WOOD COUNTY
SUBDIVISION AND SITE IMPROVEMENT MANUAL

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FOREWORD

The Wood County Planning Commission authors and administers the Wood County Subdivision Regulations, which establishes certain standards pertaining to the parameters for the subdivision of land outside corporation limits and within the boundaries of Wood County, Ohio. They can be reached at 419.354.9128.

This Subdivision and Site Improvement Manual issued under the authority of the Office of the Wood County Engineer is intended to offer guidance, minimum standards and acceptable procedures for the design of streets, drainage and the location of public and quasi-public utilities. These standards are to be used for the development of any parcel of land, whether it is for:

- Residential – subdivisions, condominiums or planned unit developments;
- Commercial – subdivisions or large parcel developments; or
- Industrial – subdivisions or large parcel developments, and

whether the improvements will come under the authority of a public entity or remain private, such as a Homeowners Association. While certain improvements may not be constructed if the development remains private, the preparation, submittal, review and approval of the plans will be treated as if the development will be under public maintenance and control.

In general, any requirements of this manual that are in conflict and are of greater constraints than the Wood County Subdivision Regulations, the stricter requirements shall apply.

This manual is subject to revisions and additions as the needs arise or as certain situations make it necessary.

Please note that provisions and design issues for water mains and sanitary sewers come under the review and responsibility of the Northwestern Water and Sewer District and they can be reached at 419.354.9090.

If questions arise concerning these standards, please don't hesitate to contact the Office of the Wood County Engineer at 419.354.9060.

The original publication date of this manual is August 5, 2014.

SURVEY REQUIREMENTS

SECTION 1- GENERAL

1) All surveys, plats of survey and legal descriptions shall conform to Chapter 4733 of the Ohio Administrative Code and the Wood County "Land Transfer Policy and Minimum Standards for Legal Descriptions and Plats of Survey."

2) Only Professional Engineers and Professional Surveyors registered in the State of Ohio shall and can provide the required engineering and surveying services.

SECTION 2- RIGHTS-OF-WAY

1) The sixty (60) foot minimum requirement for a right-of-way as required by the Wood County Subdivision Regulations is not met by every existing right-of-way in Wood County. It is recommended that a grant of right-of-way equaling to one-half (1/2) of the deficiency be made in conjunction with a new subdivision or a new road dedication to bring the existing right-of-way to sixty (60) feet, thirty (30) feet on each side of the existing centerline of right-of-way.

SECTION 3- MONUMENTATION

1) Unpaved Streets - All unpaved street centerlines shall have monuments set according to the Wood County Subdivision Regulations. Monuments shall consist of a three-quarter (3/4) inch diameter by thirty (30) inch long iron pin set in a six (6) inch diameter by thirty-six (36) inch long concrete cylinder monument. Please refer to the Wood County Standard Construction Drawing found in the Appendix, Page AP-1. Monuments shall be set prior to the final plat approval by the Wood County Engineer.

2) Paved Streets – All paved street centerlines shall have monuments set according to the Wood County Subdivision Regulations. Monuments shall consist of an ODOT monument, Type C (adjustable box) or shall consist of a one (1) inch by twelve (12) inch machine type bolt placed in a six (6) inch diameter by thirty-six (36) inch long concrete cylinder monument. Please refer to the Wood County Standard Construction Drawing found in the Appendix, Page AP-1. Monuments shall be set after the paving is

completed and prior to the final plat approval by the Wood County Engineer.

3) Bench marks - All bench marks shall have monuments according to the Wood County Subdivision Regulations and tied to the 1988 NAVD datum. Monuments shall consist of a three-quarter (3/4) inch diameter by twelve (12) inch long iron pin cast at the central axis of and at least six (6) inches below the top of a six (6) inch diameter by forty-eight (48) inch concrete cylinder cast in place. A 3 ½-inch aluminum disk, supplied by the Wood County Engineer's Office and charged to the owner/developer, shall be placed in the top. A minimum of one (1) concrete permanent bench mark conforming to this standard shall be set on site. Please refer to the Wood County Standard Construction Drawing found in the Appendix, Page AP-2. The monument(s) shall be set prior to the final plat approval by the Wood County Engineer.

   a) All new subdivisions shall contain at least two (2) permanent site bench marks. A permanent bench mark shall be established for every seven hundred (700) linear feet of street length.

   b) Alternate bench marks – Permanent bench marks located within seven hundred (700) feet of the site may be used. These bench marks shall consist of an identifiable mark on a structure that is not subject to frost heave or accidental damage. These bench marks shall be approved by the Wood County Engineer.

