DELAWARE
COUNTY OHIO USA

CHRIS E. BAUSERMAN, PE, PS • DELAWARE COUNTY ENGINEER

DELAWARE COUNTY ENGINEER'S OFFICE

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DELAWARE COUNTY ENGINEER'S DESIGN, CONSTRUCTION & SURVEYING STANDARDS

COUNTY COMMISSIONERS
Glenn A. Evans
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ADOPTED: JANUARY 22, 2008
EFFECTIVE DATE: JANUARY 30, 2008

County Commissioners Resolution No. 08-80

PROFESSIONAL ENGINEERS AND
PROFESSIONAL SURVEYORS
CREED

As a member of an honorable profession,
I dedicate my professional knowledge and skill
to the advancement and betterment of human welfare.

I PLEDGE

To give the utmost of performance;
To participate in none but honest enterprise;

To live and work according to the laws of man and to the highest standards of professional conduct;
To place service before profit;
To place honor and standing of the profession before personal advantage;
To place the public welfare above all other considerations.

In humility and with the need for Divine Guidance I make this pledge.

Table of Contents

Table of Contents

Table of Contents

Table of Contents

List of Tables

2007 Delaware County Engineer Standards Manual Revisions

1. Plans Development (Art. II) - Both Subdivision and Capital Improvement Projects (public funded) addressed, based on road classifications.

2. Preliminary Engineering Plan (Art. III)

    a. DESC requirements addressed.
    b. Submittal requirement revisions.
    c. Review time shortened from 28 to 21 days, variances must be addressed during preliminary phase.
    d. Preliminary plans, composite utilities and grading plan to be submitted with preliminary plat.
    e. Delaware County Traffic Impact Standards (TIS) to be utilized
    f. Plan and details to include pavement thickness, all access easements, location of sanitary and storm sewers and waterlines, proposed flood routing, and proposed street connections.

3. Final Engineering Plan (Art. III & IV)

    a. Submittal requirement revisions.
    b. Storm water computation sheets and storm water maintenance agreements required (for sites with offsite drainage).
    c. Submission of required approved environmental documents prior to approval of final plan.
    d. Titlesheet requirements revised.
    e. Common Access Drives, Commercial, Industrial, and Multi-family developments addressed.
    f. Referenced standard drawings (Delaware County, and/or ODOT) based on road classifications.
    g. For major and minor arterials, major and minor rural collector roads, ODOT design standards (e.g. L&D Manual, CMS, etc.) shall apply.
    h. Standard General Notes added to appendix, General Notes section added for non-standard situations, and required General

Notes plan sheets added along with table of estimated quantities.

i. Final Engineer's Estimate revised, unit bid prices on County Engineer's website updated.
j. Intersection and cul-de-sac details addressed.
k. Location by station and offset or GPS coordinates addressed
l. Cross section requirements for open ditch and curb and gutter streets updated.
m. Details for culverts larger than 36" addressed. Precast wingwalls and headwalls addressed.
n. Master Grading Plan content has been addressed.
o. Post-development calculations and required storage calculations clarified. Medium and high density residential, commercial and industrial requirements addressed. Emergency overflow for 100 year storm added.
p. Required sheets to include storm water management facility plan, sediment control plan, and maintenance of traffic plans (road widening only).
q. Road widening, shoulder and ditch improvements addressed with plan sheets to comply with ODOT L & D Manual.

    i. Typical section and pavement widths to be approved by the County Engineer. Adequacy of existing drainage structures addressed.
    ii. Requirements for work within the R/W.
    iii. Pavement reinforcement at existing/proposed interfaces addressed. Subgrade stabilization addressed.
    iv. Video documentation of existing conditions.
    v. No road widening work between December 1st and April 1st. Work requirements on existing roads addressed.

r. Traffic control, signing, pavement markings, street names and highway lighting updated.
s. Review procedures for Common Access Drives, commercial, industrial, and multi-family plans addressed.

4. Provisions and Guarantee required by Owner (Art. V)

    a. Owner's Project Agreement added (formerly Subdivider's Agreement).

b. Construction Performance Fees updated and address private developments, road widenings, storm water management systems, and subdivisions.
c. Types and details of Guarantees addressed.
d. Maintenance of improvements during construction updated.
e. No maintenance guarantees shall expire during December 1 through May 31st.
f. Prefinal and Final inspections requirements clarified.

5. Street and Bridges (Art. VI)

a. Arterial streets design per ODOT Standards. Collector and local street designs also addressed. Pavement width requirements for curbed and non-curbed streets addressed.
b. Locate waterlines on outside of loop for Loop Streets.
c. Permanent T-turnarounds and Parkways/Boulevards addressed.
d. Traffic counts for design shall comply with the County Traffic Impact Standards.
e. Townships may enact standards for obstructions in the R/W.
f. Vertical alignment requirements clarified.
g. Parking limitations on boulevards addressed.
h. Other items addressed including guardrail, shoulders, side and ditch slopes, sidewalks, bike paths, pedestrian crossings and handicap ramps. Requirements for underdrain, curb, and fire hydrant locations discussed.
i. Locations of storm structures including spacing and locations at intersections clarified.
j. Sight distance requirements at intersections with an arterial or existing county/township road addressed.
k. Temporary turnarounds clarified.
l. Bridges, culverts over 6' span and special structures clarified, minimum loading requirements addressed.
m. Special street name signs require written township trustee approval. Design street signs and bases in subdivision entrances within county or state R/W per FHWA and ODOT standards.
n. Pavement marking requirements and speed limit and school sign requirements addressed.

6. Pavement Design (Art. VII)

a. Subgrade reinforcing requirements based on evaluation of soil testing.
b. All local commercial and industrial, minor rural collector, major collector and major and minor arterial streets shall be designed based on an approved traffic study and the County Engineer shall approve the percentage of trucks used for these streets.
c. Schools or embedded commercial or industrial will need to account for the increased traffic loadings.
d. Item 448 now addressed. Any project paved after October 15 shall not include the surface course layer (404 or 448) as part of the strength computations and the surface course shall not be placed until the following construction season.

7. Work in Road Right-of-Way or Easements (Art. VIII)

a. Permit required for work within the public right-of-way including installation of driveways, drive culverts, ditch reconstruction plans, utility work, or road closures.
b. Driveway approach construction clarified, installation on non-curbed roads with 35mph or less addressed. Material compositions within the R/W addressed. Flare and radius requirements addressed for residential, commercial, shared, and CAD drives.
c. Drainage, erosion and sediment control requirements addressed for CAD drives.
d. Driveway pipes sized for 10 yr storm for local streets and 25 yr storm for collector and arterial streets and shall be a minimum of 12 inches.
e. New lots or access points on existing streets require a permit to be approved including the pipe design.
f. Road Closure section added. Road closing permits addressed.
g. Permits for utility work and excavation requirements within the R/W.

8. Drainage (Art. IX)

a. Adequate outlet clarified.
b. Easements requirements revised.

c. Storm sewer rights and maintenance in easements addressed.
d. Detention/Retention ponds design criteria clarified.
e. Existing watershed boundaries and drainage maps requirements for pre and post development to be submitted.
f. No alteration/changes of approved flood routing paths shall be made without approval of the County Engineer. Flood routes shall be provided for all storm sewers and culverts.
g. Rear lot flood routing paths added.
h. Cross sections and profiles of all flood routes clarified. Flood route calculation/capacity methods addressed.
i. Culvert design procedure shall be per ODOT L & D Manual, Volume 2.
j. Box and 3-sided slab top and arched shaped structures shall be used in lieu of multiple cell pipe culverts.
k. For minor rural collectors, major collectors, and minor and major arterial streets, use ODOT L & D Manual for design storm frequencies and design flow calculations.
l. Pipe cover and minimum pipe size addressed. Requirements for pipes greater than 36", and 3 and 4 sided box structures addressed. Headwater elevations addressed.
m. Storm Sewer material section revised and mandrel requirements clarified.
n. Storm sewer distance from adjacent property line addressed. Pipe locations on rectangular and square structures addressed. Maximum pipe size at inlets addressed.
o. For rear lot drainage, 10 yr HGL height requirements.
p. For all minor rural collectors, major collectors, and major and minor arterial streets, see ODOT L & D Manual for hydraulic gradient, design flows, and curb inlet spread of water requirements.
q. Maximum length of pipe between structures and inlet spacing addressed.
r. Maintenance easement requirements clarified.
s. Design year and 100 year channel velocity calculations, channel protection addressed.
t. Subsurface drainage tiles addressed.
u. Density calculation for the entire subdivision/project not allowed to determine allowable release rate.
v. Detention basin design requirements clarified.
w. Use of retention/detention basins for water quality added.

x. Proof surveys for storm water facilities clarified.
y. Seeding and mulching addressed.
z. Downstream Flood Routing addressed where an existing subdivision exists downstream.

9. Surveying Standards (Art. X)

a. Submit copy of final plat a minimum of 4 weeks prior to planned Regional Planning Commission approval.
b. Subdivision definition revised.
c. All property transfers per Delaware County Transfer Standards (See Appendix) and these standards.
d. Submittal format of paper and electronic documents revised.
e. Master benchmarks for each section, phase or part revised.
f. Variance for master benchmark for CAD if no road extension or widening in future added.

10. Construction Requirements (Art. XI)

a. Preconstruction process including submission checklist.
b. Preconstruction conference requirements.
c. Building Permit Release for Bonded and No Bond Subdivisions.
    i. No paving after October 31st.
    ii. Owner responsibilities.
d. Storm sewer and storm water facilities requirements.
e. Flood route construction, erosion and sediment controls.
f. Construction punchout procedures, ditch maintenance.
g. Final subdivision acceptance.

11. New Article added addressing Storm water Quality (Art. XII)

Article I

GENERAL

100 PURPOSE

The Purpose of these rules, guidelines and standards as adopted by the Delaware County Board of Commissioners, hereinafter referred to as the "County Commissioners", is to provide engineering and surveying standards in Delaware County, Ohio. More specifically, these Standards define the minimum requirements for surveying, engineering, construction, and erosion and sedimentation control as applied to land development, and road and bridge construction projects under the jurisdiction of Delaware County.

101 TITLE

These rules, guidelines and standards shall be known as, and may be cited and referred to as, the DELAWARE COUNTY ENGINEER'S DESIGN, CONSTRUCTION AND SURVEYING STANDARDS, and shall hereinafter be referred to as the "Standards".

102 AUTHORITY

The County Commissioners and the County Engineer are authorized to adopt general rules and regulations establishing standards for the design and construction of improvements shown on the plats and plans within their jurisdiction by virtue of Chapter 711 and Title 55 of the Ohio Revised Code (ORC).

103 JURISDICTION

These Standards shall be applicable to work within all public right-of-way and subdivisions of land as defined by Chapter 711 of the ORC hereinafter within the unincorporated areas of Delaware County.

104 INTERPRETATION OF TEXT

In the interpretation and application of the provisions of these Standards, these Rules, Guidelines, and Standards shall be the minimum requirements. It is not intended by these Standards to interfere with or abrogate or annul any easements, covenants, or other agreements between parties unless they violate these Standards. When two or more specific provisions of these Standards conflict with each other or when a provision of these Standards conflicts with any other lawfully adopted rule, regulation, standard, ordinance or resolution, the most restrictive or that imposing the higher standard shall apply.

Article I

GENERAL

105 ADMINISTRATION

The Delaware County Engineer or designated representative, hereinafter referred to as the "County Engineer", shall administer these Standards for the County Commissioners. These Standards are based on generally accepted engineering principles and practices. Therefore, any variances to these Standards must be submitted *in writing* to the County Engineer for review and approval. The County Engineer may grant variances to these Standards when, in the opinion of the County Engineer, they adhere to sound engineering principles and practices.

106 ADOPTION

These Standards shall become effective after: (1) the necessary public hearings, (2) adoption by the County Commissioners, and (3) certification to the Delaware County Recorder in accordance with Section 711.101 of the Ohio Revised Code.

107 AMENDMENTS

These Standards may be amended in accordance with the same procedure as stated in Section 106 of these Standards.

108 SEPARABILITY

The invalidation of any clause, sentence, paragraph or section of these Standards by a court of competent jurisdiction shall not affect the validity of the remainder of these Standards (either in whole or in part).

109 INTERPRETATION OF TERMS

For the purpose of these Standards, certain terms or words used herein shall be interpreted as follows:

A. The word "person" includes a firm, association, organization, partnership, trust, company or corporation as well as an individual.

B. The word "shall" is a mandatory requirement, the word "may" is a permissive requirement and the word "should" is a preferred requirement.

C. The present tense includes the future tense, the singular number includes the plural, and the plural number includes the singular.

110 ABBREVIATIONS and DEFINITIONS (as used herein)

Article I

GENERAL

1. ACOE: Army Corps of Engineers
2. ADT: Average Daily Traffic.
3. CBR: California Bearing Ratio.
4. CMS: Construction and Material Specifications
5. County Commissioners: The Board of Delaware County Commissioners or designated representative.
6. County Engineer: The Delaware County Engineer or designated representative.
7. County Engineer Website: http://www.co.delaware.oh.us/engineer
8. County Sanitary Engineer: The Delaware County Sanitary Engineer or designated representative.
9. County: Delaware County, State of Ohio.
10. Drainage, Erosion and Sediment Control (DESC) Certification Letter – A form certified by an Ohio Licensed Professional Surveyor or Engineer, stating that the finished grade elevations, sanitary & storm manholes, storm water structures, and flood routing on the provided "as-built" survey/plans have been verified.
11. DESC Program – The program administered by the Delaware County Engineer's Stormwater Department as part of the Phase II National Pollution Discharge Elimination System (NPDES) Storm Water Program for managing drainage, erosion, and sediment control from construction activities.
12. Design Engineer: An Ohio Registered Professional Engineer retained by the Owner.
13. Easement: a grant by the property owner for the use of an area of land by the public, a corporation or another person for specific purposes.
14. General DESC Plan – A plan consisting of the grading plan and storm water pollution prevention plan (SWP3) that details the drainage, erosion, and sediment controls for construction and post-construction activities
15. General DESC Permit – A permit issued by the Delaware County Engineer's Stormwater Department upon approval of General DESC Plan that authorizes storm water discharges from construction activities.

16. Individual Lot DESC Plan – A lot plan consisting of the grading and storm water pollution prevention plan (SWP3) that details the drainage, erosion, and sediment controls for the construction and post-construction activities
17. Individual Lot DESC Permit – A permit issued by the Delaware County Engineer's Stormwater Department upon approval of an Individual Lot DESC Plan that authorizes storm water discharges from construction activities.
18. ODNR: The Ohio Department of Natural Resources.
19. ODOT: The Ohio Department of Transportation.
20. OEPA: Ohio Environmental Protection Agency.
21. ORC: The Ohio Revised Code.
22. Owner: Any individual, developer, firm, association, syndicate, partnership, corporation, trust or any other legal entity commencing proceedings under these Standards to affect a subdivision of land hereunder for itself or for another or its designated representative.
23. Professional Engineer: A registered engineer authorized to practice professional engineering by the State of Ohio Board of Registration as specified under Section 4733 (Administrative Code), ORC.
24. Professional Surveyor: A registered surveyor authorized to practice professional surveying by the State of Ohio Board of Registration as specified under Section 4733 (Administrative Code), ORC.
25. Project Agreement: An agreement between an Owner and Delaware County setting forth the financial and performance responsibilities of both parties.
26. Public Utility: Any firm, corporation, governmental agency or board having a Public Utility Commission permit to furnish to the public, under regulations, electricity, gas, sewer, telephone, transportation, water or other similar public services.
27. Regional Planning Commission (RPC): The Delaware County Regional Planning Commission or designated representative.

29. Street, Private: A privately maintained roadway in a platted subdivision designed and constructed to these Standards but not accepted by the County Commissioners.
30. Street, Public: A roadway within a dedicated right-of-way designed and constructed to these Standards and accepted by the County Commissioners for vehicular transportation use by the public (with or without provisions for pedestrians).
31. Subdivision: As defined by Chapter 711 of the Ohio Revised Code.
32. Thoroughfare Plan: Delaware County Thoroughfare Plan, Latest Edition.
33. Traffic Impact Study (TIS): Delaware County Traffic Impact Study Guidelines, Latest Edition.
34. Variance: A modification of the strict terms of the relevant standards where such modification shall not be contrary to public interest, and where owing to conditions peculiar to the subject property and not the result of the action of the applicant and literal enforcement of the Standards would result in unnecessary and undue hardship. The County Engineer may grant said variance.

111 REVIEW

Any requests for a review of the text of these Standards shall be made in writing to the County Commissioners and County Engineer with the reasons for the review being stated. The County Commissioners and the County Engineer shall review any such request and if they feel it necessary, shall conduct a public hearing.

Article II

GENERAL PLAN DEVELOPMENT PROCEDURE

200 PURPOSE

To outline the procedures to be followed in the development of subdivision plans.

201 SUBDIVISION PROCEDURE

The proposed public improvements within all subdivisions shall follow a three-phase review and approval procedure. This procedure starts with a Conceptual Discussion phase, which leads to the Preliminary Engineering Plan phase and then to the Final Engineering and Construction Plan.

A. Conceptual Discussion - Phase I

In this phase, the Owner or Design Engineer is encouraged to meet with the County Engineer and, when a central sewer is involved, the County Sanitary Engineer, so both parties can become familiar with the existing conditions affecting the proposed improvements. This meeting should take place as soon as possible after the sketch plan review phase by Regional Planning Commission.

It should be noted that approval of zoning does not constitute a variance from these Standards. Owners are encouraged to review their zoning plans with the County Engineer prior to submittal to the Township. This step is not required but is encouraged.

B. Preliminary Engineering Plan - Phase II

The Owner shall submit this plan along with any pertinent reports and calculations concurrent with submitting the preliminary plat which is submitted to the Delaware County Regional Planning Commission (RPC). The Preliminary Engineering Plan, as outlined in Article III of these Standards, shall contain sufficient information to enable the County Engineer to determine if the proposed improvements will be feasible and will serve the public's best interest. In general, the submitted information will be similar to what is required for RPC preliminary plan/plat approval.

C. Final Engineering and Construction Plan - Phase III

The Owner shall submit a complete Final Engineering and Construction Plan (including specifications and standards

drawings), as outlined in Article IV of these Standards, of the proposed subdivision for review by the County Engineer.

202 REVIEW FEES ON SUBDIVISIONS

The Owner shall pay all costs incurred by the County Engineer for review of Preliminary Engineering Plan and Final Engineering and Construction Plan. The County Engineer shall determine the fees charged and may include supplemental consulting services. The costs for all supplemental consulting services will be billed to the Owner. The County Engineer reserves the rights to withhold review of plans until these fees have been paid.

Fees may be refunded for withdrawn preliminary engineering submittals. The amount will be at the discretion of the County Engineer. Actual refunds will be determined based on all costs associated with the review up to the date of the project being withdrawn. Requests for fee refunds shall be made in writing.

203 CONSTRUCTION AND MATERIAL SPECIFICATIONS, STANDARD DRAWING AND SUPPLEMENTAL SPECIFICATIONS REQUIREMENTS

Construction and Material Specifications (CMS), Standard Drawings and Supplemental Specifications as outlined below shall apply for all projects (Subdivision and Public (Capital) Improvement/Non-Subdivision), based on the following road classifications. Classifications for specific roads can be found in the Delaware County Thoroughfare Plan, current edition, except as noted. Minor Collector Roads are further defined in these Standards as Minor Rural and Minor Urban Collectors.

ODOT CMS and Standard Drawings, Current Edition, and Delaware County Supplemental Specifications

Major Arterial

Minor Arterial

Major Collector

Minor Rural Collector (Open Ditch Typical Section)

City of Columbus CMS Current Edition, Delaware County Supplemental Specifications, and Standard Drawings

Minor Urban Collector (Curb and Gutter Typical Section)

Article II

GENERAL PLAN DEVELOPMENT PROCEDURE

Local Streets (Through Streets, Loop Streets, Cul-de-sacs and Low Volume/Low Density Streets, etc.)

Multi-Family, Common Access Drives (CADs), Commercial and Industrial Developments

For projects where both ODOT and City of Columbus specifications are required (for example, a new subdivision with local streets with a proposed access onto an existing arterial or collector road), the City of Columbus specifications will be required for all construction from the existing County/Township Road right-of-way line inside the proposed site. ODOT specifications will be required for all work within the proposed right-of-way for the existing County/Township Road (such as a road widening, shoulder and ditch improvements). Any pipes, headwalls, etc. that are located within the right-of-way of the existing County/Township Road will need to comply with ODOT standards. The County Engineer will have final determination of which standards, including standards drawings are applicable.

Article III

PRELIMINARY ENGINEERING PLAN

300 PURPOSE

To outline the procedure to be followed for a preliminary engineering plan submittal, including the specific information necessary for the submittal. The required information shall address the feasibility of the proposed improvement and identify particular problems that may be encountered. In general, the submitted information will be similar to what is required for RPC preliminary plan/plat approval. The Owner shall address these issues in the Final Engineering and Construction Plan. A Pre-Development Storm Water Tributary Map of the existing site shall also be provided as part of the Preliminary Engineering Plan.

When a reference is made to the Preliminary Engineering Plan, it shall include all pertinent reports and calculations necessary for review by the County Engineer.

301 PROCEDURE

A. Step 1

The Owner shall submit four (4) sets of the Preliminary Engineering Plan on 22”x34” size sheets and one (1) set of the Preliminary Engineering Plan on 11”x17” size sheets, including appropriate review fees and checklists to the County Engineer by the required submittal date for the preliminary plat to RPC.

B. Step 2

Upon receipt of the Preliminary Engineering Plan the County Engineer shall complete a review of this submission within 21 calendar days. The County Engineer shall provide written comments and/or approval. Marked checked prints may be returned to aid in understanding the comments made by the County Engineer. The County Engineer shall: (1) approve; (2) approve subject to the resolution of the attached comments; or (3) not approve the Preliminary Engineering Plan.

