposed ground elevation at each lot corner (front and rear), and side lot elevations between houses to tenths of a foot.
  - m. Provide sidewalk elevations at all lot corners to one hundredths of a foot.
  - n. Provide elevations for pavement, sidewalks, parking islands and other locations as required by the Township Engineer.
  - o. When swales for lot drainage are called for on the plan, swale elevations at the high point adjacent to the house, the back of the house, and the front of the house shall be provided. General flow direction of swales shall be shown with arrows.

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- p. Drainage flow arrows shall be provided to indicate the direction of surface water drainage over the development.
- q. In residential developments each grading plan sheet shall contain a note indicating the location of footing drain/sump pump discharge.
- r. Indicate rear yard catch basins where required. The proposed rim shall be shown to the nearest hundredths.

## E. PAVING PLANS

1. All elevations shall be on U.S.G.S. datum.
2. The plan portion of the sheet shall include, at a minimum:
  - a. North arrow and bar scale.
  - b. Street names, street and easement widths, subdivision names, lot numbers and frontage dimensions, for all unplatted parcels.
  - c. Location of existing and proposed utilities crossing or within proposed right-of-way.
  - d. Existing easements on the site.
  - e. Existing adjacent streets.
  - f. Type of paving.
  - g. Radii of all curves.
  - h. Construction notes.
  - i. A tabulated list of quantities appearing on that sheet.
  - j. Sidewalks and approaches.
  - k. Proposed public street approaches with alignment and dimensions.
  - l. ADA accessible ramps and detectible warnings
3. The profile portion of the sheet, when applicable, shall appear below the companion plan portion, generally projected vertically, and shall show at least the following:
  - a. Existing and proposed centerline.
  - b. Proposed top of curb.
  - c. Proposed storm sewer and or ditch.
  - d. Existing storm sewer facilities.
  - e. Stationing where applicable.
4. Cross-sections shall be provided with the following information:
  - a. Paving type, thickness, and specification.
  - b. Base type, thickness, and specification.
  - c. Pavement width, crown, and cross-slope.
  - d. Curb section (where applicable).
  - e. Subgrade treatment.

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## F. PLAN AND PROFILE SHEETS (SANITARY, WATER MAIN & STORM)

1. Scale of plan portion of sheet shall be at minimum 1" = 50'. The horizontal scale of profile portion of sheet shall match the plan and the vertical scale shall be 1" = 5'.
2. All elevations shall be on U.S.G.S. datum.
3. Each plan and profile sheet shall include a tabulated list of quantities appearing on that sheet.
4. Structures shall be identified by numbers assigned consecutively and increasing in direction opposite to direction of flow in each sewer.
5. The plan portion of sheet shall include, at minimum:
  - a. All existing or planned surface or underground improvements in streets or easements in which sewer construction is proposed, and in adjacent areas if pertinent to design and construction.
  - b. Street names, street and easement widths, subdivision names, lot numbers, lot dimensions, and parcel numbers and frontage dimensions for all unplatted parcels.
  - c. Location, length, size and direction of flow of each section of proposed sewer between manholes.
  - d. Natural or man-made features such as drainage courses, county drains, lakes, wetlands and floodplains.
  - e. Locations of all manholes, ARV's, IFC's, BFC's, TFC's and other sewer appurtenances and special structures with ties to property lines.
  - f. Existing pipe inverts involved in the project.
  - g. House leads, wye branches or tee inlets, to be constructed with the proposed sewer, with locations at easement and/or property lines.
  - h. Limits of special backfill requirements.
  - i. A note stating that the Contractor shall adjust existing manhole covers, as required.
  - j. For water mains, locations of valves, hydrants, and bends with length of pipe in between; pipe material, class or SDR, and top of water main pipe elevation at crossings.
  - k. Basis of design for water mains and sanitary sewers.
6. The profile portion of sheet shall appear below companion plan portion, generally projected vertically, and shall show at least the following:
  - a. Size, length, slope, type and class of pipe, and bedding for each section of proposed sewer between structures
  - b. Limits of special backfill requirements.
  - c. Profile, over centerline of proposed sewer, of existing and proposed finished ground and pavement surfaces.
  - d. Locations of existing and proposed utilities crossing the line of the proposed pipe or otherwise affecting construction. Call out the top of pipe and invert elevations at the crossings. A minimum of 18" of clearance and compacted sand between pipes is required.

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- e. Location of all proposed structures, with structure number, invert elevation/direction of all connecting pipes, top of casting elevation, and structure type.
- f. Location of all house leads and wye branches to be constructed with the proposed sewer.
- g. Length of risers.
- h. Invert elevation at property line or easement line for house leads to be included with sewer construction.
- i. For water mains, profiles shall show the locations of valves, hydrants, and bends with length of pipe in between, pipe material, class or SDR, crossing locations, and pipe depth.

### G. STORM WATER MANAGEMENT BASINS AND PRETREATMENT SYSTEMS

1. Storm water management basins and/or pretreatment systems can be placed on the storm drainage plan and profile sheets or on a separate plan sheet.
  - a. Design calculations for detention/retention basin volumes required and provided, sediment loading calculations, basin outlet restriction, and a plan of the drainage area tributary to the basin shall accompany construction plans submitted for review.
  - b. For all open detention/retention basins, indicate the top-of-bank, high water and bottom of pond elevations, and side slopes. Provide location, elevation and details of basin outlet restriction and emergency overflow spillway or manhole for detention basins.
  - c. For enclosed detention basins, provide high water and bottom of system elevations, cross-section or profile of system; location, elevation and details of outlet restrictor, and method of providing for emergency overflows.
  - d. For infiltration (recharge) systems, provide soil boring logs and soils analysis, volume requirements, percolation rate, infiltration/exfiltration design calculations, cross-section or profile of system, and method for handling emergency overflows caused by rainfall in excess of the design storm event or failure of the infiltration/exfiltration medium. Soil boring for retention basins also to show ground water level, and soil types.
  - e. For open basin pretreatment systems, provide storage volume calculations, top of bank, high water and basin bottom elevations, side slopes, location of emergency overflow, and details of outlet control.

### H. DETAIL SHEETS

1. The standard detail sheets for Sanitary Sewer, Water Main, Storm Sewer, Soil Erosion and Sediment Control, as adopted by Commerce Township, shall be considered as a part of these design standards, and shall be included as part of the construction plans. A PDF copy of these details may be obtained from the Township's Engineer.
2. Complete details for all special appurtenances and structures shall be included with the construction plans.
  - a. Scales for special details shall be selected to clearly portray intended construction and component or equipment arrangement.
  - b. Scales used shall be clearly identified.