SECTION 4- SUBMITTALS

When preparing the final site or plat drawing for submission to the Wood County Planning Commission, the applicant shall also prepare and submit the following:

1) A digital, read only copy of the final site/subdivision layout in a .dwg format. This digital copy will be used by the Wood County Engineer's Office to check closure and plat dimensions.

2) Closure reports for:
   a) The site/subdivision perimeter.
   b) Each individual lot of the subdivision.

c) Each non-lot parcel of the subdivision. Non-lot parcels include, but are not limited to: streets, parks, other open spaces, easements, detention pond areas, etc.

STORM DRAINAGE DESIGN REQUIREMENTS

SECTION 1- GENERAL

1) These design standards and specifications shall serve as the minimum requirements for the design and treatment of storm water drainage. These procedures and regulations shall govern the development of all new and/or modified storm water drainage systems. The development of such drainage systems shall include the conveyance of surface water to an adequate outlet capable of carrying the flow. All proposed improvements shall be in accordance with the Wood County Subdivision and Site Improvement Manual and the Ohio Department of Transportation's Construction and Material Specifications and are subject to the approval and/or alterations by the Wood County Engineer prior to the construction of any portion of the drainage system.

2) The current list of standards to be used in the design of storm water drainage is as follows:

    a. These regulations,
    b. Storm Water Management and Sediment Control Regulations of Wood County, Ohio,
    c. Subdivision Regulations of Wood County, Ohio,
    d. Standard Construction Drawings of the Ohio Department of Transportation (ODOT), and
    e. Construction and Material Specifications of the Ohio Department of Transportation, (current edition).

3) When planning a new development, various drainage concepts should be evaluated before decisions are made as to site layout, grading, street location and alignments. Plans should be based upon incorporating existing natural waterways, artificial channels, storm sewers, and other drainage works into the proposed development. The location of catch basins, manholes, storm sewer conduits, and drainage channels shall be approved by the Wood County Engineer.

4) A fundamental study of the drainage pattern of areas contiguous to the development must be made. Storm water drainage design should begin with the designer verifying with the Wood County Engineer's Office the

limits of the drainage basin (watershed) in which the proposed project parcel is located and the location of the nearest adequate outlet. Provisions must be made to accommodate runoff from upstream areas without diversion onto neighboring properties. Tributary flows having a direct effect on the storm drainage of the proposed site shall be determined and included in the design capacities of the storm drainage system of the development. A map showing the drainage patterns of the surrounding basin shall be submitted with the drainage system plans. A U.S.G.S. topographical map may be sufficient for this submittal. The Wood County Engineer's Office takes pride in itself in the number of drainage watershed maps the Office has available for the public's use. Please contact the Drainage Department for these maps and other information.

5) The preferred runoff pattern for subdivisions from driveways and other surfaces shall be towards the street with the drainage grade break being the middle of the house area.

6) No existing watercourse shall be altered in any way to change the direction of flow or to change the amount of flow and no fill or structures shall be placed or situated in any natural watercourse unless provisions are made for the existing free flow of water in a manner to satisfy the Wood County Engineer. Changing the drainage from one watershed to another watershed without the approval of the Wood County Engineer is strictly prohibited.

7) The regulations of the Federal Emergency Management Agency (FEMA) shall be strictly followed for all developments. Impacts on floodway and floodway fringes shall be analyzed and accounted for. Filling in a flood plain requires a permit from the Wood County Planning Commission. The 100-year flood boundary shall be shown on all storm water drainage plans and subdivision plats along with the 100-year flood elevations, if known. All necessary Conditional Letter of Map Revision (CLOMR), Letter of Map Revision (LOMR), or Letter of Map Amendment (LOMA), shall be obtained from FEMA prior to the construction of any structure.

8) The Wood County Engineer shall require all design plans, quantities, and an itemized cost estimate for the storm water drainage system is prepared and stamped by a Registered Professional Engineer.

9) If the project watershed drains to Grassy Creek or the Maumee River, then plans shall also be submitted to:

Maumee Watershed Conservancy District
1464 Pinehurst Drive
Defiance, OH 43512
Tel: 419.782.8746

SECTION 2- RUNOFF ESTIMATION

1) The design of storm drainage systems under the jurisdiction of the Wood County Engineer shall be based upon the "Rational Method", Q=ciA for determining peak runoff flow-rates for areas less than 200 acres, where:

Q = peak runoff rate in cubic feet per second (cfs);

c = coefficient of runoff corresponding to surface imperviousness, see page 9;

i = average rainfall intensity in inches per hour corresponding to the storm design frequency and for a duration equal to the time of concentration, (See Appendix, Page AP-4).