Review times for subsequent reviews shall be completed by the County Engineer based on the requirements of the Supplemental Specifications of these Standards.

Copies of the County Engineer’s comments shall be submitted to the Owner, RPC and the appropriate Township. The Owner may request a meeting to review the submittal or the County

Engineer's comments. An agenda of the meeting topic(s) shall be sent to the County Engineer a minimum of two business days prior to the meeting. Approval or conditional approval does not constitute variance approval. Request for variances shall be as set forth in these Standards (See Article I and VI). Intended variances must be requested during the Preliminary Engineering Plan.

C. Step 3

The County Engineer shall submit the Preliminary Engineering Plan to other agencies deemed necessary by the County Engineer. Additional copies shall be provided to the County Engineer for these submittals upon request.

D. Step 4

All townships reviewing the Preliminary Engineering Plan shall be given ten calendar (10) days to review the plan.

E. Preliminary Plan Approval:

Approval of the Preliminary Engineering Plan by the County Engineer is not an acceptance of the entire proposed project. It is only an approval of the general concept, which should be used as a guide in the preparation of the Final Engineering and Construction Plan. Approval of the Preliminary Engineering Plan shall be effective for a period not to exceed one (1) year following the date of the approval unless an extension of time is granted in writing. Upon expiration of the Preliminary Engineering Plan approval, no approval of the Final Engineering and Construction Plan shall be given until the Preliminary Engineering Plan has been resubmitted (including appropriate review fees) and approved. Approval of the Preliminary Engineering Plan is not a waiver of any Standards that may change during the period of preparation of the Final Engineering and Construction Plan. The Final Engineering and Construction Plan shall meet the County's requirements in place at the time the Final Engineering and Construction Plan is submitted for review.

When a Preliminary Engineering Plan includes a multi-phased project, the Preliminary Plan approval shall remain in force as long as the proposed development is advancing in a reasonable

manner as determined by the County Engineer. When a proposed multi-phase project is not advancing, the County Engineer may require a resubmission of the Preliminary Engineering Plan (including appropriate review fees). The County Engineer shall advise the Owner of this requirement in writing.

Significant changes to the approved preliminary engineering plan shall be submitted to the County Engineer for approval prior to submittal of the Final Engineering Plan. A narrative describing the reason(s) for the revised plans shall be included with the revised plans. The narrative will need to address the reasons for significant changes to the plans, such as street alignment, street profile, pavement typical section, drainage changes, sight distance, adequate outlet, etc.

302 PLAN REQUIREMENTS

The Preliminary Engineering Plan shall be submitted by cover letter and include a signed and completed submission Preliminary Engineering Plan Review checklist form which is available through the County Engineer (see Supplemental Specifications of these Standards for a copy of this checklist) along with the review fees. The Preliminary Engineering Plan shall be prepared by a Registered Professional Engineer (See Article I, Section 110) and shall include the following information as a minimum. An incomplete submission shall be cause for rejection by the County Engineer.

A. Identification:

1. Name of subdivision or development
2. Location by Range, Township, Quarter-Township, Farm Lot, (U.S.M. Lands) and/or Virginia Military Survey Name and Number
3. A clearly legible location map showing the location of the project with respect to the nearest road intersection.
4. North arrow
5. Written and graphical (bar) scale
6. Name, address and telephone number of Owner and the Design Engineer preparing the plan

B. General Information:

Article III

PRELIMINARY ENGINEERING PLAN

1. Total development acreage
2. Number and location of lots (Index Map)
3. Development density (as defined in Article VI, Section F)
4. Plan showing proposed section/phase lines for the entire project
5. Copy of the preliminary plan, composite utilities and grading plan, and plat as submitted to RPC (plans shall be prepared per current RPC regulations)
6. Identification of all intended variances to these Standards along with a written request in accordance with these Standards.

C. Traffic Study:

The traffic study shall comply with the Delaware County Traffic Impact Standards (TIS), current edition. The following items outline the basic requirements. Please refer to the TIS for all required information. A copy of the TIS may be found in the Supplemental Specifications to these standards.

1. Projected ADTs, widths and classifications for all proposed streets.
2. Traffic volumes for turning movements at all major intersections and intersections with existing State, County or Township roads. AM and PM peak hour counts shall be provided. The current edition of the TIS shall be used to determine warrants for any traffic control devices, turn lanes, acceleration and deceleration lanes, etc.
3. All traffic projections shall account for offsite traffic from stub streets into adjacent properties and cut through traffic from existing public roads.
4. The current and future ADTs on existing public roads from which the proposed project takes access.
5. An analysis of the impact on the existing public road system, the capacity of the existing roads and intersections affected by the proposed project.

6. In general an internal traffic study is not required if the Delaware County typical section is used throughout the proposed improvement (ADTs for each residential street shall be provided). At the discretion of the County Engineer, an internal traffic study may be requested for specific sites.
7. Commercial site traffic considerations based on ITE Manual, Current Edition.
8. Preliminary sight distance exhibits (if the TIS is submitted prior to the Preliminary Engineering Plan)
9. The Traffic Study shall be submitted concurrently to ODOT and other public agencies for their review and approval (if applicable).

D. Street and Structure Plan:

The following items outline the basic requirements. In addition, traffic and loading design calculations shall be included with the preliminary plan submittal (refer to Articles VI and VII for minimum standards and specifications for design).

1. Proposed typical sections for all streets showing: pavement and grading sections, right-of-way widths, slopes and composition with thickness of the proposed pavement (based on the AASHTO design methods and Art. VII). Each typical section shall also show the CBR value used for design of the proposed subgrade, pavement and total design value. Pavement design calculations and documentation shall also be submitted.
2. Centerline profile, including vertical alignment and vertical curve data including approximate “K” values and design speeds. Both existing right-of-way profiles are required for all open ditch streets (preliminary plan only).
3. Post development safety considerations and traffic projections including: traffic control devices, pedestrian traffic flow, etc.
4. All existing utilities showing their locations and easements, including all access easements.

5. Design speeds and street classifications.
6. Horizontal Street/Common Access Drive alignments (including street names) with stationing at 100-foot intervals and at all intersections, PC's and PT's.
7. Horizontal curve data showing the centerline radius and delta angle for all curves.
8. Pavement and right-of-way widths.
9. Existing topography (specify source datum) at the following specified contour intervals:
    - Two–foot minimum contour intervals for subdivision lots utilizing centralized sewer systems;
    - One-foot minimum contour intervals for subdivision lots utilizing on-site sewage treatment systems;
    - Larger contour intervals (5-foot intervals maximum) may be approved by the County Engineer for sites with existing topography of 12% slopes or steeper.
    - Contour intervals provided in the Delaware County Auditor's website (DALIS) is acceptable for existing topography
10. Sight distance exhibits in accordance with the requirements of Article VI (if not submitted with the TIS).
11. Terrain classification.
12. Extent of grading/clearing limits consistent with current RPC regulations.
13. Location of sanitary sewers, water lines, storm sewers and preliminary flood routing paths.
14. Adjoining parcel lines within 50 feet of the tract boundaries and existing roads within 200 feet of the tract boundaries.
15. Proposed street connections for adjacent land (to existing or future development). The use of alternate road terminations (e.g. Permanent T-turnarounds, etc.) shall be approved in writing by the County Engineer.

E. Storm Water Tributary Map Requirements:

Article III

PRELIMINARY ENGINEERING PLAN

See Article IX and the Supplemental Specifications for Storm Water Tributary Map requirements to be included with the Preliminary Engineering Plan.

F. Narrative:

The preliminary engineering plan must also include a narrative discussing and identifying any problems which the Design Engineer and/or Owner are aware of which shall affect the feasibility of the project.

Article IV
FINAL ENGINEERING AND CONSTRUCTION PLAN

400 PURPOSE

To outline the procedure to be followed for a final engineering plan submittal, including the specific information necessary for the submittal. The required information shall address all comments/issues made during the Preliminary Engineering Plan phase. A Storm Water Management Report shall also be provided as part of the Final Engineering and Construction Plan.

When a reference is made to the Final Engineering and Construction Plan, it shall include all pertinent reports and calculations necessary for review by the County Engineer.

401 PROCEDURE

The Final Engineering and Construction Plan shall follow the procedure below:

A. Step 1

Four complete copies on 22" x 34" size plan sheets and two complete copies on 11" x 17" size plan sheets of the Final Engineering and Construction Plan including all checklists and review fees shall be submitted to the County Engineer for review.

In addition, one copy of the Storm Water Management Report shall be provided with the submittal. The Report shall be submitted in a three-ring binder with the project name, section and phase and the design engineer on the front cover and spline. The Report shall include the Pre- and Post-Development Storm Water Tributary Maps of the site conditions, calculations for storm sewers, culverts, ditches, basin sizing, drainage, water quality, and other support data as deemed necessary by the County Engineer. Flood routing calculations and a narrative on the major flood routing through and downstream of the site including specific details on the flood routing shall also be included with the Report. See Articles IX, XII, and the Supplemental Specifications for additional items and content to be included in the report. The report shall be signed and sealed by an Ohio Registered Engineer. One CD which contains the Final Engineering and Construction plan and Storm Water Management Reports (PDF format) shall be included.

Also, one copy of support data and documents, as deemed necessary by the County Engineer shall be submitted. Support data shall include, but not be limited to, homeowner association documents, offsite easements, variance approvals, and correspondence with other governmental agencies (e.g., U.S. Army Corps of Engineers, Ohio EPA, ODNR, etc.) or third parties relative to the project. A CD containing all necessary support data and documents may be requested by the County Engineer.

If a detailed Preliminary Storm Water Management Report was submitted with the previous Preliminary Plan submittal and only minor changes have occurred (involving changes to a few pages of the report or less) the Design Engineer may only need to submit the changed pages. Whether the entire report needs resubmitted shall be determined by the County Engineer based on review of the revised sheets submitted and original report along with Final Engineering and Construction Plan.

A DESC permit is required for all sites. See Article XII of these standards for additional information regarding the DESC permit.

The Final Engineering and Construction Plan submittal shall include a written response addressing the resolution of all comments made as part of the Preliminary Engineering Plan review. The submittal letter shall also identify any additions or deletions made to the plans since the last submission. Failure to identify additions/deletions shall be cause for disapproval of the plans, and require a resubmittal of the plans with additional review fees charged.

B. Step 2

Upon receipt of a complete submission (including appropriate review fees as identified in the Supplemental Specifications), the County Engineer shall review the plan within twenty-eight calendar days. During this review period, the County Engineer shall determine what items on the plan will be required to be part of the County's Drainage Maintenance Program. These items will be clearly designated on a set of marked plans and returned to the Design Engineer. These items shall be included

on a separate plan sheet (Exhibit "C") and incorporated into the Final Engineering and Construction Plan.

The County Engineer shall provide written comments and/or approval. Marked checked prints may be returned to aid in understanding the comments made by the County Engineer. The County Engineer shall: (1) approve; (2) approve subject to the resolution of the attached comments; or (3) not approve the Final Engineering and Construction Plan. Note that the plans can not be approved without the submission of Exhibit "C".

At the Owner's request, a meeting with the County Engineer may be scheduled to discuss the comments. An agenda of the meeting topic(s) shall be sent to the County Engineer a minimum of two business days prior to the meeting.

All subsequent submittals of the Final Engineering and Construction Plan shall include the following:

Major Plan Changes - A written response addressing resolution of all comments made as part of the previous Final Engineering and Construction Plan review. Major Plan Changes shall be include but not be limited to the major or significant changes as were discussed in Article III.

Minor Plan Changes - A set of marked-up prints with the specific areas that changed circled. (Note: The circling of entire plan sheets shall be considered a Major Plan Change and must also be addressed with a written response of the changes as per above in order to be reviewed).

The submittal letter shall also identify any additions or deletions made to the plans since the last submission. Failure to identify additions/deletions shall cause immediate disapproval of the plans, and require a resubmittal of the plans with additional review fees charged. Review times for subsequent reviews will be completed by the County Engineer based on the requirements of the Supplemental Specifications of these Standards.

C. Step 3

Once the Final Engineering and Construction Plan submittal

meets all the County Engineer's requirements, the Owner shall submit the original cover sheet mylar for signature along with one (1) complete plan set and the approved current estimated cost of construction. In addition, two copies of the final plat shall be included. This plat shall be nearly complete (approximately 90% complete) and be in compliance with the Final Engineering and Construction Plan.

All copies of the approved environmental documents required by other agencies (US Army Corps of Engineers, Ohio EPA, ODNR, etc.) for construction of the project must be received by the County Engineer prior to approval of the Final Engineering and Construction Plan.

Sanitary Plans: Should the Owner desire to commence construction of the sanitary sewer plans prior to approval of the Final Engineering and Construction Plan, the sanitary plans shall include adequate erosion and sediment control details. The County Engineer will not approve the sanitary plans without these details and approval of the County Engineer's Storm Water Department.

Once the County Engineer approves the Final Engineering and Construction Plan, the plan may be used for construction provided such construction is started within one year of the approval date. After one year, the County Engineer reserves the right to review a resubmittal of the plans, with appropriate review fees, and require it to be updated to the standards in place at that time.

Plans approved prior to the adoption of these Standards may be granted additional time extension which shall be approved in writing by the County Engineer.

At the discretion of the County Engineer, Final Engineering and Construction Plans that have been submitted for review prior to adoption of these Standards may be allowed to proceed to construction without being required to update to these standard.

Provide one half size signed set of final approved plans (11" x 17") and one CD containing all the plan sheets (PDF format) to the County Engineer once the plans have been approved.

D. Step 4

Change Orders: No major design or material changes to the approved Final Engineering and Construction Plan will be permitted in the field unless approved by the County Engineer. The proposed changes ("Change Order") must be added to said plan and referenced on all sheets with approvals. Minor revisions or "Field Changes" may be submitted by the Owner that do not affect the design or materially change the approved Final Engineering and Construction Plan for review and approval by the County Engineer. These "Field Changes" will be documented by the County Engineer and must be included in the "as-built plans" as the final "Change Order" for the approved Final Engineering and Construction Plan.

Submittal of all Change Orders, including proposed revisions to the Master Grading Plan, shall include two "red-line" paper copies of the proposed changes.

For projects where phase and/or part lines are added as a change order, all affected plan sheets, including the affected sanitary plan sheets and plat shall be submitted to the County Engineer for review and comment. Section 402C of these standards describes the proper subdivision nomenclature.

All sanitary sewer change orders that affect public R/W or storm sewers shall be submitted concurrently to the Delaware County Sanitary Engineer and County Engineer for review and approval. Submit two sets of marked plans to the Delaware County Sanitary Engineer and one set to the County Engineer.

An additional column in the standard change order table on the Title Sheet shall be added for the County Engineer's approval (by initialing). If the proposed change order does not affect public R/W or storm sewers, a "N/A" shall be added in the column indicating the County Engineer's approval.

E. Step 5

After all of the proposed improvements have been completed, the Owner shall submit an updated "as-built" plan to the County Engineer. In addition to the requirements of these Standards, the information and data obtained for and presented on the "as-built" plan shall conform to the as-built survey specifications currently accepted by the surveying profession. The as-built submission shall include final design calculations

and supporting documents (e.g. stormwater management calculations, verified sight distance exhibits as required, etc.) as set forth in the Final Engineering and Construction Plan.

This plan (one copy) shall be a permanent mylar copy of the Final Engineering and Construction Plan. Each sheet shall be 11"x17" in size. In addition to the submittal of the project plan mylars, four CD's containing the as-built project plan, signed plat, the stormwater management report and calculations, as-built certifications, approved cost estimate, Traffic Impact Study, supporting documentation, etc. shall be submitted (in pdf format). The project name, section, phase (if applicable) and date should be clearly marked on the CD's.

402 TITLE SHEET

The title sheet shall contain the following information:

A. Location Map: This map shall indicate the allotment's location within the County.

B. Approval Block: An area shall be prepared for the signatures of the Owner and the County Engineer. The following statement shall be placed above the Approval Block:

"The Delaware County Engineer's signature on this plan signifies only concurrence with the general purpose and location of the proposed improvement. All technical details remain the responsibility of the Professional Engineer who prepared and certified these plans."

For Common Access Drives, Commercial, Industrial and Multi-Family developments, the following statement shall be placed above the Approval Block:

"The Delaware County Engineer's signature on this plan signifies only concurrence with the general purpose and location of the proposed improvements with respect to improvements within the right-of-way, storm water management, erosion and sediment control. All technical details remain the responsibility of the Professional Engineer who prepared and certified these plans."

C. Subdivision Nomenclature:
The terms below shall be used when identifying various

divisions of subdivisions into sections, phases and parts. These terms shall be clearly shown on the title sheet.

Section -- The term used to identify major divisions of a subdivision development (label using Arabic Numerals).

Examples: XYZ Subdivision Section 1

XYZ Subdivision Section 2

Phase -- The term used to identify the divisions of a section of a subdivision (labeled using alphabetically –upper case).

Examples: XYZ Subdivision Section 1 Phase A;
XYZ Subdivision Section 2 Phase A

Part -- The term used to identify the divisions of a phase of a subdivision (labeled using Roman Numerals).

Examples:

XYZ Subdivision Section 1 Phase A Part I;
XYZ Subdivision Section 2 Phase A Part II

(If needed parts could be split and labeled by using lower case letters. Example: XYZ Subdivision Section 1 Phase A Part II-a)

D. Consultant's Certification: This is to include the name and address of firm preparing the plan. The signature and seal of a State of Ohio Registered Professional Engineer is required.

The following note shall be placed above the Consultant's Certification:

"This is to certify that good engineering practices have been utilized in the design of this project and that all of the minimum standards as delineated in the Delaware County Design, Construction and Surveying Standards Manual have been met, including those standards greater than minimum where, in my opinion, they are needed to protect the safety of the public. Any variances to the above standards are consistent with sound engineering practice and are not detrimental to the public safety and convenience. These variances have been listed herein and have been approved by the Delaware County Engineer."

E. Standard Drawing Reference Block: This area shall list all standards drawings approved by the County Engineer that are being incorporated into the plans by reference. The table shall include all applicable standard drawings (Delaware County, ODOT, and City of Columbus), drawing number or designation, originating agency and date. Reference to either ODOT or City of Columbus Standard Drawings (if required) shall be based on the road classification, as outlined in Article II, Section 203 of these Standards. If incorporated, the County Engineer shall be provided copies of these drawings when the plans are filed for construction. Copies shall also be included with plan submissions if requested.

F. Variance or Design Exceptions: These shall be shown on the appropriate plan sheets and listed in a tabular form on the title sheet along with the date approved by the County Engineer.

G. Supplemental Specifications: A list of all applicable supplemental specifications approved or adopted by the County Engineer.

H. Specification Statement: An area above the signature block shall have one of the following statements.

The following statement is for all projects that require the use of ODOT CMS.

1. "The Delaware County Engineer's Design, Construction and Surveying Standards, current edition, the standard specifications of the State of Ohio Department of Transportation, current edition (English Units), including standard drawings and supplemental specifications listed shall govern this improvement."

The following statement is for all projects that require the use of the City of Columbus CMS.

2. "The Delaware County Engineer's Design, Construction and Surveying Standards, current edition, the standard specifications of the City of Columbus, current edition (English Units), including standard drawings and supplemental specifications listed shall govern this improvement."

See Article II, Section 203 of these Standards to determine (based on road classification) which statement is required.

I. Change Order Block: Change orders shall be shown in tabular form on the Title Sheet. This block shall contain a description of the Change Order including affected plan sheets, an initial column for the design engineer with date and an approval column for the County Engineer with date and Change Order number.

The size and location of the various elements (e.g., standard drawing block, change order block, signature block, etc.) required on the Title Sheet shall be subject to the approval of the County Engineer.

403 REQUIREMENTS

A. General:

1. Plan Requirements: The Final Engineering and Construction Plan shall include all items which are required on the Preliminary Engineering Plan including documentation of resolution of all changes and corrections as discussed in the preliminary reviews along with details, estimated quantities, supplemental specifications, standard drawings, proposal notes, etc. needed for construction. Failure to identify additions/deletions shall be cause for immediate disapproval of the plans, and require a resubmittal of the plans with additional review fees. For projects which require the use of ODOT specifications per Article II, Section 203, (Major arterials, minor arterials, major collectors and minor rural collectors), the requirements of the ODOT L&D Manual, current edition shall apply for all design standards, plan preparation, etc.

2. Drawing Standards: Plan line weights and style, topographic symbols, etc. shall conform to the plan requirements as established in ODOT's Location and Design Manual, current edition.

3. General Notes: A set of general notes covering non-standard situations which are not covered under the general specifications shall be included on a separate General Notes sheet within the Final Engineering and

Construction Plan. Sample General Notes are located in the Supplemental Specifications of these Standards and must be included on the projects. These General Notes shall be used on all projects with road classifications of Minor Urban Collectors, Local, Commercial, Common Access Drives, Industrial and Multi-Family. These General Notes shall not be altered or revised without written approval of the County Engineer. General notes shall not be placed on the title sheet.

4. General Summary/Table of Estimated Quantities: A table of "Estimated Quantities" including a column for "Item Number", "Description", "Quantity" and "Unit" shall be included on a separate Estimated Quantities sheet within the Final Engineering and Construction Plan. A sample estimated quantities table is located in the Supplemental Specifications of these standards. A Microsoft Excel document containing all the estimated quantities is available from the County Engineer. Estimated quantities shall not be placed on the title sheet.

5. Cost Estimate: A Final Engineer's Cost Estimate shall be submitted. The unit prices used shall comply with current Delaware County Engineer unit bid prices.

