LUCAS COUNTY ENGINEER

DESIGN, CONSTRUCTION, AND SURVEYING STANDARDS

March 2022

(revised February 2024)

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

SECTION

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

SECTION 1 –
GENERAL

1.01 PURPOSE

The Purpose of these rules, guidelines and standards as adopted by the Lucas County Engineer's Office, hereinafter referred to as the "LCEO", is to provide engineering and surveying standards in Lucas County, Ohio. More specifically, these Standards define the minimum requirements for surveying, engineering, construction, and erosion and sedimentation control as applied to all land development including Residential, Commercial, and Industrial in the unincorporated areas of Lucas County. These standards shall also apply to all County and Township projects prepared by the LCEO.

1.02 TITLE

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

1.03 AUTHORITY

The Board of the Lucas County Commissioners is 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).

1.04 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 Lucas County.

1.05 INTERPRETATION OF TEXT

In the interpretation and application of the provisions of these Standards, these 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.

1.06 ADMINISTRATION

The Lucas County Engineer or designated representative, hereinafter referred to as the "County Engineer", shall administer these Standards. 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.

1.07 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).

1.08 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.

1.09 ABBREVIATIONS and DEFINITIONS (as used herein)

A. USACE: Army Corps of Engineers

B. ADT: Average Daily Traffic.

(Cont.) Section 1.09 – Abbreviations and Definitions

C. CBR: California Bearing Ratio.

D. CMS: ODOT Construction and Material Specifications

E. County Commissioners: The Board of Lucas County Commissioners or designated representative.

F. County Engineer: The Lucas County Engineer or designated representative.

G. County Engineer Website: http://www.lucascountyenginer.org

H. County Sanitary Engineer: The Lucas County Sanitary Engineer or designated representative.

I. County: Lucas County, State of Ohio.

J. Design Engineer: An Ohio Registered Professional Engineer retained by the Owner.

K. 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.

- Low Density: 2 or fewer dwelling units per acre (density is defined above)
- Medium Density: 2.1 to 6.0 dwelling units per acre (density is defined above)
- 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.

(Cont.) Section 1.09 – Abbreviations and Definitions

L. 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.

M. Impervious Surface - A non-vegetated surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development OR A non-vegetated surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development.

N. ITE – Institute of Transportation Engineers

O. LCAMR – Lucas County Access Management Regulations, Latest Edition

P. LCEO Design Resources – The Lucas County Engineer's Office Design Resources

Q. MS4 (Municipal Separate Storm Sewer System) Program – The program administered by the Lucas County Engineer's Office as part of the Phase II National Pollution Discharge Elimination System (NPDES) Storm Water Program for managing the six minimum control measures including drainage, erosion, and sediment control.

R. ODNR: The Ohio Department of Natural Resources.

S. ODOT: The Ohio Department of Transportation.

T. OEPA: The Ohio Environmental Protection Agency.

U. ORC: The Ohio Revised Code.

V. Owner: Any individual, developer, firm, association, syndicate, partnership, corporation, trust or any other legal entity commencing proceedings under these Standards to affect a

subdivision or development of land hereunder for itself or for another or its designated representative.

W. Professional Engineer: A registered engineer authorized to practice professional engineering by the State of Ohio Board of Registration as specified under Section 4733 of the Ohio Revised Code and the Ohio Administrative Code.

X. Professional Surveyor: A registered surveyor authorized to practice professional surveying by the State of Ohio Board of Registration as specified under Section 4733 of the Ohio Revised Code and the Ohio Administrative Code.

Y. Project Development Agreement: An agreement between an Owner and Lucas County setting forth the financial and performance responsibilities of both parties.

Z. 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.

AA. Street, Private: A privately maintained roadway designed and constructed to these Standards but not accepted by the County Commissioners.

BB. Street, Public: A roadway within a dedicated right-of-way designed and constructed to these Standards and accepted by the County Commissioners for public use.

CC. Storm Water Pollution Prevention Plan (SWP3) – 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

DD. Storm Water Pollution Prevention Plan (SWP3) Plan Approval – A plan approval is issued by the Lucas County Engineer's Office allows applicant to obtain an Ohio EPA General Permit.

EE. Subdivision: As defined by Chapter 711 of the Ohio Revised Code.

(Cont.) Section 1.09 – Abbreviations and Definitions

FF. Thoroughfare Plan: Toledo-Lucas County Major Street and Highway Plan

GG. TMACOG: The Toledo Metropolitan Area Council of Governments.

HH. Toledo-Lucas County Planning Commission (TLCPC): The Toledo-Lucas County Planning Commissions or designated representative.

II. Traffic Impact Study (TIS): See Lucas County Access Management Regulations for Definition and Requirements, current edition.

JJ. 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 particular 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.

SECTION 2 –
GENERAL PLAN DEVELOPMENT PROCEDURES

2.01 PURPOSE

To outline the procedures to be followed in the development of subdivision and site development plans or other land development.

2.02 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.

2.02.01 SUBDIVISION CONCEPTUAL DISCUSSION - PHASE I

In this phase, the Owner or Design Engineer shall meet with the County Engineer, Plan Commission, Township Zoning Officials, and County Sanitary Engineer (if necessary), and other review agencies so everyone can become familiar with the existing conditions affecting the proposed improvements. This meeting should take place early as possible and shall be prior to submitting the preliminary drawing to the Toledo-Lucas County Planning Commissions. The County Engineer's Office will have a standing meeting date on the 1st Wednesday of each month for Conceptual Discussions regarding upcoming subdivision plats. The Owner or Design Engineer shall notify the County Engineer's Office a minimum of 14 days prior to the meeting if a development intends to be on the meeting agenda. The designer should bring to the Conceptual Discussion an overview of the proposed work, including the proposed configuration of streets and basic drainage components (no sizing required).

2.02.02 SUBDIVISION PRELIMINARY ENGINEERING PLAN - PHASE II

The Owner shall submit this plan through LCExpress along with any pertinent reports and calculations (i.e. preliminary drainage and traffic studies) concurrent with submitting the preliminary plat to the TLCPC. The Preliminary Engineering Plan, as outlined in Section 3 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 the TLCPC preliminary plan/plat approval.

2.02.03 SUBDIVISION FINAL ENGINEERING AND CONSTRUCTION PLAN - PHASE III

The Owner shall submit through LCExpress a complete Final Engineering and Construction Plan (including specifications, drainage petition and cost estimates), as outlined in Section 3 of these Standards, of the proposed subdivision for review by the County Engineer.

2.02.04 SUBDIVISION REVIEW FEES

The Owner shall pay all costs incurred by the County Engineer for review of Preliminary Design Information, Final Engineering and Construction Plans and Plats. If offsite improvements are required, the Owner shall pay all costs incurred by the County Engineer for plan review and inspection of the improvements. The County Engineer shall determine the plan review, construction inspection, and SWPPP fees to be charge. The costs for all fees shall be paid by the Owner through LCExpress prior to the start of the review process by the LCEO. The current fee schedule for the costs can be found at: https://www.lucascountyengineer.org/permits.html

Fees may be refunded for withdrawn 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 to the County Engineer.

2.03 SITE PLAN PROCEDURE

The County Engineer's Office works directly with the eleven township zoning departments to assist, when requested, in providing engineering reviews of proposed site developments. This procedure starts with the Conceptual Discussion and Preliminary Design Phase, which leads then to the Final Engineering and Construction Plan.

2.03.01 SITE PLAN CONCEPTUAL DISCUSSION - PHASE I

In this phase, the Owner or Design Engineer should meet with the County Engineer, Township, ODOT, and other review agencies to become familiar with the existing conditions affecting the proposed development. This meeting should take place as soon as possible and typically after re-zoning of the property (if applicable). The County Engineer's Office will have a standing meeting date on the 1st Wednesday of each month for

(Cont.) Section 2.03.01 – Site Plan Conceptual Discussion – Phase 1

Conceptual Discussion regarding upcoming site plans. The Owner or Design Engineer shall notify the County Engineer's Office a minimum of 14 days prior to the meeting if a development intends to be on the agenda. The designer should bring to the Conceptual Discussion an overview of the proposed work, including the proposed configuration of streets/drives and basic drainage components (no sizing required).

2.03.02 SITE PLAN PRELIMINARY ENGINEERING – PHASE II

The Owner may submit this plan along with any pertinent reports and calculations (i.e. preliminary drainage and traffic studies) concurrent with submitting the plan to the Township Zoning Department. For more complex site plan developments it is recommended to submit the Preliminary Engineering plan.

2.03.03 SITE PLAN FINAL ENGINEERING AND CONSTRUCTION PLAN - PHASE III

The Owner shall submit through LCExpress a complete Final Engineering and Construction Plan of the proposed development for review by the County Engineer. The submittal shall be in accordance with the applicable Township Zoning Resolution requirements as well as Section 3 of these Standards, including any appropriate Section 3.08 Preliminary Plan Requirement items.

2.03.04 SITE PLAN REVIEW FEES

The Owner shall pay through LCExpress site plan review fees established in the County Engineer's current schedule of fees prior to review of the plans and calculations by the County Engineer. If offsite improvements are required, the Owner shall pay all costs incurred by the County Engineer for plan review and inspection of the improvements. The County Engineer shall determine the plan review, construction inspection, and SWPPP fees to be charge. The costs for all fees shall be paid by the Owner through LCExpress prior to the start of the review process by the LCEO. The current fee schedule for the costs can be found at: https://www.lucascountyengineer.org/permits.html

(Cont.) Section 2.03.04 – Site Plan Review Fees

Fees may be refunded for withdrawn 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.

2.04 CONSTRUCTION AND MATERIAL SPECIFICATIONS, STANDARD DRAWING AND SUPPLEMENTAL SPECIFICATIONS REQUIREMENTS, AS AMENDED

The current ODOT Construction and Material Specifications (CMS), Standard Drawings and Supplemental Specifications, Lucas County Engineer Standard Construction Drawings (see LCEO Design Resources) and Specifications shall apply for all projects that provide for the construction of improvements in the public right of way or that will be dedicated for public use. These standards are recommended to be used for onsite private developments and except as otherwise required by other rules or regulations, the standards used shall be as specified by the Engineer of Record.

2.05 ELECTRONIC PLAN REVIEW AND SUBMITTALS

The County Engineer's Office requires that all plans, calculations and reports be submitted in an electronic .pdf format for review and approval through LCExpress. The submittal shall be in accordance with the LCEO Electronic Plan Review Submittals and the LCEO Site Plan Checklist which can be found in the LCEO Design Resources.

SECTION 3 –
PLAN PREPARATION AND FORMAT

3.01 SUBDIVISION PRELIMINARY ENGINEERING PLAN PURPOSE

To outline the procedure to be followed for Preliminary Engineering Plan submittal, including the specific information necessary for the submittal through LCExpress.

The required information for the Preliminary Engineering Plan 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 TLCPC preliminary plan/plat approval. The Owner shall address these issues in the Final Engineering and Construction 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.

3.02 SUBDIVISION PRELIMINARY ENGINEERING PLAN PROCEDURE

A. The Owner shall submit plans and pertinent information in accordance with the LCEO Electronic Plan Submittal Requirements (see LCEO Design Resources), including appropriate review fees and the LCEO Preliminary Plan Checklist (see LCEO Design Resources), to the County Engineer through LCExpress.

B. Upon receipt of all Plan Submittal Requirements outlined in the Preliminary Engineering Plan Checklist the County Engineer shall complete a review of this submission within 21 calendar days. The County Engineer shall provide marked up electronic plans and a summary of comments and/or approval. The County Engineer shall: (1) approve; (2) approve subject to the resolution of the attached comments; or (3) not approve the Preliminary Engineering Plan.

   For Preliminary Plans that require a back check the review time by the LCEO will be 21 calendar days. This review period may be shorter if there are only minor comments on the previous submittal. The LCEO Disposition of Comments (see LCEO Design

Resources) and updated LCEO Preliminary Plan Checklist (see LCEO Design Resources) shall be provided by for each resubmittal.

Copies of the County Engineer's comments shall be submitted to the Owner, TLCPC and the appropriate Township. The Owner may request a meeting to review the submittal or the County Engineer's comments. Approval of the Preliminary Engineering Plan does not constitute variance approval. Request for variances shall be as set forth in these Standards (See Sections 1.09 and 5.02). Intended variances must be requested during the Preliminary Engineering Plan.

C. 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 eighteen (18) months following the date of the approval unless an extension of time is granted in writing. If upon expiration of the Preliminary Engineering Plan approval there has been no submittal of the Final Engineering and Construction Plans then 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. The County Engineer may require a field meeting to discuss the comments with the design engineer.

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, traffic, pavement typical section, drainage changes, sight distance, adequate outlet, etc.

3.03 SUBDIVISION PRELIMINARY ENGINEERING PLAN REQUIREMENTS

The Preliminary Engineering Plan shall be submitted through LCExpress and include a signed and completed submission Preliminary Engineering Plan Review Checklist (see LCEO Design Resources). The Preliminary Engineering Plan shall be prepared by a Registered Professional Engineer (See Section 1.09) and shall include the following information as a minimum. An incomplete submission shall be cause for rejection by the County Engineer.