A = area in acres of the contributing watershed/design area.

2) Where areas (a) are greater than 200 acres, the designer shall use the:

1. USGS Water-Resources Investigations Report 89-4126 "Techniques for Estimating Flood-Peak Discharges of Rural, Unregulated Streams in Ohio which is an update of Bulletin 32 (1959), Bulletin 43 (1969) and Bulletin 45 (1977).

2. USGS Open File Report 2432 "Estimation of Peak-Frequency Relations, Flood Hydrographs, and Volume-Duration-Frequency Relations of Ungaged Small Urban Steams in Ohio".

3. Soil Conservation Service Technical Release No. 55 (current edition).

3) Coefficient of Imperviousness

The selected runoff coefficients to be used for calculations shall reflect the anticipated land use according to the Planning Commission's long range plan or the appropriate Township's Master Plan.

4) The designer should also refer to the Soil Survey of Wood County, Ohio, publication by the Ohio Department of Natural Resources for general locations of various soil types in the development area.

5) The following table of runoff coefficients was adapted from and courtesy of the American Society of Civil Engineers (ASCE) and the Water Pollution Control Federation (WPCF), "Design and Construction of Sanitary and Storm Sewers", 1986. The table lists coefficients for various surfaces that may be used to develop a composite runoff coefficient based on the percentage of different surfaces within a drainage area. The Wood County Engineer may require breakdown of acres by land use for evaluation of runoff rates. These coefficients are consistent and applicable to all drainage improvements in Wood County.

Runoff coefficients "c" for the "Rational Method" shall be based upon the following table:

Character of Surface	Runoff Coefficient "c"
Pavement-Asphalt or Concrete	0.95
Roofs	0.95
Stone (Compacted)	0.85
Lawns, sandy soil	
Flat, 0 to 2 percent	0.10
Average, 2.01 to 7 percent	0.15
Steep, >7 percent	0.20
Lawns, heavy soil	
Flat, 0 to 2 percent	0.17
Average, 2.01 to 7 percent	0.22
Steep, >7 percent	0.35
Agricultural	0.15
Woods	0.10

Description of Area	Runoff Coefficient "c"
Business/Commercial	
Downtown	0.90
Neighborhood	0.70
Residential	
Apartment	0.70
Multi-units, detached	0.60
Multi-units, attached	0.75
Single Family	
Lot size $\leq$ 10890 square feet (1/4 acre)	0.55
Lot size >10890 square feet $\leq$ 21780 square feet (1/2 acre)	0.50
Lot size >21780 square feet $\leq$ 32670 square feet (3/4 acre)	0.40
Lot size > 32670 square feet <1 acre	0.35
Lot size $\geq$ 1 acre < 2 acres	0.30
Lot size $\geq$ 2 acres	0.25
Industrial	
Light	0.80
Heavy	0.90
Parks, cemeteries	0.25
Playgrounds	0.25
Railroad yards	0.35
Right-of-Way	0.60
Undeveloped	0.10

6) The above runoff coefficients are based on the assumption that the design storm does not occur when the ground surface is frozen. Please note the ranges of "c" values presented are typical for return periods of 2-10 years. Higher values for larger design storms are appropriate and the following multiplier factors are suggested:

Storm Event	Multiplier
25-year	1.15
50-year	1.20
100-year	1.25

Please note the adjusted "c" value cannot exceed 1.00.

The predevelopment runoff coefficient, $c_{allowable}$, is 0.10.

7) The average rainfall intensity, "i", shall be calculated from the equation:

$$i = a/ (t+b)^c$$

Where: i = rainfall intensity (inches/hour)
t = time of concentration (minutes)
a = constant
b = constant
c = constant

The constant values for the above equation shall be based upon using the values for Intensity Zone A from the "General Notes for Figures 1101-2 through 1101-3" as developed by ODOT in Volume Two of the Location and Design Manual. See Appendix, Pages AP-3 and AP-4.

8) The time of concentration (t) to the first pick-up point in the system shall be 20 minutes in residential areas. In areas other than residential, time of concentration shall be determined by the use of overland flow charts as developed by ODOT in Volume Two of the Location and Design Manual, Figure 1101-1 (See Appendix, Page AP-5). In all cases, the maximum length to the first pickup point shall be 300 feet. Overland flow paths should not be taken perpendicular to contours on proposed subdivisions since the land will be graded and swales will often intercept the natural contour, conducting water to the street in less time.