   The format for the Engineer's Cost Estimate can be found in the Supplemental Specifications of these Standards. An electronic version of the bid prices (PDF format) is available on the County Engineer's Design Resource Page on the website at: http://www.co.delaware.oh.us/engineer/drp.htm.

   This estimate shall include the name, address and phone number of the Owner; indicate if the Project Agreement is to be a bond or no-bond type of agreement; be signed and dated by an Ohio Registered Professional Engineer; and contain an approval line for the County Engineer.

   Once the final review is complete and the necessary revisions have been made to the Final Engineer's Cost Estimate, it shall be submitted for approval by the County Engineer. An approved Engineer's Estimate shall be valid for 6 months, unless otherwise approved by

the County Engineer's Office. If construction has not begun within the 6 month period, a revised estimate using current unit bid prices shall be submitted to the County Engineer for approval. Any surety issued within the 6 month period will require revision to conform to the approved Engineer's Estimate.

B. Street Plan, Plat, Profile and Cross Section Sheets:

All streets within the subdivision shall be shown on standard plan and profile sheets in accordance with Section 403.2 of these Standards. The County Engineer shall approve use of scales other than those shown below.

1. Normal scales:

a) Vertical Scale - 1" = 5'

b) Horizontal Scale - 1" = 50' (maximum)

A more detailed scale such as 1" = 20' or 1" = 30' is preferred. 1" = 20' scale is required for all road widening sheets.

c) Plats - 1" = 50 feet (maximum)

A more detailed scale such as (e.g., 1" = 40 feet, 1" = 30 feet) is preferred.

d) Intersection and Cul-de-sac Details - 1" = 20' or 1" = 30'

2. Plan Items (shall include but not be limited to):

a) Street centerline, stationing, right-of-way lines, easements and lot numbers.
b) Pavement, curbs, gutters, waterlines, storm and sanitary sewer structures, guardrail, and all existing and proposed utilities.
c) Topographic features within the general area and any obstructions or encroachments within the right-of-way or construction area.
d) Descriptions of benchmarks and their locations. (Refer to Article X of these Standards.)
e) Work and/or clearing limits.
f) Intersection and cul-de-sac details.

g) Station and offset of all structures and/or GPS coordinates.

3. Profile Items (shall include but not be limited to):
   a) Centerline stationing, original ground profile grade on the proposed centerline and the proposed profile grade.
   b) Vertical curve data and elevations (at all sag and crest points, as well as at even 25 ft. intervals) and sight distance data.
   c) Elevations at even 50-ft. stations for areas outside vertical curves
   d) Storm and sanitary sewer structures, waterline, culverts, and bridges.
   e) All existing and proposed utility crossings (location and elevation).
   f) Clearly label all pipe material specification and classification.

4. Cross-section Sheets:
   a) Minimum scales (unless otherwise approved by the County Engineer):

      Vertical Scale - 1” = 5’

      Horizontal Scale - 1” = 10’

   b) Location: Cross-sections shall be shown at even 50-foot intervals and other needed locations as determined by the County Engineer. All cross sections shall show the existing ground line dashed, with the proposed line drawn solid.
   c) Data: Include the following data from top to bottom:
      (1) Proposed finished grade elevation at centerline.
      (2) Station number (and street name, if more than one proposed street).
      (3) Existing elevation at the centerline.

(4) Ditch flowline elevation.

(5) Existing and proposed utilities (location and elevation).

(6) Foreslope and backslope slope rates (e.g., 4:1, 3:1).

d) Requirements for Cross-sections: Cross-sections shall be provided for all open ditch and curb and gutter streets. Cross-sections shall also be provided for all driveways and culverts.

Where a typical roadway cross-section is provided, road boxout dimensions shall be provided. A maximum of four cross-sections are permitted per plan sheet.

5. Drainage Structures:

Detailed drawings of all bridges, culverts and other drainage structures (other than standard culvert pipes with pipe diameter less than 36") shall be provided with the Final Engineering and Construction Plan. Plan format shall follow current ODOT L&D Manual and Bridge Design Manual Standards, and Article VI of these Standards. The plan scale shall be 1" = 10'- 0" (min). The use of precast wingwalls, headwalls, footings, etc. may be permitted at the discretion of the County Engineer. Requirements for precast wingwalls, headwalls, footings, etc. are outlined in the Supplemental Specifications of the Standards.

C. Master Grading Plan:

This plan shall include all elevations or a profile along the routing path and any other elevations necessary to show that the major storm is contained within the planned area. A detail of the typical section(s) and profile for all flood route(s) shall be provided.

The following information shall be provided on the Master Grading Plan:

1. Maximum scale of 1" = 50'-0". A more detailed scale, such as 1" = 40'-0" is permitted.

2. Rear lot drainage shall have a minimum slope of 2% or a storm sewer system shall be provided in all rear lots. The minimum slope for rear yards and side yards is 1%.

3. For rear lots with slopes of less than the 2% minimum slope, storm structures shall be placed in the rear lots at every third property line. For back yards on ravines, storm structures may not be necessary, at the discretion of the County Engineer. All sump pumps and roof drains shall outlet into the rear lot storm sewer system unless another means is found acceptable by the County Engineer based on specific site conditions.

4. The rear lot storm sewer pipes shall be designed for the 5 year hydraulic grade line not to exceed the top of grate.

5. 10-year ponding limits at all catch basins shall not exceed ponding depth of 1.5 feet.

6. No coring of the curb shall be permitted.

7. Elevations at all proposed property corners and all break points.

8. Along project boundaries with adjacent owners or at edges of No Build Zones/Conservation Easements, the proposed grades must match existing ground or lot grades.

9. Existing and proposed contours must be shown at 1-foot intervals. In areas defined as rolling terrain on the site, contours at 5-foot intervals are allowed.

10. Drainage arrows to indicate design sheet flow.

11. Cross-section and profile of all flood routes.

12. Offsite flows must be shown at property lines by arrows (indicating direction of flow) and the total acres tributary to those points.

13. Finished Grade and Hold-Down (rough grade) elevations.

14. 100-year headwater elevations for all culvert crossings, with easements provided (easement width based on elevation of 1.0’ above the 100-year elevation).

15. All easements must be shown and dimensioned, including major flood route easements, preservation easements, storm sewer easements, etc. See Supplemental Specifications for easement widths.

16. Flood routes on lot lines shall indicate limits of stormwater flow (Q100) so that utility pedestal can be placed above the Q100 stormwater flow limits. Flood Routes shall be clearly indicated and labeled on the plan.

17. All existing vegetation, limits of trees to be protected, wetlands, archeological areas, etc. must be delineated.

18. All proposed stormwater management facilities.

19. Construction limits.

20. For minor drainage courses on lot lines, utility pedestals shall be offset to avoid impeding the drainage course.

21. Landscape and/or mounding features plan for a proposed development shall be shown on the Master Grading Plan. This requirement is to assure there are no conflicts with these landscape features and the proposed drainage facilities, sight distance issues or right-of-way encroachments for the proposed development.

All proposed walkout basements shall be designated at the time the Final Engineering and Construction Plans are submitted for their initial review.

D. Detailed Retention/Detention Basin Plans

The purpose of these plans are to provide greater level of detail of how these storm water basins are to be constructed to aid the contractor as well as to aid the construction inspection of these facilities.

These basins must be provided on a separate plan sheet from the Master Grading Plan to provide a greater level of detail. However, the Master Grading Plan shall include the proposed stormwater basins drawn to proper scale. Unless otherwise approved by the County Engineer, these detailed plans shall include the following:

Note: See Section 601 of Article VI of these Standards for density classifications.

1. Dimensioned plan and cross-sectional views of the complete basin. The plan view shall include contour lines at one-foot intervals and the area of each contour plane. The basin side slopes shall be labeled on the cross sections.
2. Emergency spillway designed to convey the 100-year storm.
3. Detail(s) of the detention flow control structure(s) including sizes, orifice plates, specifications, and materials.
4. See the Article IX and the Supplemental Specifications for Allowable Peak Runoff Rates and other Design Criteria.

E. Storm Water Tributary Map Requirements:

See the Supplemental Specifications for the Pre- and Post-Development Storm Water Tributary Map requirements for the maps to be included with the Final Engineering and Construction Plan. Please refer to Article IX for the minimum standards and specifications for design.

F. Sediment Control Plan:

The erosion and sediment control plan shall represent the best management practices currently available at the time of the design. This plan must be a separate plan sheet from the Master Grading Plan. The plan must be designed in order to minimize the amount of sediment leaving the site. This plan and its components are subject to the review and approval of the Delaware County Engineer. Please refer to Article XII and the Supplemental Specifications for the requirements.

G. Road Widening, Shoulder and Ditch Improvements:

All subdivision projects (non-publicly funded) fronting on an existing public road shall provide pavement, shoulder widening and ditch improvements plan sheets. These plan sheets shall comply with the ODOT Location and Design Manual, current edition, including the Supplemental Specifications and Standard Drawings. Please also refer to the Supplemental Specifications

of these Standards for additional requirements. The plan sheets shall include, but is not limited to, the following items:

1. Typical Section and Pavement Width: The County Engineer shall approve the proposed typical section (pavement buildup) and pavement width.
2. Cross-sections at even 50-foot intervals and at all structures, drives and road entrances.
3. Proposed and existing road profile at the existing profile grade line.
4. At the discretion of the County Engineer, an alternative ditch design may be necessary for ditch slopes of 3:1 or steeper.
5. Proposed drive profiles. Note that if drives are located close to road cross sections, the drives may be shown in the cross sections instead of the drive profiles.
6. Plans for modification and/or extension of existing drainage structures and/or culverts. The County Engineer will determine if the existing drainage structure(s) are to be modified or be replaced.
7. Calculations for drive culverts.
8. Maintenance of traffic plan sheet(s), plan notes and permits are required for all work within the R/W. The Delaware County Permit Department will need to be contacted to obtain the necessary permit(s).
9. Identification, including horizontal and vertical locations of existing utilities (both above and below ground), and subsurface drainage systems. The requirements for relocation of utilities must comply with the County Engineer's Utilities Policy. A copy of this policy is included in the Supplemental Specifications of these Standards. Relocation of any affected utility lines will need to be done as part of the County Engineer's permit process. Coordination by the Owner with the affected utilities must be done as early as possible in the design process so that potential delays in relocating the utilities can be avoided. The Owner is responsible for

reimbursing the utility companies for this work. The County Engineer reserves the right to request proof of payment (by the Owner) from any utility company that is required to relocate their facility. Lack of timely relocation by the utility company could cause denial by the County Engineer of all pending utility permits for this utility company. In no case will an existing underground utility be permitted to remain beneath the pavement or shoulder.

10. Proposed right-of-way shall be shown. The right-of-way width provided shall comply with these standards. Please see the Supplemental Specifications for further information.

11. Show the Clear Zone on the plans as well as the location of existing utility poles and items that lie within the Clear Zone.

12. At the joint where the existing and proposed pavement meet the County Engineer will require an approved pavement reinforcement to minimize cracking of the pavement joint.

13. Subgrade stabilization or full depth pavement repairs may be required under the proposed pavement to minimize settlement. The requirements for this repair or stabilization (e.g., construction methods, materials, etc.) shall meet these Standards and Supplemental Specifications.

14. The Owner is required to submit a video tape of the existing roadway, documenting the condition of the existing pavement, location of existing utilities, ditches, driveways, culverts, structures, etc. at the time the plans are signed by the County. The videotaping is required to document the condition of the existing area prior to the start of construction. The tape will be used by the County Engineer during the construction phase should any disputes with adjoining property owners or the Contractor arise. The video will need to include a narrative describing the approximate location of the features mentioned previously including the date and

time of videotaping. See Supplemental Specifications for further information.

15. Construction start and end dates shall be approved by the County Engineer prior to the start of any construction activities. The County Engineer reserves the right to stop (or delay) construction activities at anytime (e.g. at the end of the construction season, etc.), should an unsafe condition arise. No road widening work will be permitted between December 1 and April 1.

All work on the existing road system such as pavement widening, turn lanes, ditch and drainage improvements, etc. shall be done as part of the first phase for any proposed development. The road widening plan sheets shall be included as part of the Final Engineering and Construction Plan for the first phase of the development. The County Engineer will not release building permits until this work is complete. Further, streets shall not be accepted onto the system without this work being complete.

H. Traffic Control, Signing, Pavement Markings, Street Names and Highway Lighting (if applicable) Plan:

All necessary street name signs, traffic control devices, traffic signs, pavement markings and highway lighting (if applicable) shall be shown in the Final Engineering and Construction Plan. These details shall be provided on separate sheet(s) and not included on the other plan sheets within the Final Engineering and Construction Plans. If only one intersection is involved with a maximum of 8 lots in the entire development, then a separate signage/striping plan is not necessary. All regulatory traffic control devices and signs shall conform to the requirements of the ODOT Manual Of Uniform Traffic Control Devices (MUTCD), Current Edition. All street names shall be approved by the Delaware County Engineer's Map Department prior to final plan approval by the County Engineer. Highway lighting (if required) shall be provided as directed by the Delaware County Engineer, and shall conform to the ODOT L&D Manual, current edition.

I. Special Construction Details:

These sheets should contain the details of special construction items not otherwise included in the plan or standard drawings modified to meet specific needs for the project. Reference must be made to the source of the drawings (e.g. ODOT, City of Columbus, etc.).

J. Drafting and Computer Aided Design and Drafting (CADD):

Drafting and CADD drawings shall conform to the requirements as established in ODOT's L&D Manual, current edition. The intent of this requirement is to provide a uniform standard concerning font sizes, line weights, symbols, etc, used in CADD drawings. It is not the intention of Delaware County to establish layer standards at this time, however, the County Engineer reserves the right to establish these standards if needed. As the County GIS system expands, this type of layer standard may be needed.

404 COMMON ACCESS DRIVES, COMMERCIAL, INDUSTRIAL, & MULTI-FAMILY PLAN DEVLOPMENT AND APPROVAL PROCEDURE

The plan development for these projects shall follow the procedure set forth in Article II of these Standards. The Final Engineering and Construction Plan shall meet all the requirements of the County Engineer as set forth in these Standards (e.g., work within the right-of-way, storm water management and erosion and sediment control). The required items on the Master Grading Plan as listed in Art. IV, Section 403 C shall apply to all CAD, Commercial, Industrial and Multi-family sites.

The submittal of the preliminary engineering plan may be waived for Commercial, Common Access Drive and Multi-family sites.

Procedure for approval: Once the Final Engineering and Construction Plan is acceptable, the County Engineer shall notify the Owner and/or Design Engineer. The original mylar title sheet, and all required permit applications (including Drainage Maintenance Petition) shall be submitted to the County Engineer for final signature. No plan will be signed until permit fees have been paid. A DESC permit is required for all CAD, Commercial, Industrial and Multi-family sites. Please refer to Article XII of these standards for further information.

Article V

PROVISIONS AND GUARANTEE REQUIRED BY OWNER

500 PURPOSE

To inform the Owner of the required provisions and guarantee needed for public improvements during construction and maintenance period prior to the acceptance of said improvements.

501 COUNTY HELD FREE AND HARMLESS

The Owner shall hold the County free and harmless from any claims for damages of every nature arising or growing out of the construction of such improvements, and shall defend, at their own cost and expense, each and every lawsuit brought against the County by reason thereof until the improvements have been accepted by the County Engineer and the County Commissioners.

502 OWNER'S PROJECT AGREEMENT

An agreement between the Owner and the County Commissioners shall be entered into which states the terms and conditions under which the Guarantees are established. This Project Agreement shall be in effect for the period of time specified in these Standards. A sample Project Agreement is included in the Supplemental Specifications of these Standards.

503 CONSTRUCTION INSPECTION FEES

An inspection and testing fee draw account shall be required for all projects. The amount of the deposit shall be determined by the County Engineer. The deposit must be received prior to the approval of the Owner's Project Agreement and scheduling of the Preconstruction Conference. The County Engineer shall draw funds from this account at an hourly rate for work performed by the County Engineer's Office and for all costs for contracted services.

504 CONSTRUCTION PERFORMANCE GUARANTEE

A. Private Developments

Private developments (private streets built to public standards) shall be required to complete all construction before the final plat will be approved by the County Engineer and forwarded to the County Commissioners for final approval.

B. Road Widenings

Article V

PROVISIONS AND GUARANTEE REQUIRED BY OWNER

All public improvements to existing roads (widenings, turn lanes, etc.) that are required to be made under a separate plan from the subdivision plan (for example, for a road improvement within the County/Township Right-of-way and the subdivision is within another jurisdiction, such as the City of Powell, City of Delaware) shall provide a construction performance guarantee for the full amount of the approved construction cost estimate prior to the beginning of construction. For these types of projects, there will be no maintenance period required once the improvements have been made to the satisfaction of the County Engineer, and the construction performance guarantee will be released upon approval by the County Commissioners.

C. Stormwater Management Systems

All Stormwater Management Systems to be publically maintained shall provide a construction performance guarantee. Requirements for temporary sediment basins are outlined in the Supplemental Specifications to these Standards.

D. Subdivisions

All public improvements shall be constructed prior to final plat approval by the County Commissioners. The Owner, in lieu of the actual installation or completion of the required improvements, may furnish the County Commissioners with a construction performance guarantee as consideration for the approval of a final plat by the County Commissioners before all improvements have been made.

E. Types of Guarantee

1. Surety Performance Bond:

The Owner shall obtain a security bond from a surety bonding company authorized to do business in the State of Ohio. The bond shall be made payable to: “The Board of Delaware County Commissioners”. It shall be in the appropriate amount and duration as outlined in these Standards. In addition to the security bond, the Owner and the surety company shall sign the bonding form.

2. Escrow Account:

Article V

PROVISIONS AND GUARANTEE REQUIRED BY OWNER

The Owner shall make arrangements to have an amount as outlined in these Standards held in an escrow account in a bank or other reputable lending institution approved by the County Commissioners. The appropriate escrow form(s) shall require the signatures of the Owner, lending institution and County Commissioners.

3. Irrevocable Letter of Credit:

The Owner shall provide a Letter of Credit from a bank or other reputable lending institution (all of which are subject to approval of the County Commissioners). This Letter shall be filed with the County Commissioners and shall certify the following:

A. That the issuer does guarantee funds in an amount as set forth in these Standards, and

B. Upon notification by the County Commissioners or the County Engineer that the Owner has failed to complete the specific improvements within the required time period, the issuer shall proceed without further action on the following:

1. Pay to the County Commissioners immediately such funds as are necessary for completion and maintenance of the required improvements up to the limit of credit stated in the letter.

2. Completion and maintenance of the required improvement, within a new time limit as agreed to by the County Commissioners.

C. That this letter of credit may not be withdrawn or reduced in amount without written approval by the County Commissioners based on recommendations by the County Engineer.

4. Certified or Bank Check:

The Owner shall deposit with the County Commissioners a certified or bank check in the amount as outlined in these Standards.

5. No Bond:

Article V

PROVISIONS AND GUARANTEE REQUIRED BY OWNER

A no-bond project Agreement is permitted as long as the final plat for the proposed development has not been signed and recorded. When a no bond agreement is desired the Owner shall still post all necessary inspection fees and subsequent Maintenance Guarantee as set forth in these Standards. If, during the course of construction and prior to the improvements being ready for the one-year maintenance period, the Owner wishes to record the plat, a "remaining items" construction performance guarantee, equal to 20 % of the approved construction cost estimate, can be posted upon approval by the County Engineer.

The County Engineer MUST agree that twenty (20) percent or less work is remaining. If greater than twenty (20) percent of the construction remains, the Owner will submit a Construction Performance Guarantee in the amount of 100 percent of the approved construction cost estimate. Upon the satisfactory completion of the remaining items, the Owner shall submit the Maintenance Guarantee.

6. Or other form as approved in writing by the County Commissioners:

The Guarantee shall clearly indicate the project for which it is issued. The date of expiration of the Guarantee shall also be shown.

F. Amount of Guarantee

The Financial Guarantee shall be in an amount equal to the approved construction cost estimate. This estimate of cost shall be in the amount as outlined in the Standards (Article IV). The amount of the construction cost estimate shall be rounded up to the nearest $1,000.00.

G. The Terms of the Guarantee

The Owner shall complete the improvements within one year of the beginning of construction. The surety posted for the work will remain in force during the entire time of the construction phase. If, for unforeseen reasons, the project takes longer than one year to construct, the Owner shall request an extension (for one year only) in

writing 30 days prior to the expiration date of the surety. If this extension is approved, an extension of the surety shall also be required. Only one extension for a period of one additional year shall be granted. The surety posted for this period shall be increased by 20% over the initial surety. After the extension has ended and construction items still remain to be completed, the County shall use the surety to construct the project. No Construction Performance Guarantee shall be released without the prior approval of the County Commissioners.

H. Release of Guarantee and Approval of the Improvement to go onto Maintenance

Upon the request of the Owner, the County Engineer shall make an inspection of the project to verify that all improvements are essentially complete and have been constructed in reasonably close conformity to the approved plans and specifications. Upon completion of the inspection, the County Engineer shall advise the Owner in writing of any work items that are incomplete or which are not in reasonably close conformity with the approved plans and specifications.

For the project to be considered for acceptance to maintenance, all significant work items shall be complete, including but not limited to: street name signs, traffic control devices, permanent or temporary barricades, flood routing, significant drainage and erosion control features. Temporary turnarounds shall also be complete.

I. Maintenance During Construction

The Owner shall be responsible for the maintenance of the improvements installed and for providing the services necessary to guarantee access to all the occupied lots for the term of the construction performance guarantee. This maintenance shall include but not limited to winter maintenance items such as snow and ice control, erosion and sediment control measures, debris, and mud tracking onto the County/Township road system.

505 MAINTENANCE GUARANTEE AFTER IMPROVEMENT APPROVAL

If the improvements specified in the approved plans have been satisfactorily completed, the County Engineer may recommend that the County

Article V

PROVISIONS AND GUARANTEE REQUIRED BY OWNER

Commissioners accept said improvements to maintenance as set forth herein.