A. Narrative:
The preliminary engineering plan shall include a narrative discussing the proposed project and identifying any problems which the Design Engineer and/or Owner are aware of that would affect the feasibility of the project.

B. Identification:
1. Name of subdivision or development
2. Location by Range, Township, Section and/or Tract or Grant Name and Number

3. A clearly legible location map showing the location of the project with respect to the nearest adjacent road intersections. (At scale not less than 1 inch equals 2000 feet)
4. North arrow
5. Written and graphical (bar) scale
6. Name, address and telephone number of Owner and the Design Engineer preparing the plan with appropriate seals and numbers.
7. "Preliminary Engineering Plan" clearly labeled on plan.

C. General Information:

1. Total development acreage and boundary (limits of disturbance)
2. Number, dimension and location of lots including front yard setbacks
3. Zoning Designation
4. Development density (as defined in Section 1.09)
5. Plan showing proposed plat/phase lines and drainage areas for the entire project.
6. Identification of all intended variances to these Standards along with a written request in accordance with these Standards.
7. Location, width, and names of existing streets, railroad rights-of-way, easements, parks, buildings, corporation and township lines; wooded areas, water courses, drainage patterns, and water bodies.
8. Topographic features within and adjacent to the plat for a minimum distance of 200 feet unless access to adjacent property has been denied the professional surveyor. Location of floodways, floodplains, and any potentially known hazardous areas.
9. Parcels of land reserved for public use or reserved by covenant or easements for residents of the subdivision.

10. Point of proposed ingress/egress or driveway locations and the distance to any existing driveway(s).
11. Type of water supply and wastewater disposal proposed, approximate locations and dimensions of all proposed utilities and sewer lines, easements, drainage tiles, water mains, culverts, or other underground utilities within the site or adjacent thereto.

D. Traffic Study:

A Traffic Impact Study or Traffic Analysis, if required to be submitted with the Preliminary Plan submittal, shall comply with the Lucas County Access Management Regulations, current edition. During the Conceptual Discussion meeting the traffic study will be discussed and a timeline for submittal will be outlined.

E. Street and Structure Plan:

The following items outline the basic requirement for the street and structure plan.

1. All existing utilities showing their locations and easements, including all access easements.
2. All easements of record.
3. Design speeds and street classifications.
4. Horizontal Street alignments (including street names) with stationing at 100-foot intervals and at all intersections, PC's and PT's.
5. Horizontal curve data showing the centerline radius and delta angle for all curves.
6. Pavement and right-of-way widths.
7. Preliminary profile information of all storm sewers crossings under the pavement is highly recommended to ensure adequate cover is provided.

8. Existing topography (specify source datum) at the following specified contour intervals:
   - Two–foot minimum contour intervals based on actual field obtained data for the subdivision; or
   - Contour intervals provided from the Lucas County Engineer's Lidar Data is acceptable for existing topography.
9. Adjoining parcel lines within 50 feet of the tract boundaries and existing roads within 200 feet of the tract boundaries.
10. Proposed street connections for adjacent land (to existing or future development). The use of alternate road terminations (e.g. Permanent T-turnarounds, etc.) shall require the written approval of the County Engineer and/or Township.

F. Preliminary Storm Water Management Report:

The following items outline the basic requirements of the Preliminary Storm Water Management Report to be submitted with the Preliminary Engineering Plan. Please refer to Section 6 for the minimum standards and specifications for design.

1. A map shall be of appropriate scale (1 inch = 500 foot maximum) and graphically show the boundaries of the entire drainage area. Provide separate map for just the development area. In addition, the existing general topography and ground contours for the following items shall be shown:
   - The development area.
   - The adjacent land within one hundred (100) feet of the limits of disturbance.
   - Any other adjacent areas which affect or may be affected by the proposed development.
2. Boundary lines of the development area (limits of disturbance) shall be clearly delineated.
3. Existing and proposed drainage structures, culverts, storm

sewers, etc. (including those in the applicable drainage area).

4. Highways, railroads, parks and other recreational areas.
5. Known subsurface drainage systems.
6. Existing topography (specify source datum) at the following specified contour intervals:
   - One-foot minimum contour intervals based on actual field obtained data for the subdivision; or
   - Contour intervals provided from the Lucas County Engineer's Lidar Data is acceptable for existing topography
7. 100-year floodplain and/or floodway for any FEMA NFIS watercourse.
8. Existing pond or ponding areas.
9. Any delineated or regulated wetlands.
10. Any existing above ground structures, buildings, facilities, etc. on or in the development area.
11. An adequate drainage outlet is of primary importance to the County; therefore on the map provide identification of the existing drainage outlet(s) for the site including size, material type, slope, and condition of any storm sewer or culverts. This information shall be based on an onsite investigation and observation of the outlet(s). The County Engineer shall require supporting evidence (e.g. videotape, field data, photographs, etc.) of the existing drainage outlet(s) be included with the submittal.
12. Provide on an analysis of the capacity of the drainage outlet(s) for the site and a determination of the adequacy of the outlet(s) under the predevelopment conditions. Refer to the LCEO Design Resources for an example.
13. Any underground facilities (e.g. leach fields, storage tanks, wells, etc.) on or in the development area.
14. At a minimum, provide drainage calculations as required in Section 6.02, Parts A, C, E, & K of these Standards.

3.04 SUBDIVISION FINAL ENGINEERING PLAN PURPOSE

To outline the procedure to be followed for a Final Engineering Plan submittal, including the specific information necessary for the submittal through LCExpress. 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.

3.05 SUBDIVISION FINAL ENGINEERING PLAN PROCEDURE

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

A. Submit plans and pertinent information in accordance with the LCEO Electronic Plan Submittal Requirements. Final Engineering and Construction Plan, including the LCEO Final Plan Checklist (see LCEO Design Resources), shall be submitted to the County Engineer for review through LCExpress.

   In addition, the electronic copy of the Storm Water Management and Drainage Report shall be provided with the submittal. 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. See Section 6.02 for requirements of the final storm water and drainage management report. The report shall be signed and sealed by an Ohio Registered Engineer.

   Also, one electronic 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 Soil Erosion and Sedimentation Control permit is required for all sites with an Estimated Disturbed Area (EDA) greater than one (1) acre or that is part of a larger common plan of development that will have an EDA of greater than one (1) acre. See Lucas County Soil Erosion and Sedimentation Control Rules for additional information regarding the permit.

The Final Engineering and Construction Plan submittal through LCExpress shall include the LCEO Disposition of Comments addressing the resolution of all comments made as part of the Preliminary Engineering Plan review. The submittal 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.

LCEO will draft the Project Development Agreement (see LCEO Design Resources for an example) after the Final Engineering and Construction Plan components are submitted through LCExpress. The Project Development Agreement shall be signed by the Owner and County Commissioners prior to final approval of the Final Engineering and Construction Plan.

B. Upon receipt of <u>all</u> Plan Submittal Requirements outlined in the LCEO Final Plan Checklist, including appropriate review fees, the County Engineer shall review the plan within twenty-eight (28) 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 Subdivision Drainage Petition.

For Final Plans that require a back check the review time by the LCEO will be 21 calendar days. This review period may be shorter if there are only minor comments on the previous submittal. The LCEO Disposition of Comments and LCEO Final Plan Checklist

shall be provided for each resubmittal. The County Engineer shall provide marked up electronic plans with comments and/or approval. The County Engineer shall: (1) approve; (2) not approve the Final Engineering and Construction Plan.

At the Owner's request, a meeting with the County Engineer may be scheduled to discuss the comments.

All subsequent submittals of the Final Engineering and Construction Plan shall include the LCEO Disposition of Comments and a LCEO Final Plan Checklist.

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 these Standards.

C. Once the Final Engineering and Construction Plan submittal meets all the County Engineer's requirements, the Owner shall submit through LCExpress a PDF for electronic signature and the approved current estimated cost of construction. The final record plat drawing shall be nearly complete (approximately 90% complete) and in compliance with the Final Engineering and Construction Plan.

All copies of the 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 through LCExpress prior to approval of the Final Engineering and Construction Plan.

All requirements of the Lucas County Access Management Regulations, including an approved Traffic Impact Study or Traffic Analysis, shall be completed prior to the approval of the Final

Engineering and Construction Plan.

Sanitary Sewer and Waterline Plans: The construction of sanitary sewer and water lines shall not begin prior to the preconstruction meeting.

Once the County Engineer approves the Final Engineering and Construction Plan, the plan may be used for construction provided such construction is started within eighteen (18) months of the approval date. After eighteen (18) months, the County Engineer reserves the right to require 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 an 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.

D. Field Modifications: No design or material changes to the approved Final Engineering and Construction Plan will be permitted in the field unless approved by the County Engineer.

E. After all of the proposed improvements have been completed, the Owner shall submit through LCExpress an as-built (Proof) survey and plan to the County Engineer as outlined in Section 6.06 (G)(11) (12). The as-built submission shall include final design calculations and supporting documents (e.g. stormwater management calculations etc.) as set forth in the Final Engineering and Construction Plan.

F. As-built plans for everything other than stormwater management facilities will be prepared by the County Engineer's Office.

G. Provide an electronic copy of all the plan sheets, signed plat, stormwater management and drainage report, calculations, traffic impact study, SWP3 Documents, as-built certifications, etc. (PDF format), AutoCAD Drawings, Plotting Files, and Cost Estimate (Excel format) to the County Engineer through LCExpress once the plans have been approved.

3.06 TITLE SHEET (Subdivisions)

The title sheet shall contain the following information:

A. Location Map: This map shall indicate the overall development with the current plat highlighted. All individual lots shall be shown along with the proposed detention area and ditches/drainage outlets labeled. All existing and proposed perimeter boundary monuments shall be shown and labeled.

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

"The Lucas 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."

C. Plat Identification – List the plat phases that are included with the plans. Quantities will need to be separated by plat in the general summary.

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 and shall comply with the Professional Engineer's definition in Section 1.09 of this Manual.

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 Lucas 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 Lucas 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 (Lucas County and ODOT), drawing number or designation, originating agency and date.

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 the following statement:

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

I. 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.

3.07 SUBDIVISION FINAL ENGINEERING PLAN 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.

2 . Traffic Study: If not previously required for submission with the Preliminary Plan submittal, a Traffic Impact Study or Traffic Analysis, if required for the development, shall comply with the Lucas County Access Management Regulations, current edition.

3. Safety Considerations: Post development safety considerations and traffic projections including: traffic control devices, pedestrian traffic flow, etc.

4. Sight distance Exhibits: Sight Distance exhibits in accordance with the requirements of Section 5 (if not submitted with the Traffic Impact Study) shall be submitted.

5. Drafting and CAD Standards: Plan line weights and style, topographic symbols, etc. should conform to the plan requirements as established in the LCEO CAD Standards and Specifications (see LCEO Design Resources) and ODOT's Location and Design Manual, current edition. The intent of the drafting and CAD standards are to create plans that are clear, concise, and organized. The goal is of the CAD Standards is to make plan review more efficient and plan reading during the project construction clear.

(Cont.) Section 3.07 – Subdivision Final Engineering Plan Requirements

6. Traffic and Pavement Design: Traffic and loading design calculations shall be included with the final plan submittal (refer to Section 5 for minimum standards and specifications for pavement design).

7. Drainage Calculations: The drainage calculations required per Section 6.02 shall be submitted with the Final Storm Water Management Report.

8. 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 Master General Notes are located in the LCEO Design Resources and must be included in the projects. The project appropriate Master 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.

9. 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.

10. Cost Estimate: A Final Engineer's Cost Estimate shall be submitted through LCExpress. The unit prices used shall comply with current Lucas County Area unit bid prices. The Engineer's Estimate shall be valid for 6 months, unless otherwise approved by the County Engineer's Office.

The format for the Engineer's Cost Estimate can be found in the LCEO Design Resources.

This estimate shall include the name, address and phone number of the Owner and be signed and dated by an Ohio Registered

Professional Engineer, per Section 1.09 of this Manual.

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 these Standards. The County Engineer shall approve use of scales other than those shown below.

1. Normal scales:
   a. Vertical Scale - 1 inch = 5 feet
   b. Horizontal Scale - 1 inch = 50 feet (maximum)
      A more detailed scale such as 1 inch = 20 feet or 1 inch = 30 feet is preferred. 1 inch = 20 feet scale is required for all road widening sheets.
   c. Plats - 1 inch = 50 feet (maximum)
      A more detailed scale such as (e.g., 1 inch = 40 feet, 1 inch = 30 feet) is preferred.
   d. Intersection and Cul-de-sac Details - 1 inch = 20 feet or 1 inch = 30 feet.