SECTION 3- STORM SEWERS

1) Prior to the development of the final paving, grading and drainage plans, an overall drainage plan showing the square footage of each lot and the limits of the contributing watershed, broken down into areas contributing to each drainage pick-up point, shall be submitted. Drainage design within the development shall be adequate to handle the entire contributing watershed area entering the proposed development, and its existing, proposed and probable future development, and not only the area being submitted for review. When the design makes use of an existing storm sewer or an open watercourse, profiles and cross sections shall be submitted to show the existing conditions at least 500 feet upstream and 500 feet downstream from the parcel being considered for development. The out letting watercourse for the development may need to be improved before development begins. An approved plan and County inspection is required when cleaning any watercourse required for plat approval. If future plat extensions will utilize the same drainage system, the overall drainage plan shall be submitted with the first plat and paving, grading and drainage plans.

2) Storm sewers shall be designed for a 5-year frequency storm with a hydraulic gradient check for a 10-year frequency storm. Storm sewers shall be designed using the "Storm Sewer Computation Sheet", or something similar to it. See Appendix, Page AP-6.

3) Minimum pipe velocities shall be three (3) feet per second. Where pipes outlet into an open watercourse, measures shall be taken to lessen potentially destructive velocities. Erosion control devices such as stilling basins, riprap, or revetments may be required.

4) Storm sewer mains shall not be placed in rear yards.

5) All conduits in the public right-of-way shall be a minimum of twelve (12) inches in diameter, excluding metering devices and excluding road underdrains.

6) When changing pipe sizes in a manhole or a catch basin, the elevations of the crowns of the smaller upstream pipes shall be matched to the elevation of the crown of the larger downstream pipe, when there is adequate change in elevation to do so.

7) All storm drainage conduits under public roads shall be Type B conduit, installed with the appropriate bedding and backfill material (per manufacturer's requirements) and shall have a minimum grade percent to produce a minimum velocity of 3.0 feet per second.

8) Storm sewer easements shall have a minimum width of forty (40) feet with the centerline of the easement being centered on the conduit. Variances from this requirement may be granted by the County Engineer for special situations.

9) Easements for all swales shall have a minimum width of twenty-five (25) feet from and perpendicular to the top of the bank, plus, the width of the swale (top of bank to top of bank) with the centerline of the easement being centered on the swale.

10) Any storm sewers discharging into the State of Ohio drainage systems or crossing state highways must be approved and permitted by the Ohio Department of Transportation.

11) The minimum cover for drainage conduits under pavement shall be per manufacturer's requirements or twenty-four (24) inches from finish grade (top of pavement) to the outside crown of the conduit, with a minimum of nine (9) inches from subgrade to the outside crown of the conduit.

12) All drainage conduits (Type A or B) laid under pavement and/or within five (5) feet of the edge of pavement/curb, shall be backfilled with granular material, and mechanically tamped per O.D.O.T. specifications. Conduit not under pavement or not within five (5) feet of the outside edge of the pavement/curb shall be Type C Conduit. For all Types A, B or C conduit installations, the bedding shall consist of structural backfill (per ODOT) extending from the spring line of the conduit to at least six (6) inches below the bottom of the conduit for the full width of the trench.

13) Corrugated metal pipe shall be permitted only when being used as a metering conduit in a detention facility.

14) Storm sewer taps shall be provided for all lots unless basements and

crawl spaces are prohibited by plat recitation. Storm sewer taps shall outlet to the main storm sewer system for the development or into structures and may not discharge directly to open watercourses, unless prior written approval is granted. Storm sewer taps shall be a minimum of six (6) inches in diameter and shall be installed at least one (1) foot beyond the right-of-way line or lot line. If more than one lot is served by a single line, the line shall be sized assuming each lot is contributing 50 gallons/minute (0.111 cubic feet/second). The flow line of the storm sewer tap at the right-of-way line shall be at least six (6) inches above the inside top elevation of the main sewer whenever possible.

15) Curb and gutter inlets shall be designed using the 2-year frequency storm with twenty (20) minute duration to the first catch basin. The maximum allowable width of the sheet gutter flow from the face of the curb shall be limited to eight (8) feet into the curb lane. Curb inlets will usually be required at all intersections and cul-de-sacs to provide for more positive drainage. See Appendix, Page AP-7.

16) On continuous grade streets with curb and gutter inlets, the maximum depth of flow in the gutter shall be five (5) inches.

17) All intersections shall be graded to eliminate one hundred percent (100%) of cross street flow. Curb inlets shall be located at the beginning of the upstream curb return before the crosswalk.

18) Sufficient curb inlets shall be provided to prevent the 25-year storm event flows from overtopping the street R/W lines.