A. Type of Guarantee

See 504 of these Standards.

The Maintenance Guarantee shall clearly indicate the project for which it is issued.

B. Terms and Amount of Guarantee

Term: The Maintenance Guarantee shall be issued for a period of at least one year from the month issued; however, the maintenance guarantee shall not expire during the time period of December 1 through May 31. The maintenance guarantee will not be accepted by the County Engineer until such time as the Owner has been notified that the project is ready to go on the maintenance period. If the maintenance guarantee is submitted prior to the project being ready to go on the maintenance period, it will be returned to the Owner. When the Owner has been notified by the County Engineer that the project is ready for maintenance, a new guarantee shall be submitted to cover the entire one-year maintenance period.

Amount: A Guarantee equal to ten percent of the originally approved construction cost estimate shall be presented to the County Commissioners for the Maintenance Guarantee for the improvements. Upon acceptance of the Maintenance Guarantee by the County Commissioners, the original Construction Performance Guarantee shall be released.

C. Items Covered Under Guarantee

The Owner shall be responsible for all routine maintenance during the Guarantee period. This shall include, but is not limited to: snow and ice removal, mud tracking, erosion and sediment control, any items relating to public safety, any items identified by the County Engineer in correspondence as part of the acceptance process, and repair/corrections of failures due to faulty construction or design. The Owner shall also make repairs needed due to erosion, damage created by utility companies in the installation of utilities, any damage created by the home builders, and shall repair all failures which occur for any other reason during the Guarantee period, as

determined by the County Engineer. Failure to comply with the above items may result in forfeiture of the Maintenance Guarantee and other legal action if warranted.

D. Prefinal and Final Inspection

Approximately 120 days prior to the maintenance guarantee expiration date, the County Engineer shall issue the inspection report for the project. On or about 90 days prior to the maintenance guarantee expiration date, the County Engineer will have a meeting at the project location to discuss the Pre-Final punchout remedial items. Required attendees for this meeting are the County Engineer and the Owner. Optional attendees are the Township and Soil and Water Conservation District. Meeting requests will be sent to all of the above. The County Engineer shall provide a letter of remedial items to the Owner. These items shall be completed in a satisfactory manner prior to acceptance of the improvements onto the public system. The Owner shall notify the County Engineer of when the remedial work is completed so an inspection can be scheduled. All remedial items shall be completed no later than two weeks prior to the maintenance guarantee expiration date. The County Engineer reserves the right to require repairs to any item found during the final inspection that has failed even if it was not identified in the pre-final inspection report. If items are not completed prior to the maintenance guarantee expiration date, the County Commissioners will take action against the surety to complete the remedial items at the Owner's expense. Upon the satisfactory completion of all of the remedial items, the County Engineer will recommend to the County Commissioners that the improvements will be placed onto the public system.

It is the desire of the County to place the improvements made under these Standards onto the public system in a reasonable time period. Therefore, the above time frames shall be strictly enforced. However, should the Owner believe there are circumstances beyond his control a written request for a time extension shall be made to the County Engineer at least 14 calendar days prior to the expiration of the Maintenance Guarantee. The County Engineer will forward the request for an extension to the County Commissioners for consideration along with a recommendation. If this extension is

approved, an extension to the Maintenance Guarantee shall be provided.

506 RELEASE OF MAINTENANCE GUARANTEE

The maintenance guarantee will be released upon acceptance by the County Commissioners.

Article VI
STREET & BRIDGE DESIGN STANDARDS

600 PURPOSE

These Standards shall be used as minimum standards for designing all streets, culverts, and bridges under the jurisdiction of the County Engineer. These standards shall not be reduced without written approval of the County Engineer.

601 STREET DESIGN

A. Arterial Streets

All design standards for arterial streets shall be based on the requirements of Article II, Section 203 (split into major and minor classifications). All arterial streets shall be designed using ODOT Standards (L & D Manual and CMS). ADT's are typically in excess of 3,500 vehicles per day. Arterials are further designated as major and minor arterials. The proposed arterial street shall conform to the higher standard of either the traffic study or as shown on the Delaware County Thoroughfare Plan current edition. The County Engineer shall determine these standards after a complete review of the project. Approval of the Preliminary Engineering plan (See Article III) will not be granted until a review of the proposed arterial street(s) is completed.

B. Collector Streets

Collector streets are designated as major collector, minor urban collector and minor rural collector. Design standards for collector streets shall be based on the requirements of Article II, Section 203. ADT's typically range from 1,500 to 3,500 vehicles per day in residential areas.

C. Local Streets

Design standards for local streets shall be based on the requirements of Article II, Section 203. Typical ADT's range from 100 to 1,500 vehicles per day.

The County Engineer shall consider the entrance street of subdivision a collector with respect to pavement width to the first intersection or a specified length as determined necessary. Left turn storage on all entrance streets shall be at least 100 feet with a 50-foot divergent taper. Longer storage length shall be as established by an analysis. A minimum pavement width of 36 feet to accommodate turn lanes is required for all entrance streets (Curbed and Non-curbed). The pavement length provided on the Final Engineering and Construction

Plan shall be approved by the County Engineer. Curb and gutter shall be provided for all entrance street intersections with existing County, Township or State Highways, if the entrance street is curbed. The curb shall terminate at the end of the radius and taper to 0" in height at both curb ends. The minimum taper length is 10-feet. For non-curbed streets, a modified shoulder section shall be used. Standard drawings showing these details are included in the Supplemental Specifications.

Local streets have been subdivided into four main sub-classifications: through, cul-de-sac, loop and low volume/low density streets.

1. Through and cul-de-sac standards: See Table 601-1 and 601-2.

2. Loop street standards: See Table 601-3 and Delaware County Engineer's Standard Drawing(s) in the Supplemental Specifications to these Standards. In addition the following requirements must be met.

    a) A maximum ADT of two hundred vehicles per day will be permitted when using the standard pavement thickness as noted in Article VII of these Standards. For ADT's greater than 200, the pavement thickness must be based on an analysis per Article VII.

    b) Used only with curb and gutter streets.

    c) Maximum parallel tangent or curved segment shall not exceed 500 feet in length.

    d) Maximum approach tangent or curved segment from a local, collector or arterial street shall not exceed 500 feet in length.

    e) Alternative loop shapes may be permitted provided the total length of the Loop Street does not exceed 1300 feet (measured along the centerline from centerline of the intersecting street).

    f) Approach or parallel centerline curves shall meet the minimum centerline radius as set forth in Table 601-2.

g) Minimum centerline radius for centerline curve between approach segment and parallel segment shall be 75 feet. The inside pavement edge and right-of-way line shall be concentric. The outside pavement and right-of-way radii shall be 35 feet and 46.5 feet respectively. The Township Fire Department must provide written approval of the proposed radii. Regardless of the radii chosen, a minimum pavement slope of 0.02 is required.

h) Minimum pavement width shall be 27 feet face-to-face of curb.

i) The waterline shall be located on the inside of the loop.

j) Only two intersecting points shall be permitted, no eyebrows or common access drives are allowed.

k) Minimum right-of-way width of 50 feet, additional utility and drainage easements shall be required along each side of the street.

l) Minimum centerline radius:

a. Angles between 80 and 100 degrees - 75-foot radius.

b. Angles less than 80 degrees or more than 100 degrees – See Table 601-3.

3. Low Volume/Low Density Local Streets:

a) A maximum ADT of 150 vehicles per day is permitted (15 lots maximum).

b) Lot size shall be restricted to 0.75 acres minimum and a 50–foot minimum building setback from the right-of-way line is required.

c) See Tables 601-1 and 601-2 for minimum pavement widths.

d) 8-foot graded shoulder (non-curbed streets only).

e) Used on a modified loop street or cul-de-sac with no extensions to adjacent parcels of undeveloped lands.

f) A minimum 50-foot right-of-way with required easements provided for drainage and utilities.

g) Written approval by the appropriate Township(s) Board of Trustees (with a copy sent to the County Engineer).

h) All other local street standards are applicable.

i) A permanent T-turnaround is acceptable. The T-turnaround may be used as a driveway access.

D. Parkways/Boulevards:

Designs for parkways and boulevards shall be submitted for County Engineer review and approval as part of the Preliminary Engineering Plan submittal. The Design Engineer is encouraged to contact the County Engineer during the preliminary design phase to discuss the design parameters for the proposed parkway or boulevard.

E. Traffic Expansion Factor

The traffic count on any street being designed within Delaware County, except local and permanent dead-end streets, shall be expanded to comply with the Delaware County Traffic Impact Standards (TIS), current edition. A copy of the TIS is included in the Supplemental Specifications of these Standards. The traffic count on any street being designed within Delaware County, except local and permanent dead-end streets, shall be expanded for a twenty (20) year growth period. Proposed traffic expansion factors must be submitted to the County Engineer for approval. An explanation of the assumptions used to establish the factors shall be provided. The County Engineer will review area growth with Delaware County RPC and advise the Owner if the proposed factors are acceptable.

The actual traffic expansion factor used shall be approved in writing by the County Engineer.

F. Residential Vehicle Demand Factor

An ADT demand for street design shall be taken to be ten (10) vehicles per dwelling unit per day in determining the street classification. Additional vehicles due to other related factors must also be taken into account when determining demands.

G. Terrain Classification

Article VI
STREET & BRIDGE DESIGN STANDARDS

The definitions of terrain classification within Delaware County are as follows:

1. Level: grade range of 0 to 8 percent, and
2. Rolling: grade of over 8 percent.

Notes to Design Engineers:

Terrain classifications pertain to the general character of the existing ground within the road right-of-way or that affects the proposed alignment and profile of the roadway.

When a proposed project has both level and rolling terrain classifications, the classification used for each street shall be consistent with the statement above. When in conflict the more restrictive classification shall be used. The terrain classification shall be clearly marked on the typical section. The County Engineer must approve the proposed terrain classification prior to Preliminary Engineering Plan approval.

H. Development Density

For the purposes of these Standards, development density is defined as the total number of dwelling units divided by total combined area of dwelling units and street right-of-way in acres. Reserves, open spaces and other non-building lots shall not be used in the calculation of development density. The development density shall be clearly shown on the title sheet.

1. Low Density: 2 or fewer dwelling units per acre (density is defined above)
2. Medium Density: 2.1 to 6.0 dwelling units per acre (density is defined above)
3. High Density: more than 6 dwelling units per acre (density is defined above)

Note to Design Engineer: The above development density is not gross zoning density.

I. Design Speeds

The design speeds shown in the tables of these Standards shall be used unless the County Engineer approves a variance.

J. Right-of-way Widths

The minimum right-of-way widths for all public streets are shown in Tables 601-1, 601-2, 601-3, 602-1, and 602-2. This minimum width shall be increased where and to the extent the County Engineer deems it necessary for topographical, construction and drainage features.

K. Right-of-way and Work Limit Clearing

The limits of the area to be cleared are to be clearly defined in the Final Engineering and Construction Plan. It is not the intention of this clearing requirement to cause the removal of trees or other natural features that do not impact the design and safety of the proposed street. Trees or other natural features that are to remain in the right-of-way or work limits shall be clearly identified in the Final Engineering and Construction Plan. Townships may enact their own standards for obstructions in the right-of-way of roads to be maintained by the township.

L. Vertical Alignment

The minimum length of curve shall conform to the requirements of the ODOT L&D Manual, current edition. A minimum profile grade of 0.5% is required for all curb and gutter streets.

M. Horizontal Alignment

A minimum tangent length of one hundred (100) feet is required between reverse curves on all arterial and collector streets. A minimum tangent length of fifty (50) feet is required on local, commercial and industrial streets. Minimum radii for horizontal curves are provided in Tables 601-1, 601-2, 601-3, 602-1, 602-2 and 603. The County Engineer reserves the right to increase the minimum tangent length between reverse curves, when necessary, in order to provide a safe and efficient roadway.

N. Pavement Width

The pavement widths for each type of street and type of use are shown in Tables 601-1, 601-2, 601-3, 602-1, 602-2 and 603. These widths shall be the minimum widths allowed. Pavement widths shall be increased where the County Engineer deems necessary in order to conform to the traffic and parking requirements of the area. Pavement width on curb and gutter type streets is measured from face to face of curb. Pavement widths for arterial streets shall be approved by the County Engineer.

O. Medians and Boulevards:

When medians are proposed, the minimum pavement widths do not include a curb offset for these medians. The County requires a minimum 2-foot offset from the face of curb or edge of median. This requirement is for any arterial, collector, commercial and industrial street. Minimum pavement widths for boulevard sections shall comply with current County Standards and township requirements for emergency vehicles. Parking limitations on boulevard sections is subject to County Engineer approval. ODOT Type 6 curb is not permitted.

P. Shoulders

The minimum width of all graded shoulders shall be eight (8) feet. Shoulder width is measured from the edge of the pavement to the point where the shoulder slope intersects the foreslope. When used, guardrail offset from the edge of pavement shall comply with the ODOT L&D Manual, current edition.
A two-foot paved shoulder (minimum) shall be required on all non-curbed arterial, industrial and commercial streets. A two-foot (minimum) treated aggregate shoulder may be required on non-curbed streets, as determined by the County Engineer. A two-foot treated aggregate shoulder shall be required on existing road system as determined necessary by the County Engineer. The County Engineer shall determine the composition of all paved or treated aggregate shoulders.

Q. Side and Ditch Slopes

Side and ditch slopes shall be shown on the typical sections. Side and ditch slopes shall conform to the requirements of the Delaware County Engineer's Standard Drawings as outlined in the Supplemental Specification of these Standards.

Modified ditch sections (using a perforated pipe and a ditch section) are required in some townships. The Owner must contact the Township regarding their requirements for open ditch roads. A copy of the modified ditch standard drawing is included with the Supplemental Specifications of these Standards. The County Engineer will encourage the use of a modified ditch section if site conditions indicate a typical ditch section would drain poorly.

R. Sidewalks, Bike Paths, Pedestrian Crossings & Handicap Ramps:

Sidewalks and/or bike paths are typically required as part of the Township Zoning, or in conjunction with Regional Planning Commission recommendations. The Owner shall check with the Township regarding their sidewalk requirements. Sidewalks or bike paths must be located a minimum of 1'-0" outside the point where the ditch backslope intersects the existing ground on open ditch roadways. All sidewalk or bike paths should be located within a dedicated easement and/or public right-of-way. Sidewalk locations for curb and gutter streets are outlined in Tables 601-2, 601-3 and 602-2.

For driveway location requirements with respect to curb ramps, please see Article VIII.

When sidewalks and/or bike paths are proposed as part of the subdivision the curbs shall be dropped or removed by a curb-cut method at the locations shown in the plans for the handicap ramps. The sidewalk, bike path, and/or handicap ramp adjacent to the curb shall comply with current Americans with Disabilities (ADA) requirements and these Standards, including the Supplemental Specifications. Six curb ramps are required for all 3-way (T-type) intersections, and 8 curb ramps are required for all 4-way intersections. Ramps shall be located perpendicular to the curb. If the ramp is located within a radial section, the ramp shall be located perpendicular to the tangent of the curve at that point. Ramps shall be located to prevent leading users into the intersection and oncoming vehicular traffic. The curb detailing shall be modified to accommodate a flush surface at the gutter pan near all handicap ramps, using a maximum slope of 1.38%. Sidewalks, bike paths and handicap ramps that are a part of a no load entrance street or in areas where access to the street is not permitted (e.g. open space areas, etc.) shall be constructed as part of the street improvements. All necessary sidewalk, bike path, handicap ramp and pedestrian crossing details (e.g., school crossing signs, crosswalk markings, signals, etc.) shall be included with the Final Engineering and Construction Plan.

S. Curb Drops:

Pre-designed curb drops for drives shall not be permitted. Curb-cut methods for establishing dropped curbs are permitted.

T. Street Access Restriction

When required by the County Engineer, based upon projected ADT's and other safety considerations, direct access to lots along a Collector or Arterial Street shall be prohibited.

As stated in Sections 601-A and 601-B, arterial and collector streets have a secondary function to service abutting land use. Therefore, the County Engineer has established a street access restriction to avoid direct access to abutting properties and lots from collector and, especially, arterial streets.

All access points to arterial and collector streets shall require the approval of the County Engineer. In addition, access points for local streets within high traffic volume areas (e.g., commercial, multi-family, industrial, etc.) shall be approved by the County Engineer.

U. Variances

These Standards have been developed based on the standard and/or traditional road, bridge and subdivision design. Variances may be granted when proven engineering practices show these Standards cannot be obtained. Intended variances shall be submitted during the Preliminary Engineering Phase as outlined in Article III, Section 302(B) 6. These variance requests shall be submitted in writing and, if approved by the County Engineer, documented (showing approval date) on the title sheet of the Final Engineering and Construction Plan. All variances must have the written approval of the County Engineer.

Variances are to be considered on a project-by-project basis. Any approved variances are not to be considered as precedent for future projects.

V. Parking Restrictions:

When one side parking restrictions are required or planned, the parking restriction shall occur on same side as the location of the fire hydrant(s).

W. Miscellaneous

Underdrains shall outlet into structures for curb and gutter streets, and at the low point of the roadway profile for all open ditch streets. Precast reinforced concrete outlets are required for all Type F outlets. The pipe material for Type F outlets must comply with the Supplemental Specifications of these Standards.

Profile grade is defined as the top of curb for all curb and gutter streets, and the top of centerline of pavement for all open ditch streets.

All arterial and major collector streets using curb and gutter sections shall comply with the ODOT L&D Manual, current edition (Type 2 Curb with a 9-inch thick gutter pan is required).

All minor rural and minor urban collector streets using a curb and gutter section shall use a 6-inch thick gutter pan.

For all open ditch streets the fire hydrant must be located 8-feet from the edge of pavement.

602 INTERSECTION DESIGN

A. Angle of Intersection

Streets should be laid out to intersect at right angles and no street shall intersect any other street at an angle of less than seventy-five (75) degrees. Current ADA requirements must be checked for all street intersections between 75 and 90 degrees to insure compliance.

B. Number of Allowable Intersecting Streets

Three-way (T-type) intersections are encouraged and in no event shall an intersection containing streets in excess of four (4) be approved.

C. Offset Intersections

Intersection offsets shall comply with the requirements of Table 605. These requirements apply to each subclassification of road (the same criteria applies for both a rural minor collector and an urban minor collector; minor arterial and major arterial, etc.).

D. Intersection Grades, Elevations, and Pavement Thickness

All intersections shall be designed to comply with current ADA requirements and these Standards, including but not limited to, minimum and maximum grades for all intersecting streets, location of curb ramps outside the midpoint of the intersection radius, and locations of all utilities so that they do not conflict with the curb ramp. Storm structures shall be offset a minimum of 4-feet from all ADA curb ramps.

Curb and gutter streets shall provide storm structures at all low points within the intersection. Elevations shall be provided at a 25' minimum spacing along the intersection radii. Pavement thickness at

all intersections shall use the thicker pavement section through the radius return point on all streets, including those streets where a thinner pavement section is permitted.

TABLE 601-1

LOCAL STREET DESIGN STANDARDS

FOR THROUGH STREETS & CUL-DE-SACS

(WITHOUT CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, mandatory for sites with Sidewalks, Bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)	
Minimum Cul-de-sac Radius (R/W)	Fifty-six feet six inches (56' –6") or Seventy five feet (75') with/island	
Terrain Classification (Art. 601-E)	**Level**	**Rolling**
Design Speed	30 MPH	25 MPH
Minimum Centerline Radius	250 feet	175 feet
Minimum Sight Distance	See Art. 602 E	See Art. 602 E
Maximum Grade	4 Percent	8 Percent
Maximum Grade of Cul-de-sac Bulb (along centerline of traveled lane)	3 Percent	3 Percent

TABLE 601-1 (continued)
LOCAL STREET DESIGN STANDARDS
FOR THROUGH STREETS & CUL-DE-SACS
(WITHOUT CURB)

Terrain Classification	**Level**			**Rolling**		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Maximum Cul-de-sac Length [1]/Minimum Pavement Width	1500/ 20	1000/ 20	750/ 20	1500/ 20	1000/ 22	750/ 24
Minimum Cul-de-sac Bulb Radius	45					
Through Street - Minimum Pavement Width	20	N/A	N/A	20	N/A	N/A
Sidewalk Width (min.)	4’-0”	4’-0”	4’-0”	4’-0”	4’-0”	4’-0”
Sidewalk Location – Approval by County Engineer Required	*	*	*	*	*	*
Graded Shoulder Width[2]	8’-0”	8’-0”	8’-0”	8’-0”	8’-0”	8’-0”

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] Cul-de-sac length is measured along the centerline from the center of intersecting street to the center of the bulb

[2] 2’-0” of graded shoulder shall be sealed aggregate berm

TABLE 601-2

LOCAL STREET DESIGN STANDARDS

FOR THROUGH STREETS & CUL-DE-SACS

(WITH CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, Mandatory for sites with Sidewalks, bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)	
Minimum Cul-de-sac Radius (R/W)	Fifty-six feet six inches (56' –6") or Seventy five feet (75') with/island	
Terrain Classification (Art. 601-E)	**Level**	**Rolling**
Design Speed	30 MPH	25 MPH
Minimum Centerline Radius	250 feet	175 feet
Minimum Sight Distance	See Art. 602 E	See Art. 602 E
Maximum Grade	4 Percent	8 Percent
Maximum Grade of Cul-de-sac Bulb (along centerline of traveled lane)	3 Percent	3 Percent

TABLE 601-2 (continued)
LOCAL STREET DESIGN STANDARDS
FOR THROUGH STREETS & CUL-DE-SACS
(WITH CURB)

Terrain Classification	**Level**			**Rolling**		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Maximum Cul-de-sac Length [1]/Minimum Pavement Width	1500 27	1000 32[2]	750 32[2]	1500 27	1000 32[2]	750 36
Minimum Cul-de-sac Bulb Radius (w/ island)	55					
Through Street - Minimum Pavement Width	27	32[2]	36	27	32[2]	36
Sidewalk Width (min)	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
Sidewalk Distance from Back of Curb	6-0"	6-0"	6-0"	6-0"	6-0"	6-0"
Type of Curb – Vertical face required for all densities	*	*	*	*	*	*

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] Cul-de-sac length is measured along the centerline from the center of intersecting street to the center of the bulb

[2] If parking is restricted on one side of street, pavement width may be reduced to 27 feet.