2. Plan Items (shall include but not be limited to):
   a. Street centerline, stationing, right-of-way lines, easements and lot numbers.
   b. Proposed typical sections for all streets showing: pavement and grading sections, right-of-way widths, slopes and composition with thickness of the proposed pavement. In lieu of pavement design calculations, Lucas County pavement composition sections per Section 5.08 may be used.
   c. Centerline profile, including vertical alignment and vertical curve data including approximate “K” values and design speeds.
   d. Pavement, curbs, gutters, waterlines, storm and sanitary sewer structures, guardrail, and all existing and proposed utilities.

e. Topographic features within the general area and any obstructions or encroachments within the right-of-way or construction area.

f. Descriptions of benchmarks and their locations. (Refer to Section 4 of these Standards.)

g. Work and/or clearing limits.

h. Intersection and cul-de-sac details.

i. Station and offset of all structures within a Subdivision.

j. Extent of grading/clearing limits consistent with current Lucas County Erosion and Sedimentation Rules.

k. Location of sanitary sewers, water lines and storm sewers. A final profile of all storm sewers and/or culvert crossings under the proposed right of way is required to ensure adequate cover per 6.06 (B)(15). If the site conditions, e.g. shallow depth outlet, etc. require a cover depth less than the minimum, a variance can be requested. The variance shall be requested as part of the Final Engineering Plan submission.

3. <u>Profile Items (shall include but not be limited to):</u>

a. Centerline stationing, original ground profile grade on the proposed centerline and the proposed profile grade.

b. Vertical curve data and profile grade elevations (at all sag and crest points, as well as at even 25 foot intervals) and sight distance data.

c. Profile grade elevations at even 50-foot 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.

g. The normal pond elevation and 25-year pond elevations shall be shown on storm profiles that have an outlet or inlet into a pond.

4. Cross-section Sheets:

a. Minimum scales (unless otherwise approved by the County Engineer):

Vertical Scale – 1 inch = 5 feet

Horizontal Scale - 1 inch = 20 feet

b. Location: Cross-sections shall be shown at even 50-foot intervals and other needed locations (ie low points, high points, storm crossings, driveways, culverts) as determined by the County Engineer. All cross sections shall show the existing ground line dashed, with the proposed line drawn solid at a line weight darker than the existing. Cross-sections shall be provided for all open ditch and curb and gutter streets.

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

c. Data: Include the following data on each section:

1. At the centerline below each section, display that section's Station Number (and street name if more than one proposed street).
2. The proposed finished profile grade elevation should be displayed above the station number.
3. The existing centerline elevation should be displayed below the station number
4. Flowline elevations and flow direction arrows in any ditches within the section.
5. Existing and proposed utilities with location and elevation information callouts.

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

5. Drainage Structures:
Detailed drawings of all bridges, culverts and other drainage structures (other than standard culvert pipes with pipe diameter less than or equal to 36 inches) 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 Section 5 of these Standards. The plan scale shall be 1 inch = 10 feet (min).

The use of precast wingwalls, headwalls, footings, etc. may be permitted at the discretion of the County Engineer.

6. Site Grading Plan:
The purpose of this plan is to show that the major storm is contained within the planned development area. This plan shall include all elevations necessary to demonstrate the proposed strategy for runoff containment and conveyance. A detail of the typical section(s) shall be provided.

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

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

b. Rear Yard Swales: Rear yard swales shall have a minimum slope of 0.50% or a storm sewer system shall be provided in all rear lots. The minimum slope for rear yards and side yards is 1%.

c. Catch Basins: Catch basins shall be placed in the rear lots at every third property line or a maximum length of 300 feet drainage in any one direction. All sump pumps and roof drains shall outlet into the front or side lot storm sewer system unless another means is found acceptable by the

County Engineer based on specific site conditions.

d. The rear lot storm sewer pipes shall be designed for the 10 year hydraulic grade line not to exceed 0.5 feet ponding depth above top of grate.

e. All Storm Sewers and Drainage Structures shall be shown on the plan.

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

g. Elevations: 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.

h. Existing and proposed contours must be shown at 1-foot intervals.

i. Drainage arrows to indicate design sheet flow.

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

k. Finished Grade elevations.

l. 100-year headwater elevations for all culvert crossings, with easements provided. The required easement width shall be provided based on an elevation of 1.0 foot above the 100-year elevation.

m. All easements must be shown and dimensioned, including preservation easements, storm sewer easements, etc. See Section 6 for easement widths.

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

o. All proposed stormwater management facilities.

p. Construction limits.

q. For minor drainage courses on lot lines, it shall be noted on the plans that all utility pedestals shall be offset to avoid

r. impeding the drainage course.

s. Landscape and/or mounding features plan for a proposed development shall be shown on the Site 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.

t. Walk out basement location/identification: All proposed walkout basements shall be designated at the time the Final Engineering and Construction Plans are submitted for their initial review.

7. Detailed Retention/Detention Basin Plans

The purpose of these plans is to provide a greater level of detail of how these storm water basins are to be constructed and operate in order 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 Site Grading Plan to provide a greater level of detail. However, the Site 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:

a. Dimensioned plan and cross-sectional views of the complete basin. The plan view shall include contour lines at one-foot intervals and a tabular summary of the area and volume of each contour plane. The basin side slopes shall be labeled on the cross sections.

b. Detail(s) of the detention flow control structure(s) including sizes, orifice plates, specifications, and materials.

c. See Section 6 for Allowable Peak Runoff Rates and other Design Criteria.

8. Storm Water Tributary Map Requirements:

The Pre- and Post- Development Storm Water Tributary Map

requirements for the maps are to be included with the Final Engineering and Construction Plan. Please refer to Section 6 for the minimum standards and specifications for design.

9. Sediment and Erosion Control Plan:
The sediment and erosion 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 Site 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 Lucas County Engineer. Refer to Lucas County Soil and Sedimentation Control Rules for the requirements.

10. Road Widening, Shoulder and Ditch Improvements:
All subdivision projects that require existing public road improvements shall provide pavement, shoulder widening and/or ditch improvements plan sheets.

    The plan sheets shall include, but not be limited to, the following items:

    a. Typical Section and Pavement Width: The County Engineer shall approve the proposed typical section (pavement buildup) and pavement width.

    b. Cross-sections at even 50-foot intervals and at all structures, drives and road entrances.

    c. Proposed and existing road profile at the existing profile grade line.

    d. At the discretion of the County Engineer, an alternative ditch design may be necessary for ditch side slopes of 3:1 or steeper.

    e. Proposed drive profiles. Note that if drives are located close to road cross sections, the drives may be shown in the standard interval cross sections instead of separate drive profiles.

(Cont.) Section 3.07 – Subdivision Final Engineering Plan Requirements

f. 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.

g. Calculations for drive culverts.

h. Maintenance of traffic plan sheet(s), plan notes and permits are required for all work within the R/W. The Lucas County Permit Department will need to be contacted to obtain the necessary permit(s).

i. Identification, including horizontal and vertical locations of existing utilities (both above and below ground), and subsurface drainage systems. 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. It is recommended that existing underground utility not be permitted to remain beneath the pavement or shoulder.

j. Existing and Proposed right-of-way shall be shown. The right-of-way width provided shall comply with these standards.

k. When necessary for safety concerns, show the Clear Zone on the plans as well as the location of existing utility poles and items that lie within the Clear Zone.

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

m. 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 Section 5 of these Standards.

n. The Owner is required to submit a video 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 video recording is required to document the condition of the existing area prior to the start of construction. The video 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 written narrative describing the approximate location of the features mentioned previously including the date and time of video recording.

o. 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 roadway widening or shoulder work will be permitted between December 1 and March 15.

11. 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 plat for any proposed development, unless otherwise outlined in the Traffic Impact Study.

12. 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 may be provided on separate sheet(s) or on intersection or other detail plan sheets within the Final Engineering and

(Cont.) Section 3.07 – Subdivision Final Engineering Plan Requirements

13. Construction Plans. All traffic control devices and signs shall conform to the requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD), Current Edition. All street names shall be approved by the Lucas County Engineer's Tax Map Department prior to final plan approval by the County Engineer. Highway lighting (if required) shall be provided as directed by the Lucas County Engineer, and shall conform to the ODOT L&D Manual, current edition. Street Name signs shall be constructed to LCEO standards and shall conform to the SignCAD PDF supplied by the LCEO.

3.08 SITE PLAN PRELIMINARY ENGINEERING, FINAL ENGINEERING & CONSTRUCTION PLAN REQUIREMENTS

The Owner shall submit all items in accordance with the appropriate Township Site Plan and the LCEO Site Plan Checklist (see LCEO Design Resources).

The Site Plan Title Sheet shall include a Title Block for the signature of the owner, Township Fire, Township Zoning, and the Lucas County Engineer's Office at a minimum. Other required signatures shall be added on a case by case basis depending on the site plan.

The Site Plan grading notes are located on the LCEO Design Resources webpage.

The Owner shall submit all plans and pertinent information to the County Engineer through LCExpress, including appropriate review fees and the LCEO Site Plan Checklists.

An electronic copy of all the plan sheets, stormwater management and drainage report, calculations, signed Site Plan Drainage Petition, Traffic Impact Study (if necessary), SWP3 Documents, as-built certifications, etc. (PDF format), AutoCAD Drawings, Plotting Files, On-site Drainage Infrastructure Cost Estimate for petition purposes (Excel format), and Off-site Infrastructure Cost Estimate (Excel format) shall be submitted to the County Engineer through LCExpress once the plans have been approved.

SECTION 4 –
SURVEYING STANDARDS

4.01 PURPOSE

These Standards are intended to define the minimum requirements for the practice of surveying within Lucas County. They include standards and accuracies that are acceptable for property surveys, the preparation of site plans, survey plats and subdivision plats, and the information to be indicated thereon. County specific standards are in addition to Ohio Administrative Code 4733-37 commonly known as “Minimum Standards for Boundary Surveys in the State of Ohio” and do not supersede any requirements set forth by the Ohio Administrative Code.

4.02 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 submitted through LCExpress to the County Engineer a minimum of two weeks in advance of Toledo-Lucas County Planning Commissions (TLCPC) 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 three weeks prior to the TLCPC deadline for final approval.

C. Surveys conducted for the purpose of designing or preparing plans and maps for improvements requiring approval by Lucas County shall be performed only by or under the direction of an Ohio Registered Professional Surveyor.

4.03 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,

(Cont.) Section 4.03 – Definitions

B. 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.

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

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

E. 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.

F. 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).

G. Subdivision: See Ohio Revised Code, Section 711.001.

H. Large Lot Subdivisions: See Lucas County Subdivisions Rules and Regulations for definition.

I. 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,

J. geologic, photogrammetric, environmental [remote sensing], soil surveying, etc.).

4.04 PROPERTY AND PLAN SURVEYING

A. All research, investigation, monumentation, measurement specifications, plats of survey, descriptions, and subdivision plats shall conform to the Standards for Boundary Surveys in the State of Ohio, Section 4733-37 (Ohio Administrative Code). 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 minimum one (1) inch diameter steel pipe shall be used as permanent markers. All pipe or iron pin markers shall have a minimum cross-sectional area of 0.21 square inches, shall be at least thirty (30) inches long and the bottom of such markers shall be set at least thirty inches below finished grade.

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. Any markers disturbed by construction or related activities are to be reset by a Professional Surveyor.

6. A signed affidavit shall be provided by the Surveyor of Record for Subdivision Plats, certifying that the monuments have been set.

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 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 Lucas County Conveyance Standards, current edition, Lucas County Subdivision Rules and Regulations, current edition, and these Standards.

4.05 PLAT AND FINAL AS-BUILT PLAN REQUIREMENTS

All final copies of required plats, plans and maps that are submitted for record shall comply with these Standards and any other applicable rules or regulations. At a minimum, the following items shall be included:

A. Conform to the LCEO CAD standards (see LCEO Design Resources).

(Cont.) Section 4.05 – Plat and Final As-Built Plan Requirements

B. 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 through LCExpress an updated as-built plan for Stormwater Management Facilities and signed plat to the County Engineer. As-built plans are required for the following:

1. All pavement and drainage improvements. As-builts will be prepared by the County Engineer for everything other than the stormwater management facilities. As-builts for private pavement subdivisions may be required when directed by the County Engineer.
2. All portions of Commercial, Industrial and Multi-family developments that contain storm water management facilities to be under maintenance by Lucas County. All drainage easements required for storm water facilities maintained by Lucas County shall be approved by the County Engineer and recorded prior to acceptance of the as-built plan.
3. All as-built submissions shall include a plan view (Basin Proof Survey) of all stormwater management 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.
4. This plan shall be submitted in accordance with the LCEO Electronic Plan Submittal Requirements and the Final Engineering and Construction Plan. An as-built title block should be placed in the lower right corner of each sheet.
    a. As-built plans and electronic files shall be submitted with the following information: as-built plan, storm water management calculations, traffic impact study, sight distance exhibits and basin proof survey. The

final as-built plans shall be submitted in AutoCAD and PDF format.

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 compliant with these Standards.

c. CAD Standards (For final record size documents)

i. LCEO CAD 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.