19) The maximum spacing between curb inlets or from a vertical crest point shall be 350 feet on curb and gutter streets and 450 feet on streets without curbs and gutters.

20) All catch basin connector pipes shall connect to the main storm sewer at manholes unless otherwise approved by the Wood County Engineer's Office. The connector pipes shall be hydraulically sized to the catch basin capacity. Direction changes shall not be designed between structures except where concrete collars may be necessary to avoid major substructure interference.

21) Manholes or catch basins shall be installed at all changes of size, grade and horizontal alignments unless prior written approval is granted.

22) The center of the structure shall be used for manhole and catch basin locations.

23) All catch basins curb inlets and manholes shall be precast concrete constructed without sumps or traps and shall be installed per ODOT Construction Standards.

24) Manhole rims in pavement areas shall be set one-quarter (1/4) inch below final pavement elevations.

25) Manhole rims outside pavement areas shall be set one (1) inch above finished grade.

26) Rear yard catch basins shall be installed and rear yard swales graded at the time the development's storm drainage and pavement are constructed. Swales shall be seeded, mulched and fertilized. No quasi-public utilities shall be installed within the drainage and utility easement until the rear lot grading has been approved by the Wood County Engineer.

27) Where a storm sewer system is to be constructed within a roadway and curbs are installed, catch basins with curb inlets shall be required in accordance with the design specifications and standard drawings of the State of Ohio Department of Transportation (ODOT). Type 3 curbing shall be required for the option of locating driveway accesses.

28) Where a storm sewer system is to be constructed and there are no curbs being installed or the storm sewer system is being installed away from the roadway, there shall be a drainage swale over the storm sewer system draining to an inlet basin.

29) Access to main storm sewers shall be provided through the use of manholes located to keep the sewer a sufficient distance behind the edge of pavement or curb line to avoid the use of granular backfill.

30) All storm sewers and appurtenances shall be designed to conform to the requirements of the most current edition of O.D.O.T.'s Construction and

Materials Specifications and Standard Construction Drawings.

31) In areas where the site grading plan calls for the conveyance of surface storm water along or across rear property lines, a rear yard catch basin shall be provided at every other lot corner. A desirable grade of 0.3% and a minimum grade of 0.1% shall be provided for rear lot swales.

32) Type A and Type B conduits shall have a minimum cover of nine (9) inches from the top outside crown to the bottom of the finished subgrade for concrete conduit and shall have a minimum cover of twelve (12) inches from the top outside crown to the bottom of the finished subgrade for polyvinyl chloride and polyethylene conduit. Type C conduit with less than eighteen (18) inches of cover shall be reinforced concrete. Granular material to be used for pipe bedding and backfilling shall meet the requirements of Item 703.11, or as modified by the Wood County Engineer. For backfill requirements, please refer to the Wood County Standard Construction Drawing found in the Appendix, Page AP-8.

33) Six (6) inch pipe underdrains shall be installed on all new roadway construction, existing road reconstruction and slope stabilization projects. The pipe underdrains shall be installed in accordance with the Wood County Standard Construction Drawings in the Appendix, Pages AP-9, 10, 11. Lot drains shall not be connected to the pipe underdrains.

34) In the design of the pipe underdrain system, consideration shall be given to the type of pipe used, the filter material, and the surrounding soils that are to be drained in order to avoid clogging and achieve adequate hydraulic capacity.

35) Roof drains and sump pump outlets may be installed and connected to the storm drainage system. Storm taps shall empty into the nearest catch basin or manhole to prevent excessive pipe sizes for the downspout drain lines. Downspouts may not directly or indirectly outlet onto a public roadway. In lots where slopes are to the rear, drain pipes may be drained to a storm sewer, or other method as available and if approved.

36) Any and all pipes connected to an existing drainage system shall be constructed under the inspection and approval of the Wood County Engineer after obtaining the appropriate permit.

37) The designer may indicate a particular kind of conduit by inserting the specification item number after the designation of the type of conduit.

38) The following types of conduit are permitted:

a. Item 611, Conduit, As Per Plan
Where Type B or Type C conduit equal to, or less than 24 inches in diameter is specified, the contractor shall use any of the following conduit materials:

Reinforced Concrete Conduit:
- ODOT 706.02 with 706.11 joints

Polyvinyl Chloride (PVC) Conduit:
- ODOT 707.42
- ODOT 707.43
- ODOT 707.45 (For 15" and under diameter)

b. PVC conduit will only be permitted at those locations where a minimum cover from the top of the conduit to the bottom of the subgrade is 12 inches, however, for no installation shall the distance from the top of the conduit to the surface of pavement, or finish grade for conduit not under the pavement, be less than 24 inches. The bedding shall extend to a height of 12 inches above the top of the polyvinyl chloride conduit.

c. Polyethylene Conduit:
- ODOT 707.33 with in-line bell couplings and o-ring rubber gaskets.

d. Polyethylene conduit will only be permitted at those locations where a minimum cover from the finish grade to the top of the conduit is 24 inches or greater. The bedding shall extend to a height of 12 inches above the top of the polyethylene conduit.

e. Where Type B or Type C conduit of 27 inches diameter or greater is specified, the contractor shall use the following conduit materials:

Reinforced Concrete Conduit:

- ODOT 706.02 with 706.11 joints.