TABLE 601-3
LOCAL STREET DESIGN STANDARDS
FOR LOOP STREETS (CURB REQUIRED)
See Art. 601 C for additional requirements

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of Way Width (Art. 601-H)	Sixty feet (60') Preferred, Mandatory for sites with Sidewalks, Bikepaths, etc. Fifty feet (50') Minimum (With drainage/utility easements)					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	30 MPH			25 MPH		
Minimum Centerline Radius – Loop Street	Angles between 80 and 100 degrees - 75-foot radius. For angles less than 80 or more than 100 degrees - 250-foot radius			Angles between 80 and 100 degrees - 75-foot radius. For angles less than 80 or more than 100 degrees - 175-foot radius		
Minimum Sight Distance	See Art. 602 E			See Art. 602 E		
Maximum Grade	4 Percent			8 Percent		
Minimum Pavement Width	27	32[1]	36	27	32[1]	36
Type of Curb – Vertical face required for all densities	*	*	*	*	*	*
Sidewalk Width	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
Sidewalk Distance from Back of Curb	6-0"	6-0"	6-0"	6-0"	6-0"	6-0"

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] If parking is restricted on one side of street, pavement width may be reduced to 27 feet.

TABLE 602-1
MINOR RURAL COLLECTOR STREET DESIGN STANDARDS
(WITHOUT CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of-way Width (Art. 601-H)	70 feet					
Sidewalk Width (min.)	5 feet (Location determined by County Engineer)					
Full Intersection Minimum Spacing Along Major Traffic Route	1300-feet					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	35 MPH			30 MPH		
Minimum Centerline Radius (Radius may be increased by the County Engineer)	350			230		
Minimum Sight Distance	See Article 602 E			See Article 602 E		
Maximum Grade	4 percent			8 percent		
Development Density (Art. 601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Pavement Width	24	24	24	24	24	24
Graded Shoulder Width[1]	8'-0"	8'-0"	8'-0"	8'-0"	8'-0"	8'-0"

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

[1] 2'-0" of graded shoulder shall be sealed aggregate berm

TABLE 602-2
MINOR URBAN COLLECTOR STREET DESIGN STANDARDS
(WITH CURB)

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]					
Right-of-way Width (601-H)	70 feet					
Sidewalk Width	5 feet					
Sidewalk Distance from Back of Curb	6 feet					
Type of Curb	Vertical Face with an 8-inch thick gutter pan					
Full Intersection Minimum Spacing Along Major Traffic Route	1300-feet					
Terrain Classification (Art. 601-E)	**Level**			**Rolling**		
Design Speed	35 MPH			30 MPH		
Minimum Centerline Radius (Radius may be increased by the County Engineer)	350			230		
Minimum Sight Distance	See Article 602 E			See Article 602 E		
Maximum Grade	4 percent			8 percent		
Development Density (601-F)	**Low**	**Med.**	**High**	**Low**	**Med.**	**High**
Curbed Pavement Width	36	36	36	36	36	36

Source: Institute of Traffic Engineers, Recommended Practices for Subdivision Streets, 1993

TABLE 603

COMMERCIAL AND INDUSTRIAL STREET DESIGN STANDARDS

ITEM (Reference)	**STANDARDS** [in feet, unless otherwise shown]	
Classification	**Curbed**	**Uncurbed**
Design Speed (Design Speed subject to approval of the County Engineer at the Preliminary Engineering Plan Phase)	25 MPH (min.) 35 MPH - Preferred	25 MPH (min.) 35 MPH - Preferred
Right-of-way width (These widths are guidelines. The design engineer is responsible to establish right-of-way adequate to construct and maintain the proposed typical section, including required bikepaths, etc.)	60 to 80 feet	70 to 90 feet
Number of Traffic Lanes – Total number of traffic lanes to be determined from approved traffic study	2 to 4	2 to 4
Width of Traffic Lanes (Minimum)	12 feet	12 feet
Curb offset- Curbed Streets Shoulder Width – Uncurbed Streets	0-feet – 25 mph 2-foot – 35 mph	2-foot paved – 25 mph 4-foot paved – 35 mph
Width of Curb Parking Lane, Safety Shoulder or Turning Lane	10 feet	10 feet (includes paved shoulder)
Type of Curb	Vertical Face with a 2-0” wide gutter pan (8” thick)	N/A

Note to designer: Center line and edge line shall be striped on all commercial and industrial streets.

Source: U.S. Department of Transportation, U.S. National Highway Functional Classification and Needs Study Manual, 1970

E. Sight Distances

1. Intersection Sight Distance (ISD): Intersection sight distance shall be in accordance with ODOT's Location and Design Manual, current edition. In order to maintain the required "clear" sight distance free of obstacles, the County Engineer shall restrict the height of embankments, locations of buildings, landscaping and screen fencing in this area.

   At an intersection with a collector, arterial or existing County/Township road, a 90-foot clear sight distance triangle shall be provided. No landscaping, embankment, or feature greater than 24-inches in height shall be permitted within this triangle. An exhibit showing this clear sight distance triangle shall be included as part of the Final Engineering and Construction Plan and certified by a Registered Professional Engineer prior to the acceptance of the street onto the public system.

2. Stopping Sight Distance (SSD): Stopping sight distance shall be in accordance with ODOT's Location and Design Manual, current edition.

3. Sight Distance Requirements: The controlling sight distance requirement shall be as set forth in the table below. The classification of the intersecting streets shall be as determined by the County Engineer. These requirements apply to each subclassification of road (the same criteria applies for both a rural minor collector and an urban minor collector; minor arterial and major arterial, etc.). Intersections within the subdivision that access an existing County or Township road shall be designed to meet the intersection stopping distance as established in ODOT's Location and Design Manual, current edition. In no case shall an intersection be designed to less than the minimum requirements.

4. Roadway Profile/Height of Object: The height of object shall be determined for the current roadway profile, and for a future roadway profile assuming a profile increase

of 6-inches, to account for future overlay(s). All necessary modifications shall be made to the plans in order to provide the required sight distance. These modifications shall include, but not be limited to, profile changes on the existing County/Township Road, removal of obstructions within the R/W to provide adequate sight distance triangle, etc. The County Engineer must approve in writing any proposed modifications as part of the Preliminary Engineering Plan approval. These modifications shall be incorporated into the Final Engineering and Construction Plans.

INTERSECTING STREET Classification/Classification	CONTROLLING SIGHT DISTANCE
Local/Local	SSD
Local/Collector	ISD / SSD*
Local/Arterial	ISD
Collector/Collector	ISD
Collector/Arterial	ISD
Arterial/Arterial	ISD

*A minimum of a 35 mph design speed shall be used for SSD for the collector street.

603 TEMPORARY AND PERMANENT TURN-AROUND

A. A temporary turn-around shall be required when the end of the road in question is greater than 250 feet from the nearest intersection. No portion of the temporary turn-around shall be used as a driveway for any of the lots on the stub street. Language to this effect shall be listed on the plat for the subdivision. For the minimum turn-around design standards, see the Supplemental Specifications of these Standards.

B. Where a temporary turn-around is used, it shall be provided with a temporary easement covering the portion of the turn-around that extends beyond the normal right-of-way limits. Such temporary easements shall be automatically vacated for the use of the abutting property owner when said temporary turn-around is no longer needed for public use.

C. Permanent turn-arounds will not be permitted without written approval by the County Engineer except for low-volume/low-

density roads. All permanent turn-arounds must be approved at the Preliminary Engineering Phase.

TABLE 604
INTERSECTION DESIGN GUIDELINES

ITEM (Reference)	STANDARDS [in feet, unless otherwise shown]	
Approach Speed	25 M.P.H.	
Sight Distance (602-E)	ODOT L&D Manual Current Edition	
Intersection Angle (602-A)	75 Degrees – Minimum 90 Degrees – Preferred	
Minimum Curb Radius Local –Local	30 feet (35 feet without curb)	
Local – Collector	35 feet	
Collector- Arterial	40 feet	
Arterial – Arterial	50 feet	
Commercial & Industrial	50 feet	
Median Nose – Distance from the Intersection	Shall not extend beyond the radius return of the approach to the intersection.	
Minimum Centerline Offset of Adjacent T type Intersections*		
Local – Local	150 feet	
Local – Collector	200 feet	
Collector – Collector	350 feet	
Intersection on Arterials	Based on a detailed traffic study and current County Traffic Impact Standards	
Terrain Classification (601-E)	**Level**	**Rolling**
Vertical Alignment within intersection Area (602-D)	Must comply with current ADA Requirements	Must comply with current ADA Requirements
Minimum Tangent Length Approaching Intersection (Each leg)	50 feet	30 feet

*Note to designer: For signalized intersections, roundabouts, etc., other design solutions beyond the above minimum centerline offset standards may be required.

604 BRIDGES, CULVERTS OVER 6-FOOT SPAN AND SPECIAL STRUCTURES

All bridges, culverts over 6-foot span and special structures shall be designed using current AASHTO specifications and the current ODOT Bridge Design Manual, ODOT Location and Design Manual, associated standard drawings, Supplemental Specifications, etc. The County Engineer shall determine the types of special structures that need to be designed to these standards. A minimum of an HS25-44 loading shall be used for all structures, unless a special loading (for example, Permit Loading) is required by the County Engineer. Pedestrian traffic, bicycle traffic and other safety considerations shall be considered in the design.

605 STREET LIGHTING

The County Engineer shall approve all street lighting details (e.g., poles, luminaries, conduit, etc.). These details shall be included in the Final Engineering and Construction Plan.

The appropriate Township shall be contacted to determine if street lighting is required and who will be responsible for future maintenance including energy cost.

606 STREET SIGNS

All necessary street name signs and locations are to be included in the Final Engineering and Construction Plan. These details shall be provided on the same plan sheet as the traffic control devices, pavement markings, etc. (see Section 607). The street name signs are to be installed prior to opening any street to traffic, before approving the subdivision for maintenance by the Owner and releasing the subdivision for Building Permits. Written approval by the township trustees is required for all special street name signs before building permits will be issued. The standards for the street name signs shall be in accordance with the requirements of the County Engineer. All special street sign installations are to be maintained by the Owner or the property owners' (homeowners) association. All street name signs to be used shall be approved for use by the County Engineer and/or Township. Street signs (including bases) at the entrance to a subdivision from a county,

township, or state highway (within County or State right of way) shall be designed to current FHWA and ODOT standards.

607 TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS

The Final Engineering and Construction Plan shall include all necessary traffic control signs, devices and pavement markings, etc. These items shall be designed to meet the requirements of the current edition of the ODOT Manual of Uniform Traffic Control Devices (MUTCD). These details shall be provided on a separate plan sheets in the Final Engineering and Construction Plan.

All striping shall comply with these Standards and Supplemental Specifications, using ODOT specifications for all arterial, major and minor rural collector roads. City of Columbus specifications shall be used for all minor urban collector and local (residential, commercial, industrial, etc.) roads. Thermoplastic striping shall be used for all minor urban collector and local (residential, commercial, industrial, etc.) roads. Pavement striping for existing County/Township road widenings must match the existing striping at the project limits.

The Owner is required to provide speed limit signs on existing County, Township or State Highways where the proposed subdivision entrance street(s) intersects the public highway. These signs shall state the posted speed limit for the intersecting County, Township, or State Highway.

Speed limit signs shall be placed on all subdivision streets. Spacing of signs shall comply with the ODOT MUTCD, current edition. School zone signs (e.g., pavement markings, cross walks. signs, etc.) shall be provided for all subdivision streets located within school zone limits as defined in the ODOT MUTCD. No parking signs shall be provided, if required based on street width.

A concrete right-in/right-out island (pork chop) shall be included with the Final Engineering and Construction Plan if required as part of the approved traffic study. Details for the island shall comply with current Delaware County Standard Drawings.

These traffic control signs, devices and pavement markings shall be installed prior to approving the subdivision to maintenance by the Owner or releasing the subdivision for building permits.

The County Engineer shall approve the final stop sign locations. Stop signs shall not be located on any street signs.

Article VII

PAVEMENT DESIGN

700 PURPOSE

This article specifies the pavement design criteria to be used in determining minimum pavement composition and thickness. All pavement materials and construction shall conform to these Standards including any supplemental specifications, unless the County Engineer determines that additional requirements are needed for a particular project. In the case of any question as to the required street classification, pavement composition, construction and materials specifications, the County Engineer shall make the final determination. Please refer to Article II and Article VI of these Standards for street classification definitions, construction and material specification clarifications, and additional design requirements.

701 SOIL SUPPORTING STRENGTH

The subgrade strength California Bearing Ratio (CBR value) shall be determined by a testing laboratory using current ASTM standards. The County also permits the assumption of poorest soil conditions. For Delaware County, a CBR value equal to 2.9, Modulus of Subgrade Reaction (K) equal to 100, or Soil Support Value (SSV) equal to 2.7 may be assumed. The Soil Supporting CBR value used in the design shall be clearly shown on the typical section for each street. The CBR value shall be determined for each street in the proposed subdivision.

Some sites may require additional strengthening in order to provide an adequate subbase for the proposed pavement section. In those cases the County Engineer may require the use of a subgrade reinforcing material. Determination of the need for subgrade reinforcing shall be based on evaluation of soils testing for the site. Pavement reinforcing may be required by the County Engineer to insure adequate pavement strength. A contingency quantity and plan notes for the pavement and subgrade reinforcing material shall be included in the Final Engineering and Construction Plan. The County Engineer shall give final approval of the need for, type, and quantity of subgrade and/or pavement reinforcing required.

702 TRAFFIC AND EQUIVALENT LOADING

Pavement design shall be based on equivalent daily 18,000 pound single axle application. Actual or estimated traffic counts shall be required for each street. All residential local streets shall be designed using 5 % trucks at full legal load per lane per day for a thirty (30) year design period. All minor urban collector streets shall be designed for no less than 5 % trucks at full legal load per lane per day for a thirty-year design period. All local commercial and industrial, minor rural collector, major collector and major and minor arterial streets shall be designed based on an approved traffic study that is to include the percentage of trucks for a

thirty-year design period. The County Engineer shall approve the percentage of trucks used for local commercial and industrial, minor rural collector, and major and minor arterial streets.

To account for design uncertainties a Reliability factor of 85% (Z_R = -1.037) shall be used. In addition, the minimum allowable standard deviation S_O for flexible pavement is 0.44 and for rigid pavement is 0.34. Design calculations shall be based on current AASHTO design methods and submitted with a copy of indicated soil test for written approval by the County Engineer. Sites that contain schools and/or embedded commercial or industrial sites will need to account for the increased traffic loading(s) due to these special uses (vs. conventional residential traffic loading).

703 MATERIAL COEFFICIENTS

The following coefficients for various types of materials shall be used with current AASHTO design equations for all residential local, commercial, industrial, and minor urban collector streets:

ITEM*	MATERIAL	Coefficient
Item 404, 402 and 301	Asphalt Concrete	0.35
Item 304	Aggregate Base	0.14

*City of Columbus Construction & Materials Specifications, Current Edition

The following coefficients for various types of materials shall be used with current AASHTO design equations for all minor rural collector, major collector, and major and minor arterial streets:

ITEM*	MATERIAL	Coefficient
Item 448 (Surface and Intermediate Course), and Item 301	Asphalt Concrete	0.35
Item 304	Aggregate Base	0.14

*Per ODOT Construction and Materials Specifications, Current Edition

Article VII

PAVEMENT DESIGN

704 ALLOWABLE AND MINIMUM PAVEMENT COMPOSITION

In lieu of an AASHTO Engineered Pavement Design the following pavement design for residential local and minor urban collector streets may be used. These designs have been developed using the AASHTO pavement design methods for flexible and rigid pavements. If the pavement sections shown in this section are used, an internal traffic study is not required for pavement design but the ADT values must be provided on the plans for each street. Under no circumstances shall a pavement composition have an SN of less than 2.66.

Pavement designs submitted shall not include the surface course layer (404 or 448) as part of the strength computations.

On any projects with paving operations occurring after October 31, the surface course layer shall not be placed until the following construction season. This will allow for the release of building permits provided all other building permit items are complete.

Article VII

PAVEMENT DESIGN

DELAWARE COUNTY RESIDENTIAL PAVEMENT DESIGN CRITERIA					
		Local Streets		**Minor Urban Collector Streets**	
Design formula symbol	Description	Flexible	Rigid	Flexible	Rigid
	Design Life	30 years			
	Percent of Trucks	5%		5%	
ESAL's (E_{18}) or (W_{18}) in ESAL/ Vehicle	18-kip Equivalent Single Axle Loads	0.0134	0.0179	0.0155	0.0216
Z_R	Standard normal deviate	85 % Reliability Factor = (-1.037)			
S_O	Standard error	0.44	0.34	0.44	0.34
S'_c	Modulus of rupture	N/A	650 psi	N/A	650 psi
Δ PSI	Difference in serviceability index	2.2		1.95	
p_t	Design terminal serviceability index	2		2.25	
D_i	i^{th} layer thickness	0.161	1.1	0.161	1.1
J	Load transfer coefficient	N/A	4.2	N/A	4.2
Mr	Resilient Modulus	2700	N/A	2700	N/A
k	Modulus of subgrade reaction (pci)	N/A	100	N/A	100
CBR		2.9			

Article VII

PAVEMENT DESIGN

The County Engineer permits the following pavement compositions for use in Delaware County without further design calculation.

The shaded area of the table also represents the “Minimum Pavement Composition” permitted for use on residential local and minor urban collector streets regardless of subsurface conditions or other design factors.

Article VII

PAVEMENT DESIGN

Street Classification	Flexible Pavement Composition	Rigid Pavement Composition (Requires Written Approval by Township Trustees)
Minimum Pavement Composition SN=2.66		
Residential Local ADT ≤ 200	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 3 inches of 301 on 4 inches of 304 SN = 2.66	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 5 inches of 305 4 inches of 304
Residential Local ADT > 200 but ≤ 1500	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 6 inches of 301 on 4 inches of 304 SN = 3.71	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 6 inches of 305 4 inches of 304
Minor Urban Collector ADT >1500 but ≤ 3500	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 7.5 inches of 301 on 4 inches of 304 SN = 4.24	1 ½ inches of 404 Surface Course on 1 ½ inches of 402 Intermediate Course on 8 inches of 305 4 inches of 304
All Local Commercial, Local Industrial, Rural Collector, Urban Collector with ADT > 3500, and Major and Minor Arterials	Pavement Design Based on Traffic Volumes, Type of Development, etc. Pavement design must be approved in writing by the County Engineer.	

Item 404-Asphalt Concrete Surface Course per Delaware County Supplemental Specifications
Item 402-Asphalt Concrete Intermediate Course per Delaware County Supplemental Specifications
Item 301 - Bituminous Aggregate Base per Delaware County Supplemental Specifications
Item 304 - Aggregate Base per Delaware County Supplemental Specifications
Item 305 - Portland Cement Concrete Base – ODOT Class “C” Concrete per Delaware County Supplemental Specifications.

Article VII

PAVEMENT DESIGN

Notes:

1) A prime coat (Item 408) (0.40 gallons per square yard) may be required between Item 304 and Item 301 at the discretion of the County Engineer in the field.

2) A tack coat (Item 407) (0.10 gallons per square yard) between Item 305 and Item 402 Intermediate Course may be required at the discretion of the County Engineer in the field.

3) Minimum asphalt concrete thickness for any flexible pavement with aggregate base shall be three (3") on all Local Streets, four (4") on all Major and Minor Collector Streets with ADT's > 3500, and all Arterial Streets.

4) Item 404 Asphalt concrete surface course shall be not less than l.5 inches nor more than 1.75 inches in thickness.

705 SOIL TESTS

If the Owner desires to perform soil testing rather than assuming a CBR value of 2.9, a meeting shall be held with the County Engineer and the design engineer prior to the Preliminary Engineering Plan phase. Soils testing shall be furnished for a minimum of every 1,000 square yards of pavement surface and in all low areas, with a minimum of one test per street. Additional testing may be required at the discretion of the County Engineer. These tests shall be made at the design subgrade elevation and to a minimum depth of five (5) feet below the design subgrade elevation. The test shall include the following:

A. Soil samples at subgrade elevation and depth by boring.

B. Moisture determination and maximum dry weight of soil.

C. AASHTO classification and group index for each sample.

   1. Liquid limit
   2. Plastic limit
   3. Plasticity index

D. Mechanical analysis of the subgrade soil.

E. Laboratory CBR values as determined by ASTM D1883

The CBR value(s) shall be approved at the Preliminary Engineering plan phase. The Final Engineering and Construction Plan shall not be submitted without the written acceptance of these CBR value(s).

Article VIII

WORK IN ROAD RIGHT-OF-WAY OR EASEMENTS

800 PURPOSE

The efficiency and safety of a County or Township roadway is largely dependent on roadside construction interfering with the movement of traffic. To minimize the impact to the motoring public, this article establishes minimum standards for permitting of work within County and Township Road right-of-way. Permits are required for a number of reasons including the construction of ditch setbacks and installation of drives, driveways and drive pipes in the public right-of-way. Permits are also required for utility work within the right-of-way as well as for road closures.