4.06 ENGINEERING AND TOPOGRAPHIC SURVEYING

A. Benchmark Standards

1. Definitions As used herein:

a. Site 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. Site benchmarks shall be provided for each plat or part of a development, or as directed by the County Engineer. At least one site 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 "site 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 "North American Vertical Datum 1988" (NAVD88) or the current North American Vertical Datum with a high level of certainty. Other established Datums may be approved for use by the County Engineer for specific projects.

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

2. Minimum Requirements

a. The elevation of each "site 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:

i. The location, description and elevation of the "site benchmark(s)" within the subject development area and the "source benchmark(s)", and

ii. The total expected error and its certainty (90% or greater) in vertical measurements between each "site benchmark" and its respective "source benchmark(s)" based on actual design or sound judgment. The maximum allowable misclosure for all level loops is defined by the following equation: 0.04 feet x $\sqrt{E}$ where E = Length of Loop in Miles (loop is defined as a series of setups closing on the starting point). Re-level all

iii. level loops whose misclosure exceeds this closure requirement.

iv. A variance to this requirement may be granted if no public road will be extended or widened.

B. Topographic Standards

1. The elevation of one hundred percent (100%) of all identifiable points shall be in error not more than one-half contour interval.

2. Paved Areas should be in error no more than ±0.07 feet.

3. Maintained Vegetated areas adjacent to the pavement should be in error no more than ±0.25 feet.

4. NOT Maintained Vegetated areas should be in error no more than ±0.50 feet.

5. Areas where vertical accuracy is not critical should be in error no more than ±1.00 feet.

6. Surveys shall be based on State Plan Coordinates. If the stationing is required for existing County or Township Roads, the surveyor shall request stationing information to be used from the County Engineer.

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 4.05 for additional "as-built" survey requirements.

SECTION 5 –
ROADWAY, BRIDGE AND PAVEMENT DESIGN

5.01 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.

5.02 STREET DESIGN

The ITE Manual, current edition, provides guidelines to determine the percentage of ADT based on AM and PM peak traffic counts. These guidelines shall be used to determine the ADT for all streets. Design standards for all streets shall be based on the requirements of this manual.

A. Arterial Streets

All arterial streets shall be designed using Lucas County Engineer and 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 Lucas County Major Street and Highway Plan, current edition. The County Engineer shall determine these standards after a complete review of the project. Approval of the Preliminary Engineering plan (See Section 3.02) or Site Plan (See Section 3.08) 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. ADT's typically range from 1,500 to 3,500 vehicles per day in residential areas.

C. Local Streets

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 plus 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, unless otherwise approved by the County Engineer. 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. The curb shall terminate at the end of the radius and taper to 0-inches in height at both curb ends. The minimum taper length is 10-feet.

Local streets have been subdivided into three main sub-classifications: Local/Collector, cul-de-sac, and loop-type streets.

1. Local/Collector standards: See Table 501 below.
2. Cul-de-sacs and loop-type standards: See Table 502 below.
3. Low Volume Residential Local Streets:
    a. A maximum ADT of 200 vehicles per day is permitted (20 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 Table 501 below for minimum pavement widths.
    d. Used on a modified cul-de-sac with no extensions to adjacent parcels of undeveloped lands.
    e. A minimum 60-foot right-of-way with required easements provided for drainage and utilities.

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 Lucas

County, except local and permanent dead-end streets, shall be expanded to comply with the Lucas County Access Management Regulations, current edition. The traffic count on any street being designed within Lucas 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 TMACOG 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. Commercial Vehicle Demand Factor

An ADT demand for street design will be determined by proposed development traffic based on ITE Trip Generation for proposed uses.

H. Design Speeds

The design speeds shown in the tables of these Standards shall be used unless the County Engineer approves a variance. The design speed for any existing County/Township Road shall be the posted speed plus 5 mph.

I. Right-of-way Widths

The minimum right-of-way widths for all public streets are shown in Tables 501 and 502 below. This minimum width shall be increased where and to the extent the County Engineer deems it necessary for topographical, construction and drainage features.

(Cont.) Section 5.02 – Street Design

J. 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. All tree removal and clearing activities shall comply with all current environmental requirements.

K. 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.

L. Horizontal Alignment

A minimum tangent length of two hundred (200) feet is required between reverse curves on all arterial and collector streets. A minimum tangent length of one hundred (100) feet is required on local, commercial and industrial streets. Minimum radii for horizontal curves are provided in Tables 501 and 502 below. 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.

M. Pavement Width

The pavement widths for each type of street and type of use are shown in Tables 501 and 502 below. 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 back to back of curb. Pavement widths for arterial streets shall be approved by the County Engineer.

(Cont.) Section 5.02 – Street Design

N. 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. Medians shall be designed per LCEO Standard Drawings (see LCEO Design Resources).

O. Shoulders
The minimum width of all graded shoulders shall be eight (8) feet. Shoulder width is measured from the edge of the traveled way to the point where the shoulder slope intersects the foreslope. When used, guardrail offset from the edge of traveled way shall comply with the ODOT L&D Manual, current edition.

A four-foot paved 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 shoulders.

P. Foreslopes and Backslopes
Foreslopes and backslopes shall be shown on the typical sections and shall conform to the requirements of the Clear Zone Grading in ODOT L&D, Volume One.

Q. Sidewalks, Side Paths, Bike Lanes, Trails, Pedestrian Crossings & Handicap Ramps:
Sidewalks and/or side paths are typically required as part of the Township Zoning, or in conjunction with The Toledo-Lucas Planning Commission recommendations. Sidewalks or side paths must be located a minimum of two (2) feet outside the point where the ditch backslope intersects the existing ground on uncurbed roadways. All sidewalk or side 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 501 and 502. For driveway location requirements with respect to curb ramps, see Section 7.

When sidewalks and/or side 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, side path, and/or handicap ramp adjacent to the curb shall comply with current Americans with Disabilities Act (ADA) requirements and detectable warnings shall be provided in accordance with Lucas County Engineer Standards. 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, side 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, side 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.

Bike Lanes, Trails, and Side Paths shall be designed in accordance with AASHTO Guide for the Development of Bicycle Facilities, current edition.

R. Curb Drops:

Pre-designed curb drops for curb ramps shall be included in the Intersection Details in the Final Construction Plans. Curb drops for driveways shall not be permitted in residential subdivisions.

S. 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.

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.

T. Variances

These Standards have been developed based on 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 Section 3.03(C) 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.

U. 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).

V. Underdrains

Underdrains shall outlet into structures for curb and gutter streets. The pipe material for Type F outlets must comply with the LCEO Standard Construction Drawing RP-1 (see LCEO Design Resources).

W. Profile Grade

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

X. Utility Locations

All utilities shall be located outside of the R/W, unless approved by the County Engineer. Please refer to Street Typical Sections in the LCEO Standard Construction Drawings (see LCEO Design Resources) for further information on utility locations.

Y. Curb and Gutter

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 and local streets using a curb and gutter section shall use a 6-inch thick gutter pan.

Z. Fire Hydrant

For all uncurbed streets the fire hydrant must be located typically 10-feet from the edge of pavement.

AA. Traffic Volume Projections on streets within a Subdivision

An internal traffic study to determine the ADT of subdivision streets is required for the streets within a subdivision where the "Residential Local ADT < 200" pavement composition as shown in Table 505 is proposed for use. If the developer proposes to use the pavement composition for "Residential Local ADT > 200 but < 1500" as shown in Table 505 for the entire subdivision the internal traffic study is not required.

(Cont.) Section 5.02 – Street Design

BB. Street Name Signs

LCEO will provide the developer a SignCAD PDF file with the required Street Name sign specifications. The developer shall purchase and install the street name signs to LCEO standards.

TABLE 501

LOCAL STREET DESIGN STANDARDS FOR ALL SUBDIVISION STREETS EXCEPT LOOP-TYPE & CUL-DE-SACS

Street Design Standards for Local and Collector		
	LOCAL STREET	COLLECTOR STREET
Right-of-Way (feet)	60	70***
Pavement Width	27*	31**
Minimum Stopping Sight Distance (feet)	200	200
Minimum Center Line Radius	105	350
Maximum Grade	5 %	5 %
Minimum Distance Between Reverse Horizontal Curves (feet)	100	200

* Back of mountable curb to back of mountable curb. Curbs 2 ½ ft. – pavement 22 ft.

** Curbs 2 ½ ft, - pavement 26 ft.

*** See Major Street & Highway Plan for specific right-of-way widths

TABLE 502

SUBDIVISION STREET DESIGN STANDARDS FOR CUL-DE-SACS & LOOP-TYPE STREETS

Right-of-way (feet)	60
Pavement Width (feet)	27 (loop street)* 33 (cul-de-sac)**
Min. Stopping Sight Distance (feet)	250
Maximum Grade	5 %
Maximum cul-de-sac length (feet)	1000
Min. cul-de-sac center island radius (ft)	20
Minimum cul-de-sac radius (pavement with island)	53 ft. to b/c
Minimum Cul-de-sac radius (pavement without island)	42.5 feet to b/c
Minimum Center Line Radius of Streets with an angle turn of: (1) between 80 and 100 (2) less than 80 or more than 100	 105 105
Minimum Design Speed	25 MPH ***
Sidewalk width (minimum)	4 feet
Sidewalk distance from back of curb	6 feet

* Back of curb to back of curb, Curbs 2 ½ ft. – pavement 22 feet for loop streets.

**Back of mountable curb to back of mountable curb, Curbs 2 ½ ft. – pavement 30 feet for cul-de-sacs.

*** Includes design of horizontal and vertical curves

5.03 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 (70) degrees. Current ADA requirements must be checked for all street intersections between 70 and 90 degrees to ensure 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.

(Cont.) Section 5.03 – Intersection Design

C. Offset Intersections

Intersection offsets shall comply with the requirements of Table 503. These requirements apply to each sub-classification 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-foot 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.

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.
2. 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.

3. Stopping Sight Distance (SSD): Stopping sight distance shall be in accordance with Table 501 or ODOT's Location and Design Manual, current edition.

4. Sight Distance Requirements: The controlling sight distance requirement shall in conformance with ODOT's Location and Design Manual, current edition. The classification of the intersecting streets shall be as determined by the County Engineer.

   In no case shall an intersection be designed to less than the minimum requirements.

F. Temporary and Permanent Turnaround

1. A temporary turnaround shall be required when the end of the road in question is greater than 250 feet from the nearest intersection, unless otherwise waived in writing by the Township Fire Department and Street Department. 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 LCEO Standard Drawing RP-4 in the LCEO Design Resources.

2. Where a temporary turnaround 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 turnaround is no longer needed for public use.

3. Permanent turnarounds will not be permitted without written approval by the County Engineer except for low-volume/low-density roads. All permanent turnarounds must be approved at the Preliminary Engineering Phase.

(Cont.) Section 5.03 – Intersection Design

G. 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 HL-93 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.

H. County Road 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.

All new street lighting installations should be installed with LED type fixtures.

Street lighting is required in all subdivisions in accordance with the County Subdivision Regulations. A street lighting assessment district shall be established through the Township Board of Trustees.

I. 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. The street name signs are to be installed prior to opening any street to traffic. If permanent signs are not available, temporary signs shall be installed. The standards for the street name signs shall be in accordance with the requirements of the LCEO Standard Construction Drawings (see LCEO Design Resources). All signing and traffic control items shall be in

accordance with the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) per section 4511.11 of the Ohio Revised Code.

All street name signs to be used shall be approved for use by the County Engineer and/or Township. Street signs shall be installed on square posts in accordance with LCEO Standard Drawing TR-4 (see LCEO Design Resources).

J. 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 Ohio Manual of Uniform Traffic Control Devices (OMUTCD), ODOT Traffic Engineering Manual and this Manual. These details shall be provided on separate detail or plan sheets in the Final Engineering and Construction Plan.

All striping shall comply with the above standards.

Speed limit signs shall be placed on all County and subdivision streets. Spacing of signs shall comply with the OMUTCD, 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 OMUTCD. “No parking” signs shall be provided, if required based on street width.

Driveway concrete island design details 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 ODOT Standard Construction Drawings and current ODOT Location and Design Manual. The County Engineer shall approve the final stop sign locations.

K. Overhead Lane Control Signs and Overhead Advance Street Name Signs

Lane Control (R3-5 Special) Signs when used overhead shall be

48" X 54". Overhead Advance Street Name Signs shall be per the OMUTCD and should be composed of initial upper-case letters at least 12 inches in height and lower-case letter at least 9 inches in height. Reference is made to LCE Standard Construction Drawings TR-6 & TR-7.

L. Object Markers for Ends of Roadways

Object markers used at the end of roadways and at the end of "T" type intersections shall be either OM4-1 or OM4-3 marker signs.