39) Crossings with other major underground sewers and utilities should be on an angle greater than 45 degrees. If insufficient vertical clearance is available, a concrete cradle with or without steel reinforcement may be required. The allowable clearance without special support between storm and sanitary sewers shall be no less than twelve (12) inches. The designer shall evaluate the trench conditions and conduit loading to determine strength classifications required for various conduits in the design.

40) Roof drains, foundation drains and all other clean water connections to sanitary sewers are prohibited.

41) Prior to final acceptance of the project by the Wood County Engineer, all storm sewers, manholes, catch basins and curb inlets shall be thoroughly cleaned and flushed with water. This pertains to new installations and/or repair projects.

42) Existing pavement replacement cost shall be included in the cost for the appropriate conduit item, if not a separate bid item.

SECTION 4- CULVERTS

1) Culverts are used to convey storm water in an open channel through an embankment. Culvert location should perpetuate existing drainage patterns to the maximum extent practical.

2) All culverts shall be designed for a 50-year frequency storm with a hydraulic gradient check for a 100-year frequency storm.

3) All culverts shall be designed using ODOT's LD-42 form (see Appendix, Page AP-12) with the Rational Method of Q = c i A or shall be designed using Talbot's formula, see below, with the Dunn's Table (See Appendix, Page AP-13). If the drainage area "A" is:

≤ 200 acres, use Rational Method formula;
200 < "A" ≤ 1000 acres, use Talbot's formula;
1000 acres< "A" ≤ 2000 acres, use Dunn's Table x 0.275;
>2000 acres, use Dunn's Table x 0.35.

Talbot's formula is: $a = C A^{0.75}$ where:

a = required cross section of waterway in square feet
C = Talbot's coefficient
A = drainage area in acres

And where:

C = 1.00 mountainous lands
= 0.80 to 0.60 hilly lands
= 0.50 to 0.40 rolling lands
= 0.30 to 0.20 flat lands

Check with the County Engineer's Office for availability of hydraulic data on receiving streams and ditches.

4) All culverts shall be designed with a uniform barrel cross section throughout their length. Location alignment, material specifications, and end treatments, (e.g., headwalls, wingwalls, channel protection, apron slabs), shall be approved by the Wood County Engineer.

5) All new culvert designs must be of adequate capacity to convey anticipated runoff of a watershed from a 50-year frequency storm at just full flow, using Manning's equation for capacity calculations. Pressure flows for fifty (50) year design storms shall be avoided.

6) Culverts shall meet manufacturer's recommendations for minimum and maximum cover, for bedding, and for backfilling.

7) The design of the culvert shall conform to the following:

   a. The 50-year headwater depth shall not be higher than the elevation of the pavement edge or top of curb.
   b. The 100-year headwater depth shall not exceed twice the diameter or rise of the culvert or four (4) feet above the crown of the culvert, whichever is less.
   c. The 100-year headwater depth shall not exceed six (6) inches at the crown of the street.

8) Type C or Type D rock channel protection without filter may be required at all culvert inlets and outlets.

9) The owner shall obtain a permit from the governmental entity with jurisdiction (city, township, county, or state) before installation of a culvert or a bridge. The permit shall state the proper size and grade of the culvert or bridge.

10) No dual culvert systems will be allowed, unless approved by the Wood County Engineer.

11) Driveway culverts for residences shall not be less than twelve (12) inches in diameter, shall be a minimum of twenty-two (22) feet in length, shall be reinforced concrete pipe, if less than twenty-four (24) inches of cover, and shall be constructed as to maintain the flow line of the ditch and such installation shall be approved by the Wood County Engineer. See Wood County Standard Construction Drawing in the Appendix, Page AP-14.

12) Sizing (size of open waterway required) of all residential drainage structures (culverts/bridges) shall be by the Wood County Engineer's Office. Flow line elevations of proposed culverts shall be set by the Wood County Engineer's Office. Consultation with the Wood County Engineer's Office shall be made to determine the status of any open ditch encountered for the proposed development.