801 GENERAL

A. Permits for Work Within Right-of-Way: In an effort to provide safe roads and to protect the property of its citizens, Delaware County requires that any person, contractor, agency, company, utility, etc. wishing to perform work of any kind within the public right-of-way (R/W) of Delaware County and Township roads or easements obtain a permit before performing the work. This shall include the installation of driveways, drive pipes, the construction or reconstruction of road ditches, the installation or repair of utilities, road closures, etc, and/or occupying said right-of-way or easements for any purpose whatsoever.

B. Permit Procedures: Permits for this work shall be required, and the County Engineer shall collect fees to cover the cost of issuing the permit and inspecting the work as needed. Permit applicants shall be required to submit all information necessary for the County Engineer to review the permit. A copy of these permit applications are included in the Supplemental Specifications to these Standards.

The provisions of this section apply to all County and Township roads. If a Township has permit provisions, then the more restrictive standards shall apply. The permitee is required to verify with the appropriate authority if an additional permit is required.

802 COMMON ACCESS DRIVE (CAD) & DRIVEWAY APPROACHES ALONG STREETS WITH CURBS AND OPEN DITCHES

A. Profile Grades:

1. Driveway and CADs on Open Ditch Roads: Driveway approaches and CADs on open ditch roads shall slope away from the edge of pavement to the centerline of the proposed drive pipe location. From the centerline of the pipe the drive

profile shall slope upward creating a "V" type of channel in the drive approach. The center of this V-channel shall be a minimum of 10 feet from the edge of pavement unless otherwise approved by the County Engineer. When a driveway continuously slopes upward from the edge of pavement or due to the other special terrain conditions, a driveway approach design shall be required. This design shall be submitted to the County Engineer for review and approval. CAD drive approaches shall be constructed with final engineering and construction plans.

Vertical Curves: To help prevent center or overhang drag, with some allowance for load and bounce, crest vertical curves should not exceed a three and one-quarter (3-¼) inch hump in a 10-foot length. Sag vertical curves should not exceed a 2-inch depression in a 10-foot length.

2. Driveways and CADs on Curb and Gutter Roads: Driveway approaches on curb and gutter streets shall be constructed so the portion within the sidewalk slopes upward at a rate of 0.02 ft/ft to a point at least one foot behind the back of the sidewalk. The approach apron (portion between the gutter and the front edge of the sidewalk) shall slope upwards from the back curb towards the front edge of sidewalk. The profile of the driveway beyond one-foot from the back of the sidewalk (within the R/W) shall conform to the maximum profile grade as set by the final engineering and construction plan for the street right-of-way section.

   A standard drawing outlining the requirements for curb and gutter approaches is included in the Supplemental Specifications of the Standards.

B. Composition:

1. Non-Curbed Streets: Approach shall have an asphalt concrete surface within the public right-of-way on all improved County or Township Roads. The minimum pavement compositions within the right-of-way are shown in Table 801 in the Supplemental Specifications. If a concrete driveway is desired beyond the public right-of-way on a non-curbed street, it shall conform to the above composition within the right-of-way before beginning the concrete portion. This is to allow for proper transition to the concrete driveway for future road

overlays. Concrete approaches will be permitted in public right-of-way with speed limits of 35 M.P.H. or less.

2. Curb and Gutter Street: The minimum pavements compositions within the right-of-way are shown in Table 801 in the Supplemental Specifications.

3. Brick, Masonry, pavers: See Supplemental Specifications for detailing of pavement composition within the right-of-way. Brick and masonry pavers are not permitted in public right-of-way with speed limits greater than 35 m.p.h. Pavers will not be replaced by the County or Township during maintenance or roadway improvements.

4. Aggregate Drives: When approved by the County Engineer, aggregate drive for single residence approaches may be permitted on existing County and Township roads that are not within an approved subdivision. Approval of these are generally limited to unimproved County or Township roads. See the Supplemental Specifications for details.

C. Width of Driveway Approach: The actual width of a driveway approach may vary depending on the type of usage and type of street it provides access to. See Table 802 in the Supplemental Specifications for dimensions.

D. Driveway Intersection Angle: The driveway intersection angle is the interior angle between the driveway approach centerline and the centerline of the street. The allowable intersection angle for all driveways shall be within the range of seventy (70) degrees to ninety (90) degrees.

E. Flares or Radii: Each drive approach shall have flare or radius return. The approach flare is required on roads with a speed limit of 25 MPH or less, while the radius return is required for roads with a speed limit greater than 25 MPH.

For single residential drives on curb and gutter streets the flare shall be a minimum of 2 feet wide at the edge of pavement to a maximum of 5 feet.

Radius returns shall be a minimum of 15 feet to a maximum of 20 feet for single residential driveways. For commercial, shared, and CAD drives, the flare or radius size shall be based on the type of vehicles that will be using the drive.

In no case shall the flare be more than five feet (5') or the radius return less than twenty feet (20').

F. Drainage, Erosion and Sediment Control:

1. DESC Permits: An approved DESC Permit is required in conjunction with the drive permit for all CAD drives. See Article XII for additional information regarding DESC Permit.

2. For Outlets from Household Sewage Treatment Systems (HSTS) or Small Flow Onsite Sewage Treatment Systems (SFOSTS), see Article VIII of the Supplemental Specifications.

3. Pond Overflows: Private Recreational pond overflow pipes are not permitted to extend into the public right-of-way.

4. Existing Road Ditch Enclosures: Existing road ditch enclosures are permitted on County Roads by variance only. Delaware County Engineer's Office will administer enclosures on Township Roads if the Township concurs in writing with the plan. Plans submitted to enclose public ditches must meet all County Drainage Design Standards.

G. Drive Approach Locations

1. Sight Distance: When in the opinion of the County Engineer the proposed driveway location will cause a safety problem, the application request may be denied.

2. ADA Ramps: No driveway will be permitted that will effect any existing or proposed ADA curb ramp.

H. Driveway Pipes

1. In a subdivision where new open ditch roads are being built, all driveway pipe sizes shall be predetermined and submitted to the County Engineer for approval at the same time the Preliminary Engineering Plan is submitted. After the minimum driveway pipe sizes have been approved, they shall be shown on the Final Engineering and Construction Plan. The pipe must be sized for the 10-year storm event for all local streets, and a 25-year storm event for collector and arterial streets. A minimum pipe size of 12" is required. These pipe sizes shall be shown in a tabular form on the sheet with the estimated quantities. The following information shall be shown: lot number, pipe size, pipe inlet and outlet elevations if location is identified, and type of pipe based on manufacture specifications for cover.

2. When new lots are being created or new access points are requested on existing streets, the permit request including the proposed driveway pipe shall be submitted to the County Engineer for approval. The pipe must be sized for the 10-year storm event for all local streets, and a 25-year storm event for collector and arterial streets. A minimum pipe size of 12" is required. At the County Engineer's discretion, drainage calculations shall be provided by a Professional Engineer.

   When new home construction is permitted in a subdivision before the County accepts the road improvements, the Owner shall be responsible for seeing that the appropriate permit is obtained before installation of any driveway pipe. All driveway pipes shall be installed to meet current County Standards, including location, size, length, type, elevation and grade.

   The Owner shall be responsible for replacement of all driveway pipes installed within the right-of-way, which do not meet current County Standards until the end of the maintenance guarantee.

3. The length of driveway pipes shall extend beyond the limits of the edges of the driveway (including flare and radii returns) a minimum distance of 4 feet. Slope from the edge of a driveway shall not be steeper than 4:1 to flow line of the pipe.

4. The property owner shall be responsible for any damage that may occur to any driveway pipe after it has been installed.

5. The County Engineer may collect a fee for these permits that shall cover the cost of issuing the permit and any inspections deemed necessary.

803 ROAD CLOSURE

A road closing permit is required from the County Engineer prior to closing any Township or County Road. The following are minimum requirements to apply for a temporary road closure due to construction in or adjacent to County and Township Roads:

A. If a Township Road is to be closed or used as part of a detour route, the Township's approval must accompany the fully completed "Road Closing Permit Application". A copy of the application is in the Supplemental Specifications.

B. A detour plan with route and proposed signage meeting the latest ODOT MUTCD, current edition.
C. All signage must be posted at a minimum of 3 days prior to the planned closure.
D. Request for closure must be applied for minimally 2 weeks prior to the closure.
E. Posted Roads are not acceptable for detour routes between the dates of Feb. 1 to June 1.

804 UTILITY WORK OR ANY EXCAVATION IN ROAD RIGHT-OF-WAY OR EASEMENTS

There are two types of public utility construction permits:

1) Application for an individual plan.
2) Application for a blanket permit issued annually.

The following process and standards are minimally required on utility permit request plans:

A. Application for public utility construction permit.

1. Submit **two** completed copies of permit application (see Supplemental Specifications for sample) **and** two sets of plans.
2. A self addressed stamped envelope must be included, if the permit applicant would like a copy of the approved permit mailed. Otherwise, the permit must be picked up at 50 Channing Street, Delaware, OH 43015 after the County Commissioners' approval.
3. Submissions must be received at least 4 weeks prior to work date.
4. Plans must include minimally the following information:

- Road improvement projects shall dimension from center line stationing or new right-of-way limits,
- Existing edge of pavement lines with a width dimension line,
- Existing right-of-way lines with a width dimension line,
- Proposed work with dimensions from edge of pavement,
- Length and size of wire, pipe, structures, etc. to be installed or repaired,
- Work location dimensioned from readily identifiable objects (e.g. driveways with address, numbered utility poles,

intersections, etc.); If installation is more than 200 feet in length, show dimensions to both ends from readily identifiable objects,

- Buried lines - Indicate method to be used for burial (e.g. trenching or bore),
- All property owners must be contacted prior to construction,
- All trenches, whether in public right-of-way, joint utility and drainage easements or private easements are to be compacted, seeded and straw mulched within 14 days. Specific seeding/compaction requirements based on ground slopes is addressed in Article XII and the Supplemental Specifications,
- Compaction requirements are detailed on Standard Drawing DCED-R100 based on zone of influence,
- Traffic maintenance during construction shall conform to the ODOT MUTCD, current edition for traffic control in work zones,
- Any above ground facility must be outside of the 100-year flood plain. A plan in these areas may be required on a case-by-case basis. Utility occupation of drainage easements will require a permit.

5. Permits are valid for **180 days** from the date of approval by the County Commissioners.
6. An extension may be granted, if a request is received in writing, at least 15 days in advance of the end of the 180-day period.
7. The applicant must contact the County Engineer at least two working days before actual commencement of work at (740) 833-2439.
8. A copy of the approved permit must be present at the job site. This is to be shown to the County Engineer or his representative upon request.
9. No work is to proceed until the permit has been reviewed by the County Engineer and approved by the County Commissioners.
    a. The County Engineer may collect a fee for these permits that shall cover the cost of issuing the permit and any inspections deemed necessary.

b. In an emergency, utility companies may proceed with needed repairs to their facilities. However, a permit shall be requested for this work within two working days. The permit is still required to assure the County's right-of-way and/or easement is restored to a condition acceptable to the County Engineer.

c. The permit fees may be waived for all public utility (i.e. companies governed by the Public Utilities Commission of Ohio) companies and agencies that provide a service necessary to maintain public health and safety and to protect our environment. The County reserves the right to collect inspection fees when needed to assure conformance to these Standards.

B. Application for Utility Blanket Permit

This permit is applied for annually, in effect from January 1 to December 31, to cover individual service installations from existing main lines currently in public right-of-way.

Types of construction covered by the blanket permit are:

1) Bores for gas taps, water taps, telephone drops, electric services, and cat drops.
2) Set up to three (3) poles in public right-of-way and construct required aerial cables/lines and anchors as required. Replace up to 3 poles due to deterioration or standard maintenance requirements.

After the blanket permit has been approved by the County Commissioners, the utility company does not need to submit an individual permit and plan for the above type situations prior to construction. Fax a sketch with adequate information reflecting location and type of work to the Delaware County Engineer's Office Permit Department.

Note that the relocation of utilities on properties not controlled by the Owner may be waived by the County Engineer (e.g., with an approved variance). It is recognized by the County Engineer's Office that the need for this variance may not be known at the time of Preliminary Engineering. In no case will an existing underground utility be permitted to remain beneath the pavement or shoulder.

Article IX

DRAINAGE DESIGN STANDARDS

900 PURPOSE

These design standards and supplemental specifications shall serve as the minimum requirements for the handling of surface water and drainage from both on-site and off-site areas. These standards and supplemental specifications shall govern the development of all new and/or modified drainage systems. The development of such drainage systems shall include the conveyance of surface water to an adequate outlet that is capable of carrying the flow. The Professional Engineer's highest design priority shall be to eliminate the possibility of loss of life or any major loss of property.

901 ADEQUATE DRAINAGE OUTLET

Surface water runoff from a development shall be drained offsite in accordance with this article to an adequate outlet(s). The County Engineer shall approve the location of the outlet(s). The outlet(s) may consist of a ditch, stream, storm sewer, retention/detention basin, etc., having sufficient capacity to accommodate the surface water runoff in a reasonable manner. The Owner shall submit with the Preliminary Engineering Plan written evidence indicating the adequacy of the outlet(s) to at least (and through) the first drainage structure offsite of the proposed improvement. The County Engineer shall review and determine the adequacy of the drainage outlet and reserves the right to require the outlet(s) to be cleaned, reconstructed and/or replaced as deemed necessary.

If a ditch, stream, etc. is desired as an outlet, the County Engineer shall require flow line elevations for the stream, ditch, etc. to be taken a minimum of 500 feet downstream of the anticipated outlet point to insure adequate fall/slope is available. This data shall be submitted to the County Engineer with the Preliminary Engineering Plan submittal. A minimum channel slope of 0.24% with a minimum 5 year storm velocity of 2.0 fps is required. A minimum of 12" of freeboard (measured from the outlet pipe flowline to the ditch flow line) is desired at the proposed outlet structure. If a buried structure, pipe, etc. is being proposed as the drainage outlet, it shall be cleaned, video-taped/camera, and mandreled at the discretion of the County Engineer. The County Engineer shall be contacted a minimum of two business days prior to any of this work being done.

An adequate outlet is defined as an outlet functioning as designed (e.g. able to convey the 2-year storm with the 10-year hydraulic grade line not exceeding the top of grate elevation for storm sewers; 10-year storm

elevation not exceeding the top of bank elevation for open channels), and able to carry the existing flows as well as the proposed flows in the post development condition. Even though the discharge rate is controlled to the two-year storm, these are often concentrated flows.

The lack of not meeting any of the requirements mentioned above shall be cause for disapproval of the plan.

902 DRAINAGE EASEMENT

A. An adequate easement shall be required along any subsurface drainage tile, detention/retention basin, drainage way, ditch, watercourse, stream, storm sewer, etc. that is not already within the street right-of-way. The easement shall be of sufficient width to allow cleaning, widening, deepening and replacing or otherwise general maintaining of such drainage course.

   Easements for flood routes shall be established to one (1) foot above the 100-year storm elevation.

B. When it is required to convey subsurface drainage or surface water outside the limits of the proposed improved area in order to discharge into an approved adequate outlet, it shall be the responsibility of the Owner to obtain easements or rights-of-way for construction and maintenance of said drainage course. These easements shall be submitted to the County Engineer and recorded prior to approval of the Final Engineering and Construction Plan.

C. All drainage easements shall be shown on the final plat and the Final Engineering and Construction Plan. The drainage easements shall be recorded for public use, and the maintenance of such drainage courses shall be the responsibility of the property owners receiving direct benefit therefrom, unless otherwise provided (e.g. County Drainage Maintenance Program, See Section 904 G and the Supplemental Specifications to these Standards). For any easement shown on the Final Engineering and Construction Plan that contains a storm sewer, the storm sewer rights are senior to the rights of any other public or private utility or interest utilizing the easement. Should access be granted for a utility, the disturbed area must be restored to its original condition. Any cost associated with the damage, repair, replacement or relocation of

any buried or above ground facility or structure that is necessary to allow the maintenance, repair or replacement of the storm sewer, will be the responsibility of the owner of said utility, facility, or structure. When maintenance, repair or replacement of a storm sewer causes the removal of any trees, plantings, landscaping, fence or decorative feature located within the easement, the replacement and cost of said items shall be responsibility of the owner of the underlying property or homeowner's association if applicable. Drainage easement widths shall conform to the Supplement Specifications of these Standards.

D. Where no direct access is provided to a drainage feature, an adequate access easement shall also be provided. The minimum width of any such access easement shall be 15 feet. Final easement widths are subject to the approval of the County Engineer.

903 GENERAL DESIGN CRITERIA

A. Acceptable Methods of Calculation

The methods of calculation as listed in the Supplemental Specifications shall be used unless otherwise approved in writing by the County Engineer.

B. Design Storms

1. Appropriate standard rainfall intensity and runoff charts are to be used. Runoff numbers and CN factors used in Delaware County are provided in the Supplemental Specifications.
2. Major Storm must be based on a return period of not less than one hundred (100) years.

C. Drainage Area Determination

The drainage area(s) (watershed area) shall be determined by a review of, but not limited to, the sources listed below. The sources listed are in order of preference.

- Field Investigation
- Delaware County topographic maps generated by the Delaware County Auditor's GIS system

- Contour Map: U.S. Geological Survey quadrangle (7.5 minute series) maps or other topographic contour map
- Soil Survey of Delaware County, Ohio, USDA

Watershed area(s) are subject to the approval of the County Engineer. Existing watershed boundaries shall be maintained. Storm Water Tributary Maps (watershed areas) for the pre- and post-developed conditions shall be submitted with the Preliminary Engineering Plan Submittal and shall also identify all offsite watersheds flowing through the site. These maps must identify the individual watersheds (using a letter designation, e.g., A, B, C, etc.) and respective release points for the pre- and post-developed condition. These release points must be maintained for each individual watershed for the post-developed condition. See the Supplemental Specifications of these Standards for additional Storm Water Tributary Map Requirements. Detention/retention ponds provided in the post-developed condition must use the same letter designation (e.g., A, B, C, etc.) used for the individual watersheds as mentioned previously. The acreages for both pre and post-developed subareas shall be shown. The overall total of pre and post-developed acreages must be equal. A Stormwater Management Summary Table shall be included in the calculations. A sample table is included in the Supplemental Specifications of these Standards. More complex sites with multiple ponds may require a more detailed table.

D. Flood Routing Path

1. Capacity: The flood routing path is that part of the major storm drainage system that carries the runoff that exceeds the capacity of the designed drainage facilities. The major storm drainage system shall have the capacity to carry runoff from a storm with a return period of not less than one hundred (100) years.

2. Surface Flood Routing Paths: Generally, it is not economically feasible to size a storm sewer system to collect and convey more than the frequent storm runoff. Essentially, the complete drainage system of an urban area contains two (2) separate drainage elements. While

the storm sewers belong to the initial system, surface drainage-ways must be provided for the major flow from more intense storms.

3. Intent in Providing Flood Routing Paths: The intent of planning for the major drainage element is to insure storm water runoff which exceeds the capacity of the initial drainage system has a route to follow which will not cause a major loss of property or any loss of life. Also, storm sewers can become partially clogged. Therefore, surface routing paths must be clearly defined and detailed.

   No alteration/changes to the approved flood routing paths can be made without approval of the County Engineer. Flood routes must be provided for all storm sewers and culverts. In cases where existing subdivisions are located directly downstream along the proposed flood route, see the Supplemental Specifications for additional requirements.

4. Street Rights-of-Way: Street rights-of-way are a common choice for conveying major drainage flows. Such use must be anticipated when the street layout is established. Side and rear lot lines offer one alternative to the street. One problem with this alternative is the possibility of individual property owners encroaching on the major drainage easement. Rarely is the problem recognized until the infrequent rainstorm occurs and the major system fails to operate properly. Where the street is designated as the major drainage-way, the depth of flow shall not exceed twelve (12) inches at the gutter line for all local (residential, commercial and industrial) and minor urban collector streets. The maximum depth of flow shall comply with the ODOT L&D Manual, current edition for all minor rural collectors, major collectors, and major and minor arterial streets. The same maximum depth criteria will apply where a major drainage way crosses the street, except for culvert pipes (pipe open at each end). In an area where a major drainage way crosses the curbed street, a variance may be

requested from the standard typical section to depress the sidewalk and area behind the curb in the flood route to an elevation equal to the top of curb (at the flood route only).

Flood routes shall not cross street R/W for open ditch roads for the 100-year storm. Where a major drainage-way is located outside a street right-of-way, easements shall be provided. Flood routes must be established for all sag areas using a maximum water depth as outlined previously (12" or per ODOT L&D Manual, current edition, based on street classification).

All major storm routing easements shall be shown on the Master Grading Plan. Easements must be determined using the 100-year flood elevation plus 1.0 ft of freeboard. Easement widths must be based upon actual cross sections. Cross sections must be evaluated at the narrowest constriction (maximum depth), and at the point where the lowest possible head (maximum width) is available.

5. Rear Lot Flood Routing Paths: Rear lot flood routing is permitted under these Standards. However, the depth of flood routing in any non right-of-way area shall not exceed a depth of 1.5 feet.

6. Multi-Purpose Flood Routing Paths: In order to protect the integrity of the non-street drainage rights-of-way, the Design Engineer is encouraged to design flood routing paths for multi-purpose functions.

7. Storm Runoff: The storm runoff is routed through the drainage system to determine if the combined capacity of the flood routing path and storm sewer system is sufficient. The capacity of the storm sewer system at any given point is assumed to be the same for the 100-year storm as for the design year storm frequency. The flood route must be designed to accommodate the flow based on the difference between the 100-year storm and the storm sewer design year storm.

If a storm sewer is designed for above the minimum design storm frequency, credit for up to the 10-year storm will be considered. In no case will pipes less than 12" diameter receive any credit and an overland flood route shall be clearly indicated on the all plans. The Final Engineering and Construction Plan shall include cross section(s) and a profile of all flood routes. The limits of the flood route (from beginning to end) shall be shown.