TABLE 503
INTERSECTION DESIGN GUIDELINES

Maximum Approach Speed (mph)	25
Clear Sight Distance (ft., length along each approach leg)	According to ODOT criteria
Minimum Angle of Intersection Streets	70° degrees - 90° preferred
Minimum Curb Radius (feet) a. local-local b. local-collector c. collector-collector d. collector- arterial	 25 35 35 45
Minimum Centerline Offset of adjacent intersection (feet) a. local-local b. local-collector c. collector-collector d. collector - arterial	 120 According to LCAMR (see LCEO Design Resources) According to LCAMR (see LCEO Design Resources) According to LCAMR (see LCEO Design Resources)
Minimum Tangent Length Approaching Intersection (each leg)	50 feet

5.04 PAVEMENT DESIGN PURPOSE

This section 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, 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 or construction and materials

specifications, the County Engineer shall make the final determination. Refer to Section 5.02 of these Standards for street classification definitions, construction and material specification clarifications, and additional design requirements.

A. 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 Lucas 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 ensure 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.

B. 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).

C. Material Coefficients

The following coefficients for various types of materials shall be used with current AASHTO design equations and the ODOT Pavement Design Manual for all streets.

ITEM	MATERIAL	Coefficient
Items 441, 442	AC Surface Courses	0.43
Items 441, 442	AC Intermediate Courses	0.43
Items 301, 302	AC Base Course	0.36
Item 304	Aggregate Base	0.14

(Cont.) Section 5.04 – Pavement Design Purpose

D. 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 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 3.40.

All paving operations shall follow ODOT CMS temperature requirements and paving of the surface course shall be completed prior to November 15th.

The values provided in the Table 504, Lucas County Residential Pavement Design Criteria, are based on the ODOT Pavement Design & Rehabilitation Manual, current edition. If there is a discrepancy between the Lucas County Residential Pavement Design Criteria Table and the ODOT Pavement Design & Rehabilitation Manual, the higher standard shall apply.

TABLE 504
Lucas County Residential Pavement Design Criteria

LUCAS COUNTY RESIDENTIAL PAVEMENT DESIGN CRITERIA				
Design formula symbol	Description	Local Streets <=200 ADT	Local Streets >200 to <=1500 ADT	Minor Urban Collector Streets
	Design Life	30 years		
	Percent of Trucks/ESAL's Per Lane Per day	6 ESAL's	5%	5%
Z_R	Standard normal deviate	85 % Reliability Factor = (-1.037)		
S_O	Standard error	0.44		0.44
Δ□PSI	Difference in serviceability index	2.2		1.95
p_t	Design terminal serviceability index	2		2.25
Mr	Resilient Modulus	2700		2700
CBR		2.9		

The County Engineer requires the pavement compositions shown in Table 505 for use in Lucas County based on street classifications without further investigation of soil support value. 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.

TABLE 505
Lucas County Streets Minimum Pavement Composition

Street Classification	Flexible Pavement Composition
Residential Local ADT ≤ 200	1 ½ inches of 441 Surface Course on 2 ½ inches of 441 Intermediate Course on 12 inches of 304 SN = 3.40 (Minimum Residential Pavement Section)
Residential Local ADT > 200 but ≤ 1500	1 ¼ inches of 441 Surface Course on 1 ¾ inches of 441 Intermediate Course on 4 inches of 301 on 8 inches of 304 SN = 3.85
Minor Urban Collector ADT >1500 but ≤ 3500	1 ¼ inches of 441 Surface Course on 1 ¾ inches of 441 Intermediate Course on 5 inches of 301 on 8 inches of 304 SN = 4.21
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. *Absolute Minimum Pavement thickness shall be 1 ¼ inches of 441 Surface Course, on 1 ¾ Intermediate Course, on 4 inches of 301, on 8 inches of 304 with a SN=3.85*

Notes:

1) A tack coat (Item 407) (0.055 gallons per square yard) between Item 301/302 and Item 441 Intermediate Course shall be included with the plans.

2) Minimum asphalt concrete thickness for any flexible pavement with aggregate base shall be four (4") on all Local Streets, five (5") on all Major and Minor Collector Streets with ADT's > 3500, and all Arterial Streets.

3) Item 441 Asphalt concrete surface course shall be not less than 1.25 inches nor more than 1.50 inches in thickness per ODOT Pavement Design Manual.

4) Recalculation of pavement sections will require the upper limit of ADT range in the street classification. Pavement structural numbers can only be reduced with improved soil support value as of a result of site investigation and/or subgrade improvement.

(Cont.) Section 5.04 – Pavement Design Purpose

E. Roundabout Pavement Design

The following designs shall be used for roundabouts on Lucas County maintained roadways.

1. Standard Roundabout Design for roads less than 1500 trucks in the opening day.

   a. 1.25" Item 441 - Asphalt Concrete Surface Course, Type 1, (449), PG 64-22
   b. 1.75” Item 441 – Asphalt Concrete Intermediate Course, Type 2 (449)
   c. 5.0" Item 301 - Asphalt Concrete Base, (449)
   d. 6.0" Item 304 - Aggregate Base

   Resulting Structural Number (SN) = 3.93

2. Modified Roundabout Design for roads less than 1500 trucks in the opening day if a higher structural number is warranted.

   a. 1.25" Item 441 - Asphalt Concrete Surface Course, Type 1, (449), PG 64-22
   b. 1.75” Item 441 – Asphalt Concrete Intermediate Course, Type 2 (449)
   c. 6.0" Item 301 - Asphalt Concrete Base, (449)
   d. 6.0" Item 304 - Aggregate Base

   Resulting Structural Number (SN) = 4.29

3. High Truck Volume Roundabout Design “Superpave” for roads with more than 1500 trucks in the opening day.

   a. 1.5" Item 442 - Asphalt Concrete Surface Course, 12.5 MM, Type A (449)
   b. 2.5” Item 442 – Asphalt Concrete Intermediate Course, 19 MM, Type A (449)
   c. 5.0" Item 301 - Asphalt Concrete Base, (449)
   d. 6.0" Item 304 - Aggregate Base

   Resulting Structural Number (SN) = 4.36

   Note: The minimum intermediate course thickness for Superpave per ODOT PDM is 2.25”, but we add the additional 0.25” thickness for conservative design.

F. Use of Geogrids and Fabrics

The Owner is allowed to utilize geogrids or fabrics in the pavement design provided the benefit calculations and assumptions are approved by the LCEO. The manufacturer and type of geogrid or fabric shall be indicated in the pavement design submittal. All geogrids and fabrics shall meet ODOT Item 204 and be approved by the Lucas County Engineer.

An approved combination of geogrid and fabric should be used in the construction of pavements for side paths, multi-use paths, and bike trails.

G. 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:

1. Soil samples at subgrade elevation and depth by boring.
2. Moisture determination and maximum dry weight of soil.
3. AASHTO classification and group index for each sample.
    a. Liquid limit
    b. Plastic limit
    c. Plasticity index
4. Mechanical analysis of the subgrade soil.
5. 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).

SECTION 6 –
DRAINAGE DESIGN

6.01 PURPOSE

These design standards and 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 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.

6.02 STORMWATER MANAGEMENT AND DRAINAGE REPORT

A stormwater management and drainage report addressing the following subjects, if applicable to the development, shall be submitted:

A. Report Summary and Narrative Statement outlining the proposed work and facilities. The Narrative Statement shall describe the site, method of calculations used, allowable release rates, computed release rates, design storm inflow and outflow, identification of any Jurisdictional Streams, and FHWA Flood Hazard Zones on or nearby the project site. The statement shall clarify the intent of the design into a cohesive and coherent stormwater management system for LCEO review.

B. Table of Contents

C. Pre and Post Tributary Maps(Including past/future development)

D. Storm Sewer Tributary Maps

E. Detention Calculations

F. Culvert Calculations

G. Storm Sewer Calculations

H. Spread and Depth Calculations

I. Post Construction Water Quality Calculations

J. Sediment Basin/Trap, Silt Fence Water Quality Calculations

K. Ditch Capacity Calculations

(Cont.) Section 6.02 Stormwater Management and Drainage Report

The submittal shall be neatly prepared, organized, and submitted in a report format for review by the LCEO. The report shall include the designer and/or reviewer name(s) and contact information. The report should contain the seal, signature, and date of the professional engineer responsible for the calculations in accordance with Section 4733.14 of the Ohio Revised Code.

It is the responsibility of the submitter to provide all materials and evidence, including but not limited to, proposed site plans and details, drainage maps, existing connecting drainage facility information, BMP manufacturers information, investigative review agency correspondence, listing of design assumptions, drainage calculation backup materials, computer model program output, etc. that supports the design under review and its inclusion or lack thereof due to threshold requirements. Appropriate annotation of exhibits shall be included, as necessary, to aid in the review.

6.03 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 County Engineer will determine the adequacy of the drainage outlet. The County Engineer will provide the Owner the hydraulic grade line (HGL), allowable peak discharge, and any other capacity constraints. The County Engineer reserves the right to require the outlet(s) to be cleaned, reconstructed and/or replaced as deemed necessary. All information and calculations provided by the County Engineer shall be included in the final Drainage Report as an appendix or attachment.

If a ditch, stream, etc. is desired as an outlet, the County Engineer shall require cross sections and flow line elevations for the stream, ditch, etc. to be taken a minimum of 500 feet downstream of the anticipated outlet point to ensure adequate fall/slope is available. This data shall be submitted to the County Engineer prior to the determination of the HGL, allowable discharge, and any other constraints. Minimum channel slopes shall match

clean out grades as established by the County Engineer for studied ditches or 0.20% with a minimum five (5) year storm velocity of 2.0 fps is required.

The outlet pipe flowline shall be placed a minimum six (6) inches above the normal water elevation of the ditch or stream.

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 outlet pipe flowline should be placed a minimum 6 inches above the invert of the receiving pipe. The County Engineer shall be contacted a minimum of two business days prior to any of this work being done. A copy of the video for the drainage outlet shall be submitted to the County Engineer with the Preliminary Engineering Plan Submittal.

An adequate outlet is defined as an outlet functioning as designed (e.g. able to convey the 5-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.

Failure to meet any of the requirements mentioned above shall be cause for disapproval of the plan.

6.04 DRAINAGE EASEMENT

A. An adequate easement, given to the Board of Lucas County Commissioners, shall be required along any subsurface drainage tile, detention/retention basin, drainage way, ditch, water course, 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. Drainage easements shall be provided for all areas where offsite water passes across or through a parcel.

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 subdivision plat and the Final Engineering and Construction Plan for subdivisions and private developments. The drainage easements shall be recorded for public use, in the name of the Board of Lucas County Commissioners, 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 Petition Program, see LCEO Design Resources). 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.

D. Easements for storm sewers shall be a minimum of twenty-five (25) feet and a minimum of twenty (20) feet for easements involving swales. A minimum of twelve and a half (12.5) feet will be required from the centerline of a pipe. Easement for retention/detention ponds shall extend a minimum of twenty-five (25) feet from top of bank. Ponds shall be located on site so as to afford the ability to provide the twenty-five (25) foot easement from

adjacent parcel boundaries. All easements shall be clear of obstructions that would prohibit equipment from performing maintenance on the facility.

E. 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 twenty-five (25) feet. Final easement widths are subject to the approval of the County Engineer.

6.05 GENERAL DESIGN CRITERIA

A. Acceptable Methods of Calculation

The methods of calculation as listed in Table 601 below shall be used unless otherwise approved in writing by the County Engineer. We recommend the use of freeware software, however, proprietary software can be used with the understanding that review times may be longer to review and run the project specific model files. The burden is therefore on the designer to provide clear reporting and adequate model output to demonstrate compliance with the Standards.

TABLE 601
ACCEPTABLE METHODS OF CALCULATION

STORM WATER QUANTITY		
DRAINAGE AREA (acres)	**PEAK DISCHARGE AND TOTAL RUNOFF**	**STORAGE VOLUME**
Less Than 200	Rational Method	Tabular (See LCEO Design Resources for Sample Calc)
200 to 640	TR-55	Tabular (Flood Routing Method)
Greater Than 640	watershed modeling software	watershed modeling software

METHOD REFERENCES:

Peak Discharge and Tabular Hydrograph: U.S. Department of Agriculture, National Resources Conservation Services (NRCS), Urban Hydrology for Small Watersheds, Technical Release No. 55, current edition.

Preferred modeling software includes HEC-HMS, SWMM, WinTR-55 and Civil 3D Storm and Sanitary Analysis (SSA). HydroCAD for detention/retention.

B. Design Storms

Appropriate standard rainfall intensity and runoff charts are to be used. ODOT L&D Volume 2, Figures 1101-2, and associated notes may be used (see LCEO Design Resources).

Rational Method C values required by the Lucas County Engineer's Office are shown in the LCEO Design Resources.

Runoff Numbers and CN Factors: In undeveloped areas, a runoff number of CN=77 shall be used as a maximum for onsite pre-development. In other cases, the appropriate "CN" factor may be determined by using Technical Release No. 55 [National Resources Conservation Services (NRCS)] current edition, and its Ohio Supplement, current edition. The post developed runoff number cannot exceed 79 for low density developments. Detention/Retention ponds shall use a CN of 98. CN values used for all conservation subdivisions shall be approved by the County Engineer at the Preliminary Engineering Plan phase.