13) For commercial and industrial applications, calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. The calculations shall identify the proposed pipe materials, diameters, slopes, inverts, inlet and tailwater conditions, headwater elevations, and flow capacities under inlet control and outlet control conditions.

SECTION 5- OPEN CHANNELS

1) New open channels shall be designed for a 50-year frequency storm with a hydraulic gradient check for a 100-year frequency storm and shall be based upon Manning's Equation with ODOT's Ditch Computation Sheet, See Appendix, Page AP-15.

Manning's Equation, $Q=1.486/n\ A\ R^{2/3}S^{1/2}$, where:

Q = flow in cubic feet per second (cfs);
n = roughness coefficient of channel;
A = cross-sectional area of channel in square feet (sq. ft.);
R = hydraulic radius = A/P in feet (ft.) where P=wetted perimeter;
S = slope of Hydraulic Grade Line (HGL) in open channel in foot/foot (ft. /ft.).

2) The following coefficients shall be used for Manning's "n":

Surface	"n" value
PVC pipe (SDR 35)	0.010
Polyethylene smooth wall	0.012
Concrete pipe	0.013
Clay tile	0.014
Corrugated metal pipe (CMP)	0.024
Street pavement	0.015
Concrete or asphalt lined channels	0.015
Rock channel protection (riprap)	0.035
Earth channel w/revetments or gabions	0.035
Earth channel, smoothly graded	0.025
Earth channel, sodded	0.040
Natural stream channel w/grass, weeds, light brush	0.045
Natural stream channel w/grass, weeds, heavy brush	0.060

3) The following table are safe or permissible velocities for erodible channels:

CHANNEL MATERIAL	MAXIMUM VELOCITY (fps)
Sand or sandy loam	2.50
Firm loam or silts	3.50
Clay, fine gravels	5.00
Shale, hard pan, coarse gravel	6.00
VEGETATION- LINED CHANNELS (Slopes < 5%)	
Kentucky 31 Fescue (30%), Perennial Rye (30%), Kentucky Blue (20%), Creeping Red (20%) Alfalfa, crabgrass, lespedeza	3.50

Grass mixture	5.00
Kentucky bluegrass, brome, buffalo grass	6.00

Open channel velocities greater than the above stated maximum values shall provide erosion control.

4) The minimum dimensional requirements for open channels shall be a two (2) foot bottom width, two (2) foot depth (for drive pipe coverage), with side slopes graded to a two to one slope unless otherwise directed by the Wood County Engineer. Please note that slopes flatter than two to one are preferred for mowing purposes. Drainage swales that convey water specifically for and between lots may be exempt from this item.

5) The minimum slope of open channels shall be one tenth of one percent (0.10%). All open channels, slopes and other areas disturbed by construction shall be seeded and mulched per the NPDES Permit.

6) Subdivisions that are involved with an open channel may be required to enclose the open channel if the enclosure would involve a 48-inch conduit or smaller size. No dual conduit systems will be allowed unless approved by the Wood County Engineer.

7) Larger open channels may require that side slopes of channel banks be stabilized with rock channel protection or by some other means.

8) When proposed drainage improvements utilize an existing storm sewer or an existing open channel, cross sections and profiles shall be submitted detailing existing conditions at least 500 feet downstream from the point of impact. The outlet stream for the development may need improvements prior to development. An approved plan and County inspection is required when cleaning any open channel required for plat approval.

9) All open channels outside of the normal road right-of-way shall be put under the Ditch Petition Maintenance Program and shall be of a width as required by ORC 6137.12 and said easements shall be required on <u>both</u> sides of the channel. Consultation with the County Engineer's Office is strongly recommended during the design process.

10) All drainage structures and appurtenances shall comply with applicable County specifications and/or the most current edition of O.D.O.T.'s Construction and Materials Specifications and Standard Construction Drawings. The Wood County Engineer shall arbitrate any discrepancies between said standards.

11) When traversing an open channel with any utility, there shall be a minimum clearance distance of 36 inches between the outside of the utility conduit and the clean out grade or hardpan elevation of the open channel.

12) Calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. The hydraulic design of open channels shall be based upon Manning's Equation and/or computer modeling software/programs found acceptable by the Wood County Engineer. The calculations shall identify the proposed roughness factors, side slopes, longitudinal slope, depth of flow, and flow capacities.

SECTION 6- STORM WATER COLLECTION FACILITIES

1) The County shall require all new residential, commercial and industrial developments to have on site storm water collection facilities, also known as detention/retention basins.