8. Offsite Water: Flood routing will be required for all offsite water draining through a site. This requirement is applicable for all developed sites (e.g. subdivisions, commercial, industrial, multi-family, CAD, etc.).

9. Flood Route Calculation/Capacity: In general, flood routes must be analyzed as weirs if the path from the source to the mouth is discontinuous. If the path from the source to the mouth is continuous, the flood route must be analyzed as a channel. The height of water in the street must be based on a weir calculation unless a special design is proposed. The special design must be submitted to the County Engineer at the Final Engineering and Construction Plan submittal. Provide calculations for all proposed flood routes in the storm water management report.

904 SPECIFIC DESIGN SPECIFICATIONS

A. Roadway Culverts

1. General Specifications: The size and shape of the culvert should be such that it will carry a predetermined design peak discharge without the depth of water at the entrance or the outlet velocity exceeding allowable limits.

2. Design Procedure: The culvert design procedure as described in the ODOT Location and Design Manual Volume 2, current edition, shall be used.

3. Structure Types: Single span culverts, including concrete four-sided box and three-sided slab top and arched shaped structures shall be required in lieu of multiple cell pipe culverts.

4. Drainage Area: The drainage area (in acres) and the estimated runoff or design discharge (in cubic feet per second) for the design year and 100-year storms shall be shown on the plan for each culvert.
5. Inlet Elevation: The flowline elevation at the culvert inlet should be set deep enough to provide an adequate outlet for future storm sewer and/or channel improvements upstream. The County Engineer shall provide final approval of the proposed flowline elevation(s).
6. Design Storm Frequency (Roadway Culverts): The minimum storm frequency used shall comply with the Supplemental Specifications to these Standards.
7. Design Flow: For method of calculation, please refer to the ODOT L&D Manual, current edition.
8. Minimum Cover to Subgrade: Twenty-four inches measured from top of pipe to the bottom of subgrade shall be the minimum depth of cover. The cover over each crossing shall be shown in the profiles.
9. Minimum Diameter of Roadway Culvert Pipe: 12 inches
10. Plan Sheets: Culvert plan and profile sheets shall be required for all pipe culverts with spans greater than 36 inches, and all three-sided and four-sided box structures. The plan format shall comply with current ODOT L&D Manual, current edition.
11. Headwater elevations: The design year and 100-year ponding limits (headwater elevations) upstream of all culverts must be shown on a separate plan as part of the drainage report. This plan shall be drawn to scale (1" = 50', maximum), showing proposed contours (1-foot minimum intervals) and the associated headwater pools upstream of the culvert(s). Any structure (buildings, etc.) upstream of the culvert(s) be shown on this plan. These headwater pools (ponding limits) shall be shown on the Master Grading Plan (See Art. IV).

B. Storm Sewers: The following criteria shall be used for designing storm sewer systems:

Article IX

DRAINAGE DESIGN STANDARDS

1. Depth: The sewer must be deep enough to receive the flow from all of its sources within the watershed.
2. Size: The size of the storm sewer must be adequate for flowing full based on the design storm.
3. Design: All storm sewer systems are to be designed per these Standards and Supplemental Specifications.
4. Material: The storm sewer material shall meet the requirements of these Standards (See Art. II, Sect. 203) and the Supplemental Specifications to these Standards. No plastic pipe (707.33, etc.) shall be permitted under the pavement. Where plastic pipe is used, 100% of the pipe will be mandrelled 30 days after installation. At the end of the maintenance period, all plastic pipe shall be mandrelled again. All plastic pipe failing the mandrel test shall be retested and/or replaced per these Standards and Supplemental Specifications.
5. Flow line: The flow line of the storm sewer pipes should be set so that the crown of the pipes (at the junctions) is at the same elevation.
6. Offsite Tributary Acres: A storm sewer structure shall be located no less than 10 feet from the property line for all offsite tributary areas with drainage areas of 1 acre or more. For areas with ravines this requirement can be waived.
7. Pipe Junctions: Sewer pipes shall enter in the front face of the walls for rectangular and square structures. For all curb inlets, sewer pipes shall enter through the front and back of the structure. Sewer pipe shall not be allowed to be located parallel to the curb and gutter and within the zone of influence for the roadway section. The County Engineer will determine if the proposed storm sewer locations will cause potential maintenance issues in the future.
8. Pipe Separation: The main storm sewer pipe, if greater than or equal to 24-inches shall be required to be separated from all inlets.
9. Minimum Design Storm Frequency (Storm Sewers):

   For All Local Streets and Minor Urban Collector Streets:

Two-year storm (flowing full) – Curb and Gutter Section

Ten-year storm (flowing full) – Open Ditch Section

For All Minor Rural Collectors, Major Collectors, and Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

If a combination of a storm sewer and open ditch are used to convey storm flow, see the Supplemental Specifications to these Standards for related design criteria.

10. Hydraulic Gradient:

For All Local Streets and Minor Urban Collector Streets:

Based on a five-year storm, the hydraulic grade line shall not exceed the window or grate elevation for an inlet or catch basin. For rear lot drainage, the 10-year hydraulic grade line shall not exceed 1.5 feet. Grade line shall be based on the tailwater or eight-tenths (0.8) of the pipe diameter at the outlet or other critical points, whichever is greater, within the system.

For All Minor Rural Collectors, Major Collectors, and Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

11. Design Flow:

For method of calculation for storm sewer sizing, refer to the Supplemental Specifications to these Standards.

For All Local Streets and Minor Urban Collector Streets:

Maximum time of concentration to first structure:

Curb Inlet -- - - - - - - - - - - - 10 minutes

Ditch Catch Basin- - - - - ---- 15 minutes

Time of concentration used shall be approved by the County Engineer

For All Minor Rural Collectors, Major Collectors, and Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

12. Minimum Diameter of Storm Sewer Pipe: 12- inches

13. Pipe Roughness Coefficient (n):

    An "n" of 0.012 is to be used for sewers 60-inch diameter and under, and 0.013 for sewers larger than 60-inches in diameter. The basic "n" for smooth pipe, concrete or vitrified is 0.012. These values do not compensate for minor head losses at catch basins, inlets, and manholes that are encountered in a storm sewer system. If in the opinion of the County Engineer these become significant, then the pipe coefficient shall be increased to 0.015 to account for these losses.

14. Minimum cover to Subgrade:

    Reinforced or Concrete Pipe

    (Measured from the top of pipe to bottom of subgrade) -- 24 inches

    The cover over each crossing shall be shown in the profiles.

15. Maximum Cover:

    The support strength of the conduit as installed must be in accordance with the Maximum Height of Cover for Pipe found in the Supplemental Specifications to these Standards.

16. Minimum Velocity for Design Flow: 3 fps

17. Maximum length of pipe between structures: 300 feet.

C. Open Watercourses

1. Federal and State Regulations: The requirements for open watercourses that may be affected by a construction project are subject to Federal and State regulations. Both the U.S. Army Corps of Engineers (Corps) and the Ohio Environmental Protection Agency (OEPA) have jurisdiction over the construction activities that occur in and near Waters of the United States and/or Jurisdictional Streams. Both of these agencies have a permit process in

force (404/401 permits) that address what types of construction activities can be permitted. For sites that contain Waters of the United States and/or Jurisdictional Streams, the open watercourses within the site will not be required to be enclosed with storm sewer pipe. Areas of heavily wooded ravines with large diameter trees and with depth sufficient to receive the flow from storm sewers without disturbing the natural state, will not need to be enclosed with storm sewers. Please refer to Article XII for additional requirements.

2. Drainage (Maintenance) Easements: Access to open watercourses (e.g., drainage ditches, channels, swales, etc.) shall be by means of drainage (maintenance) easements. The easement widths shall be as outlined in the Supplemental Specifications to these Standards.

3. Plan Approval: Approval of the Final Engineering and Construction Plans shall not be granted until the County Engineer has received a copy of all applicable approvals/permits (received from the Army Corps, Ohio EPA, ODNR, etc.).

   The requirements for all open watercourses are outlined in the Supplemental Specifications to these Standards.

4. Design Criteria:

   a) Minimum Design Storm Frequency (new channels/open watercourses):

   Ten (10) year (bank-full)

   b) Design Flow:

   For method of calculation, refer to the Supplemental Specifications to these Standards.

   c) Allowable Velocities in Existing Channels:

   The existing open watercourse (channel) must have the ability to handle the flow of the post development improvements satisfactorily. Calculations for the design year and 100-year channel velocities must be submitted to the County Engineer for review and approval.

Channel protection must be provided per these Standards and Supplemental Specifications.

d) Minimum Slope:

For New Channels: 0.40% (Desirable); 0.24% (Minimum) with a minimum velocity of 2 fps for the Design Year Storm

e) Side Slopes: 4:1

D. Subsurface Drainage Tile

All existing subsurface tile, including those on the County Drainage Maintenance (Ditch Petition) Program, shall be accounted for in the design of the storm sewer system. Locations of existing drainage maintenance tile systems within Delaware County are available by contacting the County Engineer and the Soil and Water Conservation District. This existing tile system(s) shall not be connected into the proposed storm water management system unless approved as part of the Preliminary Engineering Plan approval.

E. Curb Inlet

a) Maximum width of spread of flow:

For All Local Streets and Minor Urban Collector Streets:

Street Width	Width of Spread
<= 26 feet	8 feet
> 26 feet	9 feet

For All Minor Rural Collectors, Major Collectors, and Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

b) Inlet spacing shall not exceed 400 feet.

c) The spread of flow calculations must include bypass flow from the previous inlet(s), if applicable. Current ODOT spread of water calculation methods (e.g., nomographs) are permitted, provided the parameters used

to develop the nomographs are adjusted to fit the proposed curb inlet width, gutter pan width and gutter pan cross slope.

F. Driveway Pipes: See Article VIII of these Standards.

G. Retention and Detention Facilities

1. General:

The quantity, location, construction, ownership and maintenance of the detention or retention facility, whether public or private, shall be resolved prior to recording the final subdivision plat and the acceptance of the Final Engineering and Construction Plan. Chapter 6131, ORC, outlines the method of providing maintenance.

The Owner shall petition the County Commissioners for maintenance of the storm water management system and facilities of the proposed development prior to the final approval of the subdivision. The County Commissioners will not sign the plat until this petition has been filed and approved. An outline of the procedure for this petition process is contained in the Supplemental Specifications of these Standards.

All retention and detention basins are to be cleared (including the removal of trees), seeded, top soiled and mulched. The limits of seeding, mulching, clearing, etc. are subject to the approval of the County Engineer.

Standard drawings for detention and retention basins are included in the Supplemental Specifications.

For detention/retention requirements for Conservation Subdivisions, see the Supplemental Specifications.

2. Design Criteria:

a) Acceptable Methods of Calculation:

See the Supplemental Specifications of these Standards.

(1) Release Rates: Release rates shall be provided as outlined in the Supplemental Specification of these Standards.

(2) Time of Concentration: Times of Concentration for Residential, Multi-Family, Commercial, and Industrial Developments, Road Widening Projects and Mixed Developments shall be provided as outlined in the Supplemental Specification of these Standards.

3. Design Outlets

Submerged outlets will only be permitted at the discretion of the County Engineer. The use of submerged outlets will not be permitted for aesthetic purposes. Where submerged outlets are permitted, the outlet structure (headwall) shall extend one-foot above the 100-year storm elevation or the spillway overflow elevation, whichever controls.

4. Design Specifications

a) The surface of a detention area and basin volumes shall be constructed as outlined in the Supplemental Specifications to these Standards.

b) A ditch of adequate size and slope (See Section 904 C) through the detention basin shall be constructed from the inlet pipe to the outlet structure. The maximum depth of the ditch shall be as outlined in the Supplemental Specification to these Standards.

c) Seeding and other erosion control methods shall be used to protect all slopes. The type and extent of proposed erosion protection shall be as outlined in the Supplemental Specification to these Standards.

d) The side slopes for a basin shall be as outlined in the Supplemental Specifications to these Standards.

e) Freeboard:

The minimum freeboard shall be as outlined in the Supplemental Specifications to these Standards.

f) Outlet velocities at release points:

The outlet velocities at release point(s) shall be reduced such that erosion to the existing channel is eliminated. Erosion (Rock channel) protection shall be required at all release points to dissipate concentrated flows. The Supplemental Specifications to these Standards contains a method to determine the geometry, thickness, etc. for the erosion protection.

g) Debris-Control Structures

Debris-control structures may be required in some of the detention methods and should be considered as an essential part of the design. The procedure is outlined in the Supplemental Specifications of these Standards. For dams and levies over ten (10) feet in height, refer to Section 1521.062, ORC.

h) Provisions for Upstream Tributary Areas

No storage volume will be required for off-site upstream tributary areas. Flows from off-site areas in excess of the allowable discharge from the on-site area(s) may be routed around or through the detention/retention basin. Provision for excess (off-site) flow through the storage facility shall be included in the design of the emergency spillway.

i) Emergency spillways shall be provided for all retention/detention facilities. The spillway shall be designed for the 100-year storm, with the outlet plugged. The discharge from the spillway shall be directed away from any developed property.

j) The height of water in detention facilities shall not be excessive. The maximum height of water is outlined in the Supplemental Specifications to these Standards.

k) A table of elevations (with corresponding storage volume) shall be provided with the Final Engineering and Construction Plan for all detention and retention basins.

l) Additional construction requirements for all detention and retention ponds are included in the Supplemental Specifications of these Standards.

5. When detention and retention basins are to be used as water quality basins, the basins shall comply with these Standards and the Supplemental Specifications of these Standards. When conflicts between two or more portions of the standards arise, the more restrictive shall apply.

6. Proof surveys are required to be performed by the Owner in order to demonstrate conclusively that the detention/retention facilities are constructed to the capacity, elevations, slopes, grades and sizes shown on the approved plans. Such surveys shall be conducted by an Ohio Registered Professional Surveyor, shall employ standard techniques, and shall produce and furnish field notes to the County Engineer for review and record purposes. Reduction of notes and any plotting necessary to make notes interpretable shall be by the surveyor performing the proof survey. Proof surveys shall be in addition to and separate from other inspections that may be conducted by the County Engineer. All discrepancies revealed in the as-constructed facilities by the proof survey shall be rectified by the Owner, and the proof survey re-performed in order to demonstrate conformance. The proof survey shall be submitted to the County Engineer for all retention/detention facilities, including those used for private commercial, industrial and multi-family sites. The proof survey shall be submitted for review and approval prior to final acceptance of the construction or issuance of individual lot DESC permits.

7. The use of existing ponds as storm water management facilities shall be subject to the approval of the County Engineer. An evaluation of the existing pond(s) is required prior to acceptance by the County Engineer. This evaluation must be completed prior to submittal of the Final Engineering and Construction Plans. Please

refer to the Supplemental Specifications of these Standards for the requirements of this evaluation.

H. Sump Pumps and Roof Drains:

Provisions for all private drainage systems (sump pumps, roof drains, etc.) shall be included in the storm water management calculations.

Private drainage systems shall not outlet through the curb or discharge into the underdrain/curb tile.

I. Temporary Sediment Basins:

See the Supplemental Specifications for requirements for projects that require temporary sediment basins to be maintained beyond the one-year maintenance period.

905 SEEDING AND MULCHING

All areas disturbed during construction shall be seeded and mulched. Seeding and mulching shall be completed prior to the completion of construction. The seeding and mulching shall be in accordance with these Standards and Supplemental Specifications. The required seed mix design for all local (residential, commercial and industrial) and minor urban collector streets is included in the Supplemental Specifications to these Standards. Seed mix design for minor rural collectors, major collectors and major and minor arterials shall comply with ODOT CMS, current edition. The County Engineer shall determine the final limits of seeding and mulching, and may also require a special mix design where appropriate.

Article X

SURVEYING STANDARDS

1000 PURPOSE

These Standards are intended to define the minimum requirements for the practice of surveying within Delaware County. They include standards and accuracies that are acceptable for property surveys, the preparation of survey plats and subdivision plats, and the information to be indicated thereon.

1001 GENERAL STANDARDS

A. Property surveying activities conducted within the County shall be performed by or under the direction and close supervision of an Ohio Registered Professional Surveyor.

B. Plat approval: A copy of the final plat shall be sent to the County Engineer a minimum of four weeks in advance of Delaware County Regional Planning Commission (RPC) approval. This will allow the County Engineer an opportunity to review the plat and resolve any comments prior to actual approval. The Owner is encouraged to submit the final plat to all parties signatory to the final plat a minimum of four weeks prior to the RPC deadline for final approval. At the request of the Owner, the County Engineer will schedule a meeting with all plat signatories to discuss comments on the final plat. This meeting is not mandatory, but is encouraged.

C. Surveys conducted for the purpose of designing or preparing plans and maps for improvements requiring approval by Delaware County shall be performed only by or under the direction of an individual who has a thorough knowledge of surveying science and practice. Emphasis of experience shall be in the complexities of survey measurements and their analysis.

1002 DEFINITIONS

As used herein:

A. Photogrammetry: the science of making measurements on photographs. Terrestrial photogrammetry applies to the measurement of photographs that are taken from a ground station, the position of which usually is known or can be readily determined. Aerial photogrammetry applies to the measurement of photographs taken from the air and includes all operations, processes and products involving the use of aerial photographs. Among these are: the measurement of horizontal distances, the determination of elevations, the compilation of planimetric and topographic maps, the preparation

of mosaics and orthophotos, and the interpretation and analysis of aerial photographs.

B. Plat, Subdivision: a map of a subdivision of land prepared in accordance with State plat statutes and the Subdivision Regulations of Delaware County, current edition.

C. Plat, Survey: a graphical description drawn to scale showing all essential data pertaining to the boundaries and subdivisions of a tract of land.

D. Professional Surveyor: a registered surveyor authorized to practice professional surveying by the Ohio State Board of Registration, as specified under Section 4733 (Adm. Code) ORC.

E. Property Surveying: the branch of surveying that involves "the art and science of: (1) reestablishing cadastral surveys and land boundaries based on documents of record and historical evidence; (2) planning, designing and establishing property boundaries; and (3) certifying surveys as required by statute or local ordinance such as subdivision plats, registered land surveys, judicial surveys and space delineation" (knowledge of both the weight-of-authority and statute law relative to the establishment of boundaries by both written and unwritten methods is imperative).

F. Subdivision:

(1) The division of any parcel of land shown as a unit or as contiguous units on the last preceding tax roll into two or more parcels, sites, or lots, any one of which is less than 5 acres for the purpose, whether immediate or future, of transfer of ownership provided, however, that the division or partition of land into parcels of more than 5 acres not involving any new streets or easements of access, and the sale or exchange of parcels between adjoining lot owners where such sale or exchange does not create additional building sites shall be exempted; or

(2) The improvement of one or more parcels of land for residential, commercial or industrial structures or groups of structures involving the division or allocation of land for the opening, widening or extension of any street or streets, except private streets serving commercial and industrial structures; the division or allocation of land as open spaces for common use by owners, occupants or lease holders or as easements for the extension and maintenance of public sewer,

water, storm drainage or other public facilities. (Section 711.001, ORC)

G. Surveying Practice: includes any professional service which requires the application of special knowledge of the principles of mathematics, the related physical and applied sciences, and the relevant requirements of law for the adequate performance of the art of surveying (included are all major categories of surveying practice, e.g., property, topographic, hydrographic, engineering, geologic, photogrammetric, environmental [remote sensing], soil surveying, etc.).

1003 PROPERTY AND PLAN SURVEYING

A. All research, investigation, monumentation, measurement specifications, plats of survey, descriptions, and subdivision plats shall conform to the Minimum Standards for Boundary Surveys in the State of Ohio, Section 4733-37 (Adm. Code) ORC. These Standards are intended to be a minimum requirement and where the surveying profession dictates a higher level of standards in one or several areas, the practitioner is encouraged to follow those particular standards of the profession.

B. The basis for monumenting both non-platted and platted individual subdivision boundary and lot corners are as follows:

1. The surveyor shall set boundary monuments so that upon completion of the survey each corner of a subdivision lot, at the time it is platted for public record, will be physically monumented. On the plat of record a notation shall be made at each corner showing that either a boundary monument was found and/or set. In addition there shall be a statement or legend describing the monument found or set.

2. A solid iron pin or steel pipe of at least one inch diameter shall be used as permanent markers. All pipe or iron pin markers shall have a cross section of 0.2 square inches, shall be at least thirty inches long and the bottom of such markers shall be set at least thirty inches below finished grade. On a curb and gutter street, a drill hole shall be set into the top of the concrete curb to reference the front property line or a PK nail/spike set into the centerline of the street after the subdivision has been constructed. Pins must also be set at this time on the rear lot corners. Iron pins must be set on the property corners at

the street ROW line on each lot corner after construction of the house and final lot grading.

3. When it is physically impossible or impractical to set a boundary monument on a corner, the surveyor shall set a reference monument, similar in character to the normal corner monument and preferably along one of the property lines which intersect at that corner. When such a reference monument is used, it shall be clearly identified as a reference monument on the plat of record and in any deed description which may be written for the property.

4. The boundary monuments shall be identified with a durable marker bearing the surveyor's Ohio registration number and/or name or company name.

5. The setting of such markers shall not be required prior to completion of construction necessary to the improvement of the land but must be in place prior to recording of the plat.

C. When a written and/or graphical description is prepared for the purpose of conveying a permanent easement (e.g. for utilities, right-of-way, etc.), said description shall include sufficient and adequate legal and technical working so that the easement can be definitely located and defined in relation to the actual property corners and/or the centerline survey control points involved. For this purpose, whenever the said corners or control points are determined to be obliterated or lost, or if they are to be called for in a description, they shall be established and monumented in accordance with the minimum standards as referred to above in paragraphs “A” and “B”.