C. Existing 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.

1. Field Investigation
2. Lucas County topographic maps generated by the Lucas County Engineer's GIS system
3. Lucas County/Township Historical Drainage Maps
4. Contour Map: U.S. Geological Survey quadrangle (7.5 minute series) maps or other topographic contour map

Watershed area(s) are subject to the approval of the County Engineer. Existing watershed boundaries shall be maintained along the perimeter of any development sites. 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 Section 3.03(F) 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. More complex sites with multiple ponds may require a more detailed table. The USGS StreamStats website: http://water.usgs.gov/osw/streamstats/ohio.html may be used to verify items 1-4 above as a preliminary aid in determining watershed characteristics for the site.

6.06 DESIGN SPECIFICATIONS

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

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. All storm sewer systems are to be designed using the Manning's Equation.

   Storm sewer tributary maps shall be included in the storm water management report.
4. Material: The storm sewer material used in the public right of way or for infrastructure that will be turned over to a public

agency shall meet the requirements of ODOT Item 611 except as modified in these standards. Allowable pipe materials shall be per Table 602. All pipe shall be designed, inspected and videotaped, as required, in accordance with ODOT Item 611.

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, when there is adequate change in elevation to do so.

6. Offsite Tributary Areas: A storm sewer structure shall be located no less than ten (10) feet from the property line for all offsite tributary areas with drainage areas of one (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.

8. Sewer Pipe Location: Within the zone of influence, as detailed on LCEO Standard Construction Drawing RP-10 (see LCEO Design Resources), sewer pipes shall not be allowed to be located parallel with the curb and gutter. The County Engineer will determine if the proposed storm sewer locations will cause potential maintenance issues in the future.

   Access to main line storm sewer shall be provided through the use of manholes located to keep the storm sewer offset and outside the zone of influence of the roadway. Catch basins are not to be located on the main line storm sewer, on curbed or urban pavement typical sections, but are allowed on rural typical sections.

   Mainline storm sewers shall not be placed in rear yards without the approval of the LCEO.

TABLE 602

PIPE MATERIAL SPECIFICATIONS FOR STORM SEWER APPLICATIONS (SEE NOTES 1 & 2)			
PIPE	**MATERIAL**	**Not Under Pavement** Minimum Height of Cover from Finished Grade to Top of Pipe (See Note 3)	**Under Pavement** Minimum Height of Cover under Pavement (See Note 4)
TYPE B OR C: Less Than or Equal to 18 Inch	Concrete 706.02 W/706.11	12”	9”
	Polyvinyl Chloride (PVC) 707.42, 707.43, 707.45(15” and Under) ASTM F679 (18” Diameter)	18”	12”
	Polyethylene 707.33, 707.65, W/ O-Ring Gaskets Meeting ASTM F477	18”	12”
TYPE C OR TYPE B (not placed under mainline pavement) - (see note 5): 21 Inch or 24 Inch	Concrete 706.02 W/706.11	12”	9”
	Polyvinyl Chloride (PVC) 707.42,707.43, ASTM F679	18”	N/A
	Polyethylene/ Polypropelene 707.33, 707.65, W/ O-Ring Gaskets Meeting ASTM F477	18”	N/A
TYPE B (under mainline pavement): 21 in or 24 in **TYPE B or C 27 In or greater**	Concrete 706.02 W/706.11	12”	9”

NOTES FOR TABLE 602

1. Types B and C as defined in ODOT Construction and Materials Specifications (CMS) are shown. Use of Types A, D, E and F as defined in ODOT CMS may be required at the discretion of the County Engineer

2. Maximum Depth of Cover shall be determined for pipe depths greater than fifteen (15) feet.

3. Within Right-of-Way and/or easements

4. The minimum height of cover is measured from the top of the pipe or pipe-arch to the top of the subgrade. See ODOT Location and Design Manual, Volume 2, Current Edition.

5. Not located under mainline pavement, including shoulder and berm or within the area of influence of adjacent pavement.

(Cont.) Section 6.06 Design Specifications (Storm Sewers)

9. Pipe Separation: The main storm sewer pipe, if greater than or equal to 24-inches shall be required to be separated from all inlets.

10. Minimum Design Storm Frequency (Storm Sewers):
    a. For All Local Streets and Minor Urban Collector Streets:

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

       Five-year storm (flowing full) – Pipe/Open Channel Section

    b. 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 ditches are used to convey storm flow, see the ODOT L&D Volume 2.

11. Hydraulic Gradient: Based on a ten-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 0.5 feet above the top of grate. Grade line shall be based on the tailwater or eight-tenths (0.8) of the pipe diameter at the outlet or other critical points (such as the high water elevation in a receiving water quality basin), whichever is greater, within the system.

(Cont.) Section 6.06 Design Specifications (Storm Sewers)

12. Design Flow: For methods of calculation for storm sewer sizing refer to the Table 601.

    Streets: Minimum time of concentration to first structure:
    Curb Inlet -- - - - - - - - - - - - 20 minutes
    Ditch Catch Basin- - - - - - - 20 minutes

    Use the method in ODOT L&D Volume 2, Section 1101.2, to calculate time of concentrations from the remote point in drainage area to point of concentration. If time of concentration used is greater than twenty (20) minutes it shall be approved by the County Engineer.

13. Minimum Diameter of Storm Sewer Pipe: Twelve (12) inches for all storm sewer pipes within public right-of-way and all drainage easements.

14. 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 concrete is 0.012. A pipe roughness coefficient of n= 0.010 may be used for thermoplastic pipe. 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.

15. Minimum cover to Subgrade:
    Rigid Pipe - (Measured from the top of pipe to bottom of subgrade) – Nine (9) inches or per manufacturer’s requirements.

Thermoplastic Pipe (See Table 602) - The cover over each crossing shall be shown in the cross sections.

A preliminary profile of all storm sewers crossings under the right-of-way is highly recommended at the Preliminary Engineering Plan submittal for (See Section 3.03 (E) (7)) to ensure adequate cover is provided. It is the County Engineer's intent to provide no less than the minimum cover. If the site conditions, e.g. flat terrain, shallow depth outlet, etc. require a cover depth less than the minimum, a variance can be requested. The variance shall be requested as part of the Preliminary Engineering Plan submission.

16. Maximum Cover: The support strength of the conduit as installed must be in accordance with the current ODOT requirements.

17. Minimum Velocity for Design Flow: Three (3) fps at full flow or at the flow depth when designed to flow partially full.

18. Maximum length of pipe between structures: Three-hundred fifty (350) feet.

19. Runoff coefficients for solar fields (and other similar disconnected hard surface construction) shall be determined using the Coefficient Method for Unconnected Impervious Areas as found in Chapter 9 of the NRCS Part 630 National Engineering Handbook.

B. 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. See Table 602 for Pipe Material Specifications for Storm Sewer and Culvert Applications. Culverts shall be Type A per ODOT 611.02, except 707.01 to 707.25 are not permitted. All culverts shall be concrete per ODOT CMS 706.02.

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. Culvert sizes for precast three-sided and four-sided structures shall be limited to those provided in the ODOT L&D Manual, Volume 2, current edition. The design (e.g., foundation and footing design, allowable live load, cover limitations, wingwall design etc.) of all precast three-sided and four-sided structures shall comply with the ODOT L&D Manual, current edition (Section 1008).

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 (if located in a FEMA study area) shall be shown on the plan for each culvert.

5. Inlet Elevation: The flowline elevation at the culvert inlet shall 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). For structures that encounter a rock or unyielding foundation, additional excavation and granular material shall be provided at the direction of the County Engineer.

6. Design Storm Frequency (Roadway Culverts):The minimum storm frequency to be used shall be as follows:

    1. Local Streets - Ten (10) year
    2. Minor Urban Collector Streets - Twenty-five (25) year
    3. Minor Rural Collector, Major Collector, and Minor and Major Arterial Streets – See ODOT L&D Manual, Current Edition

7. Design Flow: For method of calculation, please refer to the ODOT L&D Manual, current edition.

8. Minimum Cover to Subgrade: A preliminary profile of all culvert crossings under the proposed R/W is required at the Preliminary Engineering Plan submittal to ensure that adequate cover is provided. It is the County Engineer's intent to provide no less than the minimum cover. If the site conditions, e.g. flat terrain, shallow depth outlet, etc. require a cover depth less than the minimum, a variance can be requested. The variance shall be requested as part of the Preliminary Engineering Plan submission.

9. Minimum Diameter of Roadway Culvert Pipe: Twelve (12) inches.

10. Plan Sheets: Culvert plan and profile sheets shall be required for all pipe culverts with spans greater than thirty-six (36) inches, as well as all three-sided and four-sided box structures. The plan format shall comply with current ODOT L&D Manual, current edition.

(Cont.) Section 6.06 Design Specifications (Roadway Culverts)

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 inch = 50 feet, 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) shall be shown on this plan. Culvert headwater pools (ponding limits) shall be shown on the Site Grading Plan (See Section 3). The maximum allowable headwater elevations shall comply with the ODOT L&D Manual current edition. The finished floor elevations of all impacted structures upstream of the culvert must be shown on the plan.

    100-year headwater elevations for all culvert crossings will require easements based on an elevation of 1.0 foot above the 100-year elevation.

    The hydraulic calculations for all roadway culverts shall comply with the ODOT L&D Manual, current edition.

12. Design Coefficients for Roadway Culverts: See Table 603. This table applied for culvert crossings only and is not applicable for storm sewers.

TABLE 603

DESIGN COEFFICIENTS FOR ROADWAY CULVERTS

TYPE OF STRUCTURE	MANNING'S ROUGHNESS COEFFICIENT (n)	LOSS ENTRANCE COEFFICIENT (Ke)
CONCRETE PIPE	0.012	0.2
BOX CULVERT	0.012	0.2 to 0.5
FLAT TOP & THREE- SIDED ARCH CULVERTS	0.03 to 0.05	0.2 to 0.5

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.

2. Drainage (Maintenance) Easements: Access to open watercourses (e.g., drainage ditches, channels, streams, etc.) shall be by means of drainage (maintenance) easements. These easement widths shall be not less than twenty-five (25) feet in width on each side (bank). This distance is measured horizontally from the top of the bank, exclusive of the width of the ditch, channel, etc. Maintenance easements are to be kept free of obstructions. Final determination of the easement width is subject to approval by the County Engineer.

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 following information shall be included in the Final Engineering and Construction Plan for all open watercourses:

a. Complete hydraulic computations shall be submitted to the County Engineer for review and approval and if required, a low flow analysis.

b. Adequate erosion protection is required to prevent erosion at times of peak flow. The type of erosion protection shall comply with the requirements of ODOT, L&D, Vol. 2, Section 1102.3.2. Riprap, matting, willow stake, or approved equal shall be used.

c. All open watercourses shall be placed on the County's Drainage Maintenance Program. This is done through a ditch petition process as set forth in the Ohio Revised Code. A copy of the procedure is in the LCEO Design Resources.

4. Design Criteria:

a. Minimum Design Storm Frequency (new channels/open watercourses):
Ten (10) year (bank-full)

b. Design Flow:
Use ODOT L&D Vol. 2, Current Edition

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 up to and including the 100-year channel velocities must be submitted to the County Engineer for review and approval. Channel protection must be provided in accordance with the requirements of ODOT, L&D, Vol. 2, Section 1102.3.2.

d. Minimum Slope:
For New Channels: 0.40% (Desirable); 0.20% (Minimum) with a minimum velocity of 2 fps for the

Design Year Storm. At the discretion of the County Engineer a modified channel section may be required for any channel with a slope less than 0.4%

e. Side Slopes: 4:1 preferred for new watercourses and 3:1 minimum.

f. Depth: Minimum depth shall be two (2) feet. If adjacent to a roadway, the minimum depth shall be measured from the edge of pavement or shall be one (1) foot minimum from the top of slope.

D. Subsurface Drainage Tile

All existing subsurface tile shall be accounted for in the design of the storm sewer system.

Locations of existing drainage maintenance tile systems within Lucas County may be available at the County Engineer's Office or at the Soil and Water Conservation District. This existing tile system(s) shall not be connected into the proposed storm water management system unless approved by the County Engineer.

E. Curb Inlets

1. Maximum width of spread of flow:

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

2. Inlet spacing shall be governed by the LCEO Spread and Depth Criteria..

3. The spread of flow calculations must include bypass flow from the previous inlet(s), if applicable. Current ODOT

4. 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.

5. Curb inlet spread and depth calculations shall be included in the storm water and drainage management report. Curb inlets shall be located at or near the lowest point of a sag. The County Engineer's standard spreadsheet method for Type F Curb Spread & Depth check found in LCEO Design Resources shall be used for all Type F curb use.