D. All property transfers shall comply with the Delaware County Transfer Standards, current edition, the Subdivision Regulations of Delaware County, current edition, and these Standards, including the Supplemental Specifications to these Standards.

1004 PLAT AND FINAL AS-BUILT PLAN REQUIREMENTS

General: All final copies of required plats, plans and maps that are submitted for record shall comply with these Standards, including the Supplemental Specifications to these Standards. At minimum, the following items shall be included:

A. Be neatly and legibly drawn or printed so that several successive reproductions shall be reasonably legible. The reproductions shall be

legible when the plat, plan and maps are reduced to 11" X 17" size paper.

B. Conform to the CADD standards as provided in these Standards.

C. Final Engineering and Construction As-Built Plan and Signed Plat: After all of the proposed improvements have been made and are complete, the Owner shall submit for record an updated as-built plan and signed plat to the County Engineer. As built plans are required for the following:

1. All streets (public or private) built to public standards.
2. All portions of Commercial, CAD's, Industrial and Multi-family developments that contain storm water management facilities maintained by Delaware County.
3. All Master Grading Plans for Commercial, CAD's, Industrial and Multi-family developments. In addition to the requirements of these Standards, the information and data obtained for and presented on the as-built plan shall conform to the as-built survey specifications currently accepted by the surveying profession.
4. All as-built submissions shall include a plan view of all retention/detention facilities, showing the approved plan contours (dashed lines) and the "as-built" contours (solid lines). This plan view must use the same scale as was used on the approved plans. Calculations for the as-built storage volumes must be provided. In addition, a table showing the contours and associated storage volumes for the approved plans and the as-built plan is required.
5. This plan shall be a permanent mylar copy of the Final Engineering and Construction Plan. Each sheet shall be eleven inches by seventeen inches (11" x 17") in size. A title block should be placed in the lower right corner of each sheet.
    a) One reduced set of mylar (11" X 17") as-built plans and four compact discs (CD) shall be submitted with the following information: as-built plan, storm water management calculations, traffic impact study, sight distance exhibits and basin proof survey. Acceptable formats: high resolution PDFs and TIFs (provide resolution of 300 dpi or greater).
    b) Where changes have been made to the storm water management system which deviate from the approved

construction plans, the Professional Engineer shall submit supporting documentation with the as-built plans which proves that the storm water system is in compliance with these Standards and Supplement Specifications.

c) Prior to submitting the record set of as-built plans, a check-set shall be submitted to the County Engineer for review and approval as a final change order for the improvement. The County Engineer shall review these plans and provide approval to prepare the final record set of as-built plans. This check-set of as-built plans shall be submitted with an opinion statement by a Professional Engineer and/or Professional Surveyor that these plans conform to the intent of the approved Final Engineering and Construction Plan.

d) CADD Standards (for final record size copies)

i. Current ODOT standards for CADD developed drawings shall be followed unless otherwise noted in these standards.

ii. The minimum letter size shall not be less than 3/32".

iii. Lettering within lined areas, such as a quantity box, shall at no time come in contact with any of these lines.

iv. Letters shall be properly spaced so that a crowded condition does not exist.

v. All lines shall be of uniform weight and density.

1005 ENGINEERING AND TOPOGRAPHIC SURVEYING

A. Master Benchmark Standards

1. Definitions

As used herein:

a) Master benchmark: shall be a vertical control monument which is durable, easily identifiable and permanently located within the development area in a position which affords the highest possible protection from disturbance. Master benchmarks shall be provided for each section, phase or part of a development, or as directed by the County Engineer. The master benchmark(s) shall be

located within a reserve lot. At least one master benchmark shall be located within a reserve lot near an existing County or Township road. Temporary benchmarks of a lesser nature and with elevations derived from the "master benchmark" may be used for control within the development area.

b) Source benchmark: shall be an existing, permanently established and undisturbed monument with a known elevation which is related to the "National Geodetic Vertical Datum" with a high level of certainty.

c) Development area: is the area of land included within each individual subdivision (section or phase of subdivision) as submitted for review and approval.

2. Minimum Requirements

a) The elevation of each "master benchmark" shall be determined and established by measurements designed and executed with control over uncertainty, through use of well designed specifications.

b) The following shall be on all Final Engineering and Construction Plans:

(1) the location, description and elevation of the "master benchmark(s)" within the subject development area and the "source benchmark(s)", and

(2) the total expected error and its certainty (90% or greater) in vertical measurements between each "master benchmark" and its respective "source benchmark(s)" based on actual design or sound judgment.

A variance to this requirement may be granted for a Common Access Drive (CAD), or if no public road will be extended or widened.

B. Topographic Standards[1]

[1] * U.S. Department of Agriculture, Soil Conservation Service, Engineering Field Manual, Chapter 1, Table 1-1, Pg. 1-2

1. The elevation of ninety percent (90%) of all identifiable points shall be in error not more than one-half contour interval.

2. No point shall be in error more than a full contour interval.

C. "As-built" Surveys

These are surveys to determine positions of structures as actually constructed. "As-built" surveys are required to check the contractor's work, assure that the structures will function according to design, and provide a record of locations of structures for maintenance and other subsequent design purposes. In addition to the requirements of these Standards, the information and data obtained for and presented on the "as-built" plan should conform to the as-built survey specifications currently accepted by the surveying profession. See Section 1004, for additional "as-built" survey requirements.

Article XI

PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION

1100 PURPOSE

To provide the procedures and requirements for subdivision project construction and maintenance, as well as the release of building permits.

1101 CONSTRUCTION REQUIREMENTS

A. Preconstruction Process: The Owner shall provide a written request to schedule the preconstruction conference. This request shall include a completed submission checklist that contains the following information:

1. Proof of execution of the project agreement
2. Proof of the deposit of the inspection fees
3. Two copies of the signed Final Engineering and Construction Plans (street and storm)
4. Two copies of the signed sanitary plans
5. Proposed construction sequence, including documentation of public utility schedules requiring relocation
6. Copies of all approved off-site work agreements, right-of-way permits, recorded agreements and/or easements to include if applicable, U.S. Corps of Engineer, EPA and/or ODNR permits.
7. DESC preconstruction site meeting- Refer to Article XII and the Supplemental Specifications of these Standards.

Upon receipt of the written request and copies of the above items, the County Engineer will respond within three (3) working days to schedule the preconstruction conference.

B. Preconstruction Conference: The preconstruction conference will be held at the County Engineer's office or in the field at the discretion of the County Engineer. The following individuals are required to attend the preconstruction conference and are notified by the Owner:

1. Owner
2. Design Engineer
3. Contractor(s)
4. Soil and Water Conservation District
5. Utility representative(s)

In the event of the absence of any of the above required attendees, the preconstruction conference may be cancelled and rescheduled at the discretion of the County Engineer. Also, the preconstruction conference shall start no later than 15 minutes after the scheduled start time.

C. General Specifications and Responsibility:

1. These Standards and the Supplemental Specifications to these Standards shall apply unless otherwise approved by the County Engineer.
2. The County Engineer shall be responsible for the inspection of all improvements that falls under his authority.
3. The County Engineer shall determine the amount of the inspection, including laboratory and/or other tests, required to assure that the Owner or his Contractor has complied with these Standards, Supplemental Specifications and the approved plans.
4. Project Superintendent: The Owner shall at all times have a competent superintendent acting as his agent on the project. The superintendent shall have the authority to execute the plans and specifications. It is understood that during the absence of a direct representative of the Owner, then the contractor's superintendent shall serve in this capacity.
5. Stormwater Quality (erosion and sediment controls): Refer to Article XII and the Supplemental Specifications of these Standards.
6. Repair or Damage: Any damage done to the improvements or to the existing public infrastructure by construction, local traffic or by any other means shall be repaired or replaced by the Owner (and/or his Contractor) at his expense, and to the satisfaction of the County Engineer as soon as possible.
7. Requirements for Early Model Home Permit with Direct Access from an Existing Public Road:

   a. The Owner shall submit a written request specifying the lot on which the model home is to be constructed.

   b. The County Engineer shall review and either approve or disapprove the lot. The lot for construction must have frontage on the existing road system. Also, the temporary drive shall not be longer than 100 feet measured from the existing edge of pavement to the model home.

   If approved, the County Engineer will advise Code Compliance to release the lot for its Building Permit.

c. A certified house number shall be obtained using the existing road for the house number. This house number may be on the proposed street provided. A sign must be placed on the existing road clearly identifying the temporary access point. The certified house number is required prior the issuance of the Building Permit. The certified house number is to correlate with the public road numbering system.

d. Access to the site shall be a temporary or permanent drive from the existing public road.

e. Written approval from the appropriate Emergency Services is required.

f. Written approval from the appropriate Township Zoning officer is required.

g. A Building Permit may then be issued with occupancy not granted until such time as the remaining portion of the subdivision is ready for the release of Building Permits. The County Engineer will advise Code Compliance when this occurs. Since the certified house number was issued to correlate with the existing public road numbering system and not that of the proposed subdivision, a new certified house number shall be required prior to occupancy.

h. A DESC permit is required from the County Engineer- See Article XII and the Supplemental Specifications of these Standards for additional information.

i. The building may not be used for any purpose until the occupancy permit is issued.

j. Any violation of the provisions of these guidelines is cause for halting work on not only the model home, but also for the proposed subdivision.

1102 BUILDING PERMIT RELEASE

A. Private Developments: Refer to Article V of these Standards

B. Subdivisions

1. No Bond Subdivisions- All construction must be complete including all remedial items prior to releasing building permits.
2. Bonded Subdivisions:
    a. Paving- Completed with the exception of remedial work. Asphalt surface course (404/448) shall not be placed after October 31. Building permits can be released if all other

building permit items are completed. If the surface course is not completed, the owner shall be responsible for the repair and/or replacement of all damaged curb or pavement prior to the placement of the surface course the following year. The maintenance period will not begin until the paving (and all other remedial items) are complete. Refer to the Supplemental Specifications of these Standards for additional requirements.

b. Storm Water Management Systems- Complete and functional with the exception of remedial work. The as built survey for retention basins, detention basins and/or sediment basins must be submitted and approved.
c. Flood Routes- Staked and constructed.
d. Erosion and Sediment Controls- All controls to be in place.
e. Safety Items- All safety related items to be in place (temporary T-turnarounds, guardrails, barricades, street name signs, stop signs, etc.)

1103 CONSTRUCTION PUNCHOUT

1. The construction punchout shall be performed by the County Engineer after all work has been completed.

2. Prior to the performance of the construction punchout, the Owner shall submit the top of casting and invert elevations of the storm sewer system in a tabular form. This form will provide both the proposed elevations and the as constructed elevations.

3. Prior to the performance of the construction punchout, the Owner shall submit the as-built survey for all detention and/or retention basins (see Article X of these Standards).

4. After submission of the above items, the County Engineer will provide a Construction Punchout letter to the Owner.

Additional construction may be required based on a review of these submissions.

1104 MAINTENANCE

The construction punchlist shall be completed for the subdivision to be placed onto the maintenance period. See Article V of these Standards.

1105 PRE-FINAL PUNCHOUT

Refer to Article V of these Standards.

Article XI

PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION

1106 FINAL ACCEPTANCE OF THE SUBDIVISION

1. After the satisfactory completion of remedial work contained in the Pre-Final punchout letter, the County Engineer will recommend to the County Commissioners to accept the improvements onto the public road system. Refer to Article V of these Standards.
2. At this time the permanent lot corner monuments should also be in place. Refer to Article X of these Standards.

Article XII

STORMWATER QUALITY

1200 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM REGULATIONS

The development, implementation, and enforcement of the Delaware County Drainage, Erosion, and Sediment Control (DESC) Permit Program is mandated by both the Federal Government and the State of Ohio. The Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Stormwater Regulations require that stormwater discharges from certain types of facilities be authorized under discharge permits (40 C.F.R., 122.26). The goal of the NPDES stormwater permits program is to reduce the amount of pollutants entering streams, lakes, and rivers as a result of stormwater runoff from residential, commercial, and industrial areas. The original 1990 regulation (**Phase I**) covered municipal (i.e., publicly-owned) storm sewer systems for municipalities over 100,000 population. The regulation was expanded in 1999 to include smaller municipalities, as well as some counties, including Delaware County. This expansion of the program is referred to as **Phase II**. In Ohio, stormwater discharge permits are issued by the Ohio Environmental Protection Agency (OEPA). The Phase II municipal separate storm sewer systems (MS4s) will be covered under an OEPA general permit for stormwater discharges. As per the Phase II regulation, the main requirement of this general permit will be for Delaware County to develop and implement six stormwater management programs, or minimum control measures. One of these six measures is **construction site stormwater runoff control**. The Phase II regulation states that the County must "develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from unincorporated lands in the County to the Maximum Extent Practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. In short, the Delaware County must develop a stormwater management program that meets the requirements of the six minimum control measures and protects state waters from pollution, contamination, and/or degradation.

1201 PURPOSE

To inform the Owner and his contractor(s) of the information, scheduling and requirements that must be provided and followed during construction of the improvement.

Article XII

STORMWATER QUALITY

1202 GENERAL SPECIFICATIONS

These Standards and Delaware County Supplemental Specifications shall apply unless otherwise approved by the County Engineer. Please refer to Article II, Section 203 for additional information on the required construction and material specifications.

No person shall cause or allow earth- and/or land-disturbing activities on a development area except in compliance with these Standards. A DESC plan shall be submitted and approved prior to any land-disturbing activities on development areas involving earth disturbance, including those development areas being a part of a larger common plan of development or sale. The person proposing such land-disturbing activities shall develop and submit for approval a plan containing erosion and sediment pollution control practices (SWP3) so that compliance with other provisions of this regulation will be achieved during and after development. Such a plan shall address specific requirements established by the Delaware County Engineer.

The requirement for and design of permanent drainage systems for the control of stormwater runoff shall be based upon the general and specific policies, standards and specifications outlined in the latest version of the Delaware County DESC Manual. A copy of the DESC Manual is included in the Supplemental Specifications of these Standards. Temporary and permanent stormwater runoff controls shall be designed in accordance with the standards and specifications outlined in the latest edition of the Ohio Department of Natural Resources (ODNR) Rainwater and Land Development manual. Other federal, state, or local manuals containing standards and specifications for erosion and sediment control practices may be used, subject to prior approval of these manuals by the Delaware County Engineer.

1203 GENERAL DESC PERMIT PROCESS

1. **Application -** An application for the DESC permit must be completed and submitted with the plans for review and approval. The Owner or designated representative must sign the application declaring him/her as the person responsible for the land disturbing activity. A copy of the DESC permit application is included in the Supplemental Specifications of these Standards.

2. **Fee -** Fee amounts for the DESC permit(s) are provided in the Supplemental Specifications of these Standards.
3. **Plans –** All projects require the submittal and approval of a preliminary SWP3 plan. In addition, all projects require the submittal and approval of a *General DESC Permit* along with, or as part of, the Final Engineering and Construction Plan.
4. **Detailed Construction Plan Checklist -** A completed *General DESC Checklist for Construction Activities* must be submitted along with the SWP3 for review and approval. A copy of the General DESC Checklist is included in the Supplement Specifications of these Standards.
5. **Pre-construction site meeting(s) -** If required as a condition of *General DESC Permit* Plan approval or deemed necessary *during* the Final *General DESC Permit* approval process, a pre-construction site meeting shall be conducted *prior* to the final action on the *General DESC Permit.* The Delaware County Engineer will also require a pre-construction site meeting as a condition of Final *General DESC Permit* approval. This meeting must occur prior to scheduling of a pre-construction conference (per Article XI). If site clearing is necessary, this meeting must occur prior to any clearing activities. The purpose of a pre-construction site meeting is to correct any inadequacies in the *General DESC Permit* that are identified during the visit and to ensure that the Owner and the onsite contractor representative understand the *General DESC Permit*, sequence of construction related activities, self-inspection reporting, and maintenance and record keeping requirements.
6. **Erosion and Sediment Control Surety -** Delaware County requires surety for erosion and sediment control construction. The types of surety accepted by Delaware County are listed in Article V. The surety shall be an amount sufficient to cover site stabilization costs should the site fall out of compliance. The Delaware County Engineer shall review and approve the Engineer's estimate for the site stabilization costs. The Owner is responsible for the site until the site is accepted by Delaware County.
7. **Issuance of a Drainage, Erosion, Sediment Control (DESC) Permit -** Upon adequate completion of the above activities, as applicable, Delaware County Drainage Engineer will issue *General DESC Permit.* No land disturbing activities, including clearing, grubbing, or blasting, may occur on the site prior to this time. Doing so will result in an immediate issuance of a Notice of Violation with a Stop Work Order.
8. **Final Stabilization -** Final stabilization at the site must include the following:

a. All land disturbing activities at the site have been completed.
b. There are no areas of active erosion evident.
c. Establishment of a permanent perennial vegetative cover of the disturbed area, with a minimum density of 70% cover for the area has been established; or the area has been seeded and interim measures (i.e., mulches or geotextiles) sufficient to prevent erosion from the disturbed areas have been employed. The Delaware County Engineer shall determine if the minimum 70 % coverage or if adequate seeding and interim measures have been provided.

9. **Letter of Completion -** The Owner must submit a Letter of Completion to the Delaware County Engineer (Stormwater Permit Department) upon completion of site construction and final stabilization. On this letter, the Owner shall certify that construction, including final stabilization, is complete and in accordance with the approved *General DESC Permit*.
10. **Release of the General DESC Permit -** Once the results of the final inspection signify compliance with the approved SWP3 plans and conditions, including final stabilization, the General DESC permit shall be terminated.
11. **Release of Surety -** One year after release of the *General DESC Permit*, the final inspection for the release of the surety may be conducted. The Owner shall contact the County Engineer to schedule this inspection.

1204 REQUIRED AGENCY DOCUMENTATION

The following items shall be obtained by the Owner prior to issuance of the General DESC permit and approval of the Final Engineering and Construction Plan. Copies of these items shall be submitted to the County Engineer as part of the General DESC permit and Final Engineering and Construction Plan approval.

1. **Ohio EPA NPDES Permits authorizing stormwater discharges associated with construction activity or the most current version thereof -** Proof of compliance with these requirements shall be the Owner/Applicant's Notice of Intent (NOI) number from Ohio EPA, a copy of the Ohio EPA Director's Authorization Letter for the NPDES Permit, or a letter from the Owner certifying and explaining why the NPDES Permit is not applicable.
2. **Section 401 of the Clean Water Act -** Proof of compliance with Section 401 of the Clean Water Act shall be a copy of the Ohio EPA Water Quality Certification application tracking number, public notice, project approval, or

a letter from the Owner certifying that a qualified professional has surveyed the site and determined that Section 401 of the Clean Water Act is not applicable. Wetlands, and other waters of the United States, shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time an application is made under this regulation.

3. **Ohio EPA Isolated Wetland Permit** - Proof of compliance with an Ohio EPA Isolated Wetland Permit shall be a copy of Ohio EPA Isolated Wetland Permit application tracking number, public notice conditions, project approval, or a letter from the Owner certifying that a qualified professional has surveyed the site and determined that Ohio EPA's Isolated Wetlands Permit is not applicable. Isolated wetlands shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time an application is made under this regulation.

4. **Section 404 of the Clean Water Act -** Proof of compliance with Section 404 of the Clean Water Act shall be a copy of the U.S. Army Corps of Engineers Individual Permit application, public notice, or project approval, if an Individual Permit is required for the development project. If an Individual Permit is not required, the Owner shall submit proof of compliance with the U.S. Army Corps of Engineers Nationwide Permit Program. This shall include one of the following:
    a. A letter from Owner certifying that a qualified professional has surveyed the site and determined that Section 404 of the CleanWater Act is not applicable.
    b. A site plan showing that any proposed fill of waters of the United States conforms to the general and special conditions specified in the applicable Nationwide Permit. Wetlands, and other waters of the United States, shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time an application is made under this regulation.
5. **Ohio Dam Safety Law** - Proof of compliance with Ohio Dam Safety Law shall be a copy of the ODNR Division of Water permit application tracking number, a copy of the project approval letter from the ODNR Division of Water, or a letter from the Owner certifying and explaining why the Ohio Dam Safety Law is not applicable.

1205 OPEN WATERCOURSES

Article XII

STORMWATER QUALITY

The requirements for Open Watercourses are outlined in Article IX, Section 904. In addition to the requirements outlined in Article IX, first- through third-order streams shall not be enclosed with storm sewers.

1206 CONSTRUCTION SITE RUNOFF CONTROLS.

Controls shall be implemented to address construction site runoff. These runoff controls are outlined in the Supplemental Specifications of these Standards (Please refer to the Delaware County DESC Manual in the Supplemental Specifications).

1207 POST CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

Unless otherwise exempted, all runoff from development sites shall be directed to one or more stormwater quality controls designed according to these Standards and Supplemental Specifications. These stormwater quality controls are outlined in the Supplemental Specifications of these Standards (Please refer to the Delaware County DESC Manual in the Supplemental Specifications).

Stormwater quality control facilities shall either be integrated with the stormwater quantity controls or, if not integrated, flows exceeding the capacity of the stormwater quality control shall be conveyed to a stormwater quantity control facility. Permanent stormwater quality control basins, as defined by these Standards may be used as temporary sedimentation basins designed to control sedimentation during construction, as long as collected sediments are removed, the design grade of the facility is restored, permanent vegetation is established, the temporary outlet is removed, and permanent outlet structure is constructed as designed. Please refer to the Supplemental Specifications of these Standards for additional requirements.

Measures to address post-construction stormwater quality shall comply with these Standards and Supplemental Specifications. These post-construction stormwater quality controls are outlined in the Supplemental Specifications of these Standards (Please refer to the Delaware County DESC Manual in the Supplemental Specifications).

INDEX

INDEX

INDEX

INDEX

INDEX

INDEX