F. Driveway Pipes: See Section 7 of these Standards.

G. Stormwater Management 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.

All stormwater management facilities with post construction Best Management Practices (BMP's) shall be placed under the County Drainage Maintenance Petition Program to assure future maintenance. The Owner, through the use of a form prepared and provided by the County Engineer, 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 final engineering plan. An outline of the procedure for this petition process is contained in the LCEO Design Resources.

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.

The LCEO Standard Construction Drawings outlining the requirements for detention and retention basins are located in the LCEO Design Resources.

Use of existing streams as Storm Water Management facilities is not permitted.

For sites with multiple lots, such as a large commercial site (e.g., larger commercial lots with smaller outparcel lots), a mixed-use site (e.g., a combination of commercial, office, multi-family), etc. the use of centralized basins are encouraged. In general, basins will be required for each watershed within the development. Centralized basins are required for sites which will be publicly maintained through the drainage maintenance petition process. The allowable peak discharges for the post-development 25-year storm, pre-development 5-year storm or any other allowable peak storm discharges required by the County Engineer shall be provided for each lot or outparcel on the approved site grading plan. The design engineer is required to contact the County Engineer prior to preparing the final Storm Water Management Report to discuss the detention requirements for the site.

2. Miscellaneous - Additional requirements for all proposed and existing Storm Water Management (Retention and Detention) Facilities are as follows:

   a. Anti-seep collars are required for all pond outlets. A minimum of two collars are required. See Detention/Retention Pond Standard Drawings in the LCEO Design Resources for the anti-seep collars details. Alternatively, the outlet pipe may be backfilled with impervious clay for a minimum of twenty (20) feet in length.

   b. Metering for pond outlets should be by use of a pipe sized to constrain the pond outflow to the allowable release rate for the site. Outlet pipe slope shall be a

maximum of four (4) percent. The minimum meter line pipe size shall be four (4) inches in diameter. The design of the meter line shall use an n=0.012 for smooth wall pipe and n=0.024 for interior wall corrugated pipe. Corrugated pipe shall be plastic and in accordance with ODOT 707.32. Weirs or orifices used for pond outlet volume metering shall not be used except on a case by case basis should site conditions prohibit the use of a pipe for metering.

c. Maximum Embankment slope is 4:1 in the vicinity of the outlet structure for maintenance purposes.

d. Trees and landscaping shall not be permitted on embankment surfaces.

e. Requirements for Pre- and Post- Development Storm Water Tributary Maps. Refer to Section 3.03 F for additional requirements.

f. Storage basins used for storm water detention or water quality shall not be located in a FEMA regulated floodplain or floodway.

g. Outlet structure windows shall be designed to pass the required allowable outflow from the basin to supply the meter line.

3. Design Criteria:

a. Acceptable Methods of Calculation: See Table 601.

b. Release Rates: Calculations shall be provided for each surface and subsurface drainage structure for the pre and post-developed condition.

c. Low Density Residential only - The peak rate of runoff under post-development conditions shall not be greater than the peak runoff rate from an equivalent size storm under pre-development conditions over the entire

development area. Consideration of the one (1), two (2), five (5), ten (10), twenty-five (25), fifty (50), and one- hundred (100) year frequency, twenty-four (24) hour storms shall be considered adequate in designing and developing to meet this standard. Follow Critical Storm Method, per Appendix 11 of the Rainwater and Land Development Manual, current edition.

In general, single lot residential development that drains via vegetated surfaces and swales to the public Right-of-Way and does not directly connect to a public storm sewer, will not require detention. However, a direct connection to the storm sewer will require analysis of the capacity of the public sewer and its ability to carry the proposed additional flow. This analysis may result in required on-site detention and water quality treatment.

d. Medium and High Density Residential and All Commercial, Multi-Family and Industrial - The post-development twenty-five (25) year frequency peak rate of runoff shall not be greater than that of the pre-development five (5) year frequency, peak rate of runoff over the entire development area. Calculations for other storm frequencies (e.g., one, two, ten, etc.) for the pre-development and post-development conditions shall be required at the discretion of the County Engineer. The determination of the allowable release rate must be based on the density of each specific section, phase or part of the project, even if section, phase or part lines are added after approval of the Final Engineering and Construction Plan has been made. Using an overall density calculation for the entire subdivision/project to determine the allowable release rate will not be permitted when the project is built in phases.

Required storage volumes shall be calculated by the

procedures corresponding to the acceptable methods of calculations specified in Table 601. The design criteria for the OEPA Construction General Permit may be more restrictive than the requirements in this section.

e. Time of Concentration: Times of Concentration for Residential, Multi-Family, Commercial, and Industrial Developments, Road Widening Projects and Mixed Developments for sizing stormwater management facilities shall be provided as follows:

Times of Concentration shall be calculated by the procedures corresponding to the acceptable methods of calculations specified in Table 601 with the exception that the maximum sheet flow length used shall not be greater than three-hundred (300) feet.

f. Storage Volume & Outlets: The required storage volume of the pond shall at a minimum be set above the 10-year Hydraulic Grade Line (HGL) of the receiving stream or pipe. The downstream 10-year HGL elevation (or other critical higher elevations) shall be utilized in design of the meter line or other outlet constriction for determination of the detention pond high water elevation. The outlet end of the meter line from the pond shall be set above the normal water elevation of the receiving stream or ditch, or no less than six (6) inches above the invert of the receiving pipe.

g. Detention Pond Storm Sewer Outlets: Submerged storm sewer outlets into a pond will only be permitted at the discretion of the County Engineer. The use of submerged storm sewer outlets into a pond will not be permitted for aesthetic purposes. Where submerged storm sewer outlets are permitted, an outlet structure (headwall) shall be provided and extend one-foot

above the 100-year storm elevation or the spillway overflow elevation, whichever controls.

h. Landlocked Storage: In any case were a proposed basin is landlocked and constrained by private lots without direct and proximate access to the receiving ditch/stream or conduit, or the pond outlet employs a check valve to prevent downstream high-water levels from backflowing into the proposed basin, accommodations shall be made in the design of the basin to provide either an emergency outlet to prevent high pond elevations or a sufficient pond sizing to contain that volume without flooding the constraining properties. Such accommodations should be designed for a 100-year storm flow. A drainage easement (granted to the Board of County Commissioners) shall be provided for the emergency outflow path from the basin to the receiving ditch/stream or conduit, if employed.

4. Design Specifications

a. The surface of a detention area and basin volumes shall be constructed with sufficient slopes and/or subsurface drainage (minimum of 2% on grassed surfaces without subsurface drainage) to drain properly so that all the runoff is removed following a storm. The basin shall be detailed per the current LCEO Standard Construction Drawings (see LCEO Design Resources).

b. Allowable Outflow Requirements for Commercial, Industrial, or Institutional Sites: The following guidelines (shown in Table 604 below) shall be used in the determination of the development of predevelopment runoff coefficients and allowable outflows for Commercial/Industrial/Institutional sites in order to design and develop stormwater detention facilities. The Engineer's Office will determine under which

development scenario the proposed site development falls. In all cases, the area used for allowable outflow determination shall be based on the smaller of that which either currently flows or is proposed to flow to the proposed identified outlet. Time of concentration shall be calculated for the site using the methods required elsewhere in the LCEO manual with a minimum time of twenty (20) minutes as a threshold level. Rainfall intensities shall be determined using the methods required elsewhere in the LCEO manual. Runoff coefficients (C) shall be those found in the LCEO Design Resources Runoff Coefficients for Rational Method.

When the soil has two hydrologic groups, the sandier soil grouping shall be used for determining the existing runoff coefficient. Example: B/D Hydrologic group for Open Space, Good Condition, "C" = 0.16

c. A ditch of adequate size and slope (See Section 6.06 (C) through the detention basin shall be constructed from the inlet pipe to the outlet structure. The maximum depth of the ditch shall be limited to three (3) feet. If perforated pipes are used, the need for a ditch will be determined by the County Engineer.

d. Seeding and other erosion control methods shall be used to protect all slopes. All basin slopes shall be covered with ODOT Item 671-Erosion Control Mat, Type B. The remainder of the basin shall be seeded and stabilized per ODOT Item 659. Dry extended detention basins should be seeded with a special Wetland Seeding Mix that can tolerate frequent inundation as well as long term dry periods in accordance with the requirements of the Engineer.

TABLE 604
DETENTION & ALLOWABLE OUTFLOW REQUIREMENTS

Development Scenario	Development Description	Required Predevelopment C Values and Detention Requirements
New Development	Development on empty, vacant, natural land	C = Current, existing, good condition cover type for corresponding site soils
Redevelopment	A site that is currently developed, but being modified to provide for either an upgraded similar use, or completely new use. Existing structures being demolished.	C = Open space category, good condition cover type for corresponding site soils (See Note 1 below)
Expansion with Existing Detention (Expansion area not originally accounted for in Existing Detention design)	Expanding on-site or with added land. Providing a new pond for only expansion area.	C = Current, existing condition for expansion area on empty, vacant land C = Open space if expansion area is deemed to fit Redevelopment category
	Retrofitting existing pond to handle expansion area.	C = Weighted value using new or redeveloped rules for expansion area + original undeveloped condition for the existing site area.
Expansion without Existing Detention	Expansion on existing property or with additional acquired or secured land	C = Shall be determined by County Engineer based on site conditions to include: size of the expansion, amount of land acquired for expansion (if any), existing storm sewer capacity, amount of other (re)development on existing site being proposed, soil type, OEPA concerns regarding WQv, vacant area available for remedial storage. Other factors will be considered as necessary.

(Cont.) Section 6.06 Design Specifications (Stormwater Management Facilities)

Upgrade/Improvement without Existing Detention	Minor construction with no net impervious surface added (e.g., small building expansions over existing hard surfaces, minor reconfiguration of parking, etc.)	No detention required. (See note 2 below)
Part of Larger Development	Development of parcels within a larger development (e.g., within an existing platted office park)	If one exists, conform to the assigned lot allowable outflow for the larger development, otherwise treat as New Development.
Any Scenario	Drainage outfall constrained	Allowable outflow limited by LCEO determination through assigned and/or apportioned watershed areas.

Note 1 – Redevelopment within the original plan of a larger development shall maintain the original plan design requirements.
Note 2 - In any case where Ohio EPA Stormwater Quality regulations require the addition of post-construction BMP's to meet requirements of the General Permit for Stormwater Discharges, stormwater detention shall be required under the Redevelopment category guidelines.

e. The side slopes for a basin shall be as follows:

i. For a detention facility slopes shall be no steeper than 4:1, and

ii. For a retention facility, the slopes shall be 4:1. The minimum depth of the normal pool water level to the bottom of the side slope shall be two (2) feet. A safety bench is required for retention facilities. The bench shall be detailed per the current LCEO Standard Construction Drawings (see LCEO Design Resources).

iii. In lieu of safety bench specified above for retention basins, a six (6) foot high fence of either chain link or vertical vinyl or aluminum slats to prevent access by children shall be provided. Split rail fences will not be permitted. The fence shall allow access via suitable sized gates for maintenance equipment and shall be set back from the top of bank to allow enclosing the twenty-five (25) foot required drainage maintenance easement.

5. Freeboard:
The minimum freeboard shall be one (1) foot above the twenty-five (25) year flood on all basins.

6. 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 in accordance with ODOT L&D Vol. 2, Current Edition. The rock channel protection shall not protrude above the top of the ground

surface. Other erosion protection methods, such as paved concrete mats, may be used at the discretion of the County Engineer. Paved concrete mats shall be used where storm water management facilities are located near a parking lot, etc.

7. 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 recommended for use is the Hydraulic Engineering Circular No. 9, available from the Superintendent of Documents, U.S. Government Printing Office, Washington DC. For dams and levees over ten (10) feet in height, refer to Section 1521.062, ORC.

8. 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. Sending significant off-site flows through storage facilities should be avoided by re-routing or re-designing drainage systems.

9. The height of water in detention facilities shall not be excessive. The height should be limited to three (3) feet. If provisions for safety of children near the detention basin are provided, a variance to increase the height may be considered. The County Engineer shall review and approve the proposed safety measures. In no case shall the height exceed six (6) feet.

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

(Cont.) Section 6.06 Design Specifications (Stormwater Management Facilities)

11. Detention allotment volumes for each phase of the development shall be provided in the Stormwater Management and Drainage Report. The allotted total detention volume of all the phases shall equal the required detention volume for the development. If any phase of the development changes size or scope a revision to the Stormwater Management and Drainage Report shall be submitted to the County Engineer's Office for approval.

    When detention and retention basins are to be used as water quality basins, the basins shall comply with the provision of the OEPA Construction General Permit and Lucas County Soil Erosion and Sedimentation Control Rules. When conflicts between two or more portions of the standards arise, the more restrictive shall apply.

    As Built (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 subdivisions, 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 Sediment and Erosion Control permits.

12. Infiltration basins can be used for detention basins provided the following design procedures are utilized:

    a. Infiltration rate shall be established through appropriate soil testing by a registered geotechnical laboratory.

    b. One test per each 2,500 SF of basin bottom shall be taken within the proposed basin bottom footprint with a minimum of 2 tests.

    c. The design infiltration rate shall be 50% of the lowest test result rate found.

    d. Only the bottom of the basin shall be used to calculate the design infiltration outflow.

    e. Basin drawdown time for a twenty-five (25) year storage volume shall not exceed 36 hours.

    f. An emergency overflow for flows above the design storage volume shall be supplied. This includes the one-hundred (100) year volume for landlocked basins in subdivisions.

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:

For projects that require temporary sediment basins to be maintained beyond the two-year maintenance period, the County Engineer shall require the Owner to provide a cost estimate for these future improvements. The cost estimate shall include all proposed work, including all future grading, future pipe installation, etc. The estimate shall use current Lucas County area

construction prices. This estimate will be reviewed and approved in conjunction with final engineering plan approval by the County Engineer.

The Owner shall provide a bond for the costs associated with the temporary sediment basins. This bond shall not expire until the temporary sediment basins are removed. No letters of credit will be accepted.

J. Orifice Plates: Orifice Plates are not permitted.

K. Basin Data Summary
A summary of the detention basin data shall be provided for each stormwater facility and shown in the plans. A sample of this summary can be found on Exhibit F of the Stormwater Detention Design Example found in the LCEO Design Resources website.

6.07 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 required seed mix design for all local (residential, commercial and industrial) and minor urban collector streets shall be as per ODOT CMS, Item 659 Class 1. 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.

In addition to the required seeding, subdivision rear yard swales elevated due to a plat phased development shall be lined with erosion control matting.

SECTION 7 –
WORK IN RIGHT OF WAY OR EASEMENTS

7.01 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 traveling public, this section establishes minimum standards for permitting of work within County and Township Road right-of-way. Permits are required for any work within the public right-of-way, including the construction or modification of driveways and drive pipes. Permits are also required for utility work within the right-of-way as well as for road closures.

7.02 GENERAL

A. Permits for Work Within Right-of-Way: In an effort to provide safe roads and to protect the property of its citizens, Lucas 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 Lucas County and Township roads or easements obtain a permit before performing the work. This shall include the installation or modification of driveways, drive pipes, the construction/reconstruction of road ditches (including enclosures), 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 submit all information necessary for the County Engineer to review the permit through LCExpress. LCExpress information and the current fee schedule can be found at: https://www.lucascountyengineer.org/permits.html

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 coordinate with all appropriate authorities to obtain the required permits.

7.03 DRIVEWAY APPROACHES ALONG STREETS WITH CURBS AND OPEN DITCHES

A. Profile Grades:

1. Driveways on Non-Curbed Roads: Driveway approaches on non-curbed roads shall slope away from the edge of pavement to the centerline of the proposed drive pipe location or swale (where no drive pipe is required). The drive profile shall be designed per Standard Construction Drawing RP-9.. 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.

   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.

   The LCEO Standard Construction Drawing RP-9 outlining the requirements for driveways on Non-Curbed Roads is located in the LCEO Design Resources.

2. Driveways 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.

   The LCEO Standard Construction Drawing outlining the requirements for curb and gutter approaches is located in the LCEO Design Resources.

(Cont.) Section 7.03 – Driveway Approaches along streets with curbs and open ditches

B. Composition:

1. Non-Curbed Streets: The minimum pavement compositions within the right-of-way are shown in Table 701 below. If a concrete driveway is desired on a non-curbed street, there shall be a 3 foot to 5 foot space left between the edge of pavement and the edge of the concrete portion that shall be asphalt concrete. Concrete approaches will be permitted in public right-of-way with a speed limit of 25 M.P.H.

2. Curb and Gutter Street: The minimum pavements compositions for curb and gutter streets within the right-of-way are shown in Table 701 below.

3. Brick, Masonry, pavers: Brick and masonry pavers are not permitted in public right-of-way with speed limits greater than 35 MPH. 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. The minimum composition for aggregate drives are shown in Table 701 below.

(Cont.) Section 7.03 – Driveway Approaches along streets with curbs and open ditches

TABLE 701

DRIVEWAY APPROACH COMPOSITION MINIMUM REQUIREMENTS*

	Curb and Gutter **	Non-Curbed
Residential (Single or Shared)	6 inches concrete	6 inches ODOT 304 **or** 2 inches ODOT 441 Surface Course on 6 inches ODOT 304 **or** 6 inches concrete
Common Access (3 or more residences)	6 inches concrete	3 inches ODOT 441 Surface Course on 8 inches ODOT 304 **or** 6 inches concrete
Commercial/Industrial	8 inches concrete on 4 inches ODOT 304	1 ½ inches ODOT 441 Surface Course on 1 ¾ inches ODOT 441 Intermediate Course on 4 inches ODOT 301 on 6 inches ODOT 304 **or** 8 inches concrete on 4 inches ODOT 304

* all materials shall meet ODOT CMS or LCEO standards

** asphalt pavement may be permitted for the drive approach outside subdivisions

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. The Lucas County Standard Construction Drawing outlining the requirements for Driveway Approach Widths is included in the LCEO Design Resources.

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 residential 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. For single residential drives on streets without curb and gutter the radius returns shall be a minimum of 15 feet to a maximum of 25 feet.

For commercial drives the radius size shall be based on the type of vehicles that will be using the driveway. In no case shall the radius return be less than thirty five feet (35'). The maximum radius will be determined based on vehicle type.

All flares and radii shall not encroach on any neighboring property by extending beyond the property line.

F. Drainage:

1. Pond Overflows: Private Recreational pond overflow pipes are not permitted to extend into the public right-of-way without providing erosion protection. The outlet pipe size shall be a maximum of 6" unless approved by the County Engineer.
2. Roadside Ditch Enclosures: Enclosing an existing roadside ditch may be permitted on County or Township Roads. These enclosures shall meet all requirements from other regulatory agencies. Plans submitted to enclose roadside ditches must meet all requirements outlined in Section 6 of this Manual.

G. Drive Approach Locations

1. The drive approach location shall comply with the provisions set forth in the Lucas County Access Management Regulations, current edition.
2. Sight Distance: When in the opinion of the County Engineer the proposed driveway location will cause a safety (sight distance, etc.) problem, the application request may be denied.

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

H. Driveway Pipes

1. 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 shall be sized per Section 6 of this manual. A minimum pipe size of 12” is required. At the County Engineer’s discretion, drainage calculations shall be provided by a Professional Engineer.
2. 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 8 feet. Slope from the edge of a driveway shall not be steeper than 4:1 to flow line of the pipe.
3. The property owner shall be responsible for any damage that may occur to any driveway pipe after it has been installed.
4. Driveway pipe material shall comply with Section 6 of this Manual.
5. No headwalls that extend above the driveway approach shall be installed within the public right-of-way.
6. The property owner shall be responsible for maintaining flow through their driveway pipe.

7.04 ROAD CLOSURES

A General 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 general permit. The General Permit shall be obtained through LCExpress at the County Engineer's website.

B. A detour plan with route and proposed signage meeting the latest ODOT MUTCD, current edition.

C. Request for closure must be applied for minimally 14 days prior to the closure. Any submissions for a road closure less than 14 days from the closure date will not be approved.

D. Closure requests due to annual events shall be submitted to the County Engineer's Office a minimum of 90 days prior to the event. The request shall have a letter from the Township Trustees approving the request and a traffic control plan showing the proposed detour route.

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

A General Permit is required from the County Engineer for any utility work within the public right-of-way of County or Township roads. The following process and standards are minimally required on utility permit request plans in LCExpress:

A. Submit electronic completed copy of permit application, set of plans, and appropriate fees.

B. Submissions must be received at least 4 weeks prior to work date.

C. Open cutting of roadway pavement will not be permitted.

D. Plans must include minimally the following information:

1. Road improvement projects shall dimension from

center line stationing or new right-of-way limits.

2. Existing edge of pavement lines with a width dimension line.
3. Existing right-of-way lines with a width dimension line,
4. Proposed work with dimensions from edge of pavement.
5. Length and size of all wire, pipe, structures, etc. to be installed or repaired.
6. Depth of all wire, pipe, structures, etc. to be installed or repaired.
7. 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.
8. Buried lines - Indicate method to be used for burial (e.g. trenching or bore).
9. All property owners must be contacted prior to construction.
10. Location, size, and depth of all bore pits. Bore pits should be located outside the area of influence zone as detailed on LCEO Standard Construction Drawing RP-10 (see LCEO Design Resources) or shall utilize LSM backfill per RP-10.
11. All bores under the pavement shall be a minimum of 48” below the top of the subgrade.
12. 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 shall comply with Lucas County Standards.
13. Compaction requirements are detailed in the LCEO Standard Construction Drawings (see LCEO Design Resources) and are based on zone of influence.

14. Traffic maintenance during construction shall conform to the Ohio MUTCD, current edition for traffic control in work zones.
15. 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.

E. Permits are valid for **180 days** from the date of approval by the County Engineer.

F. An extension of up to 180 days may be granted, if a request is received the LCExpress, at least 15 days in advance of the end of the 180-day period.

G. The applicant must contact the County Engineer at least two working days before actual commencement of work at (419) 213-2860.

H. 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.

I. No work is to proceed until the permit has been reviewed and approved by the County Engineer. 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 and appropriate fees submitted. 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.

SECTION 8 –
CONSTRUCTION & INSPECTION STANDARDS

8.01 PURPOSE

To provide the procedures and requirements for subdivision project construction and maintenance.

8.02 CONSTRUCTION REQUIREMENTS

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

1. Proposed construction sequence, including documentation of public utility schedules requiring relocation
2. One electronic copy of all approved off-site work agreements, recorded agreements and/or easements to include if applicable, U.S. Corps of Engineer, EPA and/or ODNR permits.

Upon receipt of notification in LCExpress 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, in the field or by virtual method or at the discretion of the County Engineer. The following individuals are required to attend the preconstruction conference and are notified by the Owner:

1. County Engineer Representative
2. Owner
3. Design Engineer
4. Contractor(s)
5. County Sanitary Engineer/City of Toledo
6. 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.

(Cont.) Section 8.02 – Construction Requirements

C. General Specifications and Responsibility:

1. These Standards, the current ODOT Construction and Material Specifications, 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 all current Standards, Supplemental Documents, 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 (sediment and erosion controls): Refer to approved project stormwater pollution prevention plan (SWP3).
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 within 30 days or as directed by the County Engineer.

8.03 FINAL PLAT RECORDING

A. Private Developments:

1. Private developments shall be required to substantially complete all construction before the final plat will be approved by the County Engineer and forwarded to the County Commissioners for final approval.

B. Subdivisions

1. Paving- All paving operations shall follow the requirements of the ODOT CMS including temperature requirements. Paving of the surface course shall be completed prior to November 15th. All other courses of asphalt pavement shall comply with the ODOT CMS. Building permits will not be released until the intermediate asphalt course has been completed. It shall be the intent of the developer to place all asphalt courses in the same calendar year. If weather conditions prevent the surface course from being placed prior to winter the surface course shall be placed as soon as weather permits in following Spring. The maintenance period will not begin until all the paving (and all other remedial items) are complete.
2. 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.
3. Erosion and Sediment Controls- All controls to should be in place in accordance with regulatory requirements. Escrows or performance guarantees established shall be provided for any remaining items.
4. Safety Items- All safety related items to be in place (temporary T-turnarounds, guardrails, barricades, street name signs, stop signs, etc.)
5. Pavement and Drainage Improvement escrows or performance guarantees shall only be allowed when there is minimal remaining work (no greater than $10,000).

(Cont.) Section 8.03 – Final Plat Recording

6. The final plat shall not be recorded until all public improvements are complete and/or performance guarantees have been established.

8.04 CONSTRUCTION PUNCH LIST

A. The County Engineer will perform a review of the site and generate the construction punch list after the Owner/Developer or representative has stated in writing that all work has been substantially completed. A representative from the contractor shall be present for the site walk through to assist in the review of site work.

B. All ODOT Item 611 requirements shall be complete and submitted to the County Engineer prior to the performance of the construction punch list. In addition to the ODOT Item 611 requirements 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 constructed elevations.

C. Prior to the performance of the construction punch list, the Owner shall submit the as-built survey for all detention and/or retention basins.

D. After completion of the above items, the County Engineer will provide the Construction punch list to the Owner.

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

F. The punch list shall be completed within 45 calendar days of receipt.

8.05 MAINTENANCE

The construction punch list shall be completed for the subdivision prior to the beginning of the maintenance period of two years. A maintenance bond amount of 25% of the construction cost shall be provided for the maintenance period.

8.06 FINAL ACCEPTANCE OF THE SUBDIVISION

A. After completion of remedial work contained in the punch list, the County Engineer will recommend to the County Commissioners to accept the improvements onto the public road system for maintenance.

B. Prior to Final Acceptance documentation shall be uploaded to LCExpress indicating the permanent plat boundary and lot corner monuments are in place. This documentation shall include the date each monument was installed.

C. All sediment and erosion control items shall be completed in the public right of way, rear yard swales, and within stormwater management facilities.