2) All surface storm water generated by the development must be collected and metered out with the allowable discharge ($Q_{allowable}$) being limited to and not to exceed a two (2)-year frequency storm for undeveloped conditions of the proposed development site using an intensity time of i = 20 minutes and a runoff coefficient "c" of 0.10.

3) The collection facilities shall be able to store or detain the proposed discharge from a 100-year frequency storm minus the allowable discharge ($Q_{allowable}$).

4) Existing conditions may limit the allowable discharge ($Q_{allowable}$) from the proposed development. For example, a proposed development may drain 20 acres to an open channel or conduit that receives a total drainage area of 100 acres. The existing open channel or conduit may have the capacity

to carry 20 cfs and it was determined that the existing conditions for the 20 acres to be developed carried 20 cfs. In this situation, the proposed site would be prorated over the entire drainage area and would be allowed one fifth of the outlet capacity since the site has one fifth of the overall drainage area.

5) The detention basin shall have a minimum two (2) feet of freeboard above the design High Water Elevation of the collection facility.

6) Collection facilities in proposed residential areas should be aesthetically pleasing in accordance to the Wood County Planning Commission.

7) Dry collection basins with bottom widths greater than forty (40) feet shall have subsurface drainage at no more than twenty (20) foot spacing to dry the basin after storm water discharge. If elevations do not permit the use of subsurface drainage, the engineer shall show such in the design calculations. Dry basins shall have a bottom slope of 0.30 percent towards the flow control device. If a pump station is necessary due to grade constraints, pump sizing and pump station location shall be subject to approval by the Wood County Engineer.

8) The number of collection basins shall not exceed two (2) unless otherwise approved by the maintaining authority and shall be on lands owned (owned or have right of access by easements) by the maintaining authority.

9) When utilizing a parking area for detention facilities, the depth of water detained shall not exceed six (6) inches, unless otherwise approved by the County Engineer.

10) Meter line flow shall be based on "Q flow" and not "Q average". See Appendix, Page AP-16. Submit a copy of completed work sheet with subdivision improvement plans in order to decrease review time.

11) The outside and inside slopes of detention/retention basins shall be three (3) to one (1) horizontal to vertical ratios, or flatter to insure maintenance capability.

12) The minimum top width of the embankment of a detention/retention basin shall be fifteen (15) feet.

13) Wet collection basins shall have a six (6) foot minimum wide safety ledge around the perimeter, two (2) feet below the normal water surface elevation.

14) All new residential subdivisions shall have all storm water collection facilities and drainage improvements placed into the County Ditch Maintenance Program as specified in Sections 6131.63 and 6137 of the Ohio Revised Code (ORC). Drainage improvements shall include, but are not limited to: collection facilities, detention/retention basins, pumping stations, storm sewers, catch basins, manholes, swales, and open channels as shown on the approved drainage and grading construction plans of the subdivision. See Section 9 for references to Sections 6131.63 and 6137 of the Ohio Revised Code.

SECTION 7- PUMP STATIONS

1) Pump stations at a minimum must be duplex in nature, i.e., they must contain at least two (2) pumps. One (1) pump should be able to handle the minimum flow. In some cases, there may be three (3) pumps required.

2) The wet well of the pump station shall have a minimum eight (8) inch diameter overflow pipe to drain to an adequate outlet.

3) Controls shall have telemetric capabilities.

4) Pump stations for storm water in residential subdivisions shall be put under the County Ditch Maintenance Program prior to the recording of the final plat.

SECTION 8- SEDIMENTATION AND EROSION CONTROLS

The following procedures are hereby specified to help minimize erosion and sedimentation problems encountered during the construction phase and to comply with EPA NPDES requirements. Meeting the following standards and criteria does not relieve any person or firm from liability for erosion or sediment damage to another person's property.

1) All subdivisions shall be reviewed by the appropriate agency to see if control measures are needed to minimize water, erosion and/or sediment problems.

2) An erosion and sedimentation control plan shall be submitted for all subdivisions containing more than ten lots, the construction of a street, or as required by NPDES regulations. Approved NPDES permit and a copy of the submission to OEPA shall be submitted with plat during the review process.

3) Subdivisions that are a portion or phase of a larger proposed allotment, shall submit a tentative erosion and sediment control plan for the entire allotment.

4) Runoff originating upstream of the proposed construction site shall be intercepted and/or diverted away from the construction site so as to minimize the amount of potential flow over the area of disturbed soil.

5) Sedimentation basins, silt fences, and/or silt traps shall be inspected by the NPDES authority and certified to the Wood County Engineer as installed per NPDES permit.

6) Terraces, diversions and/or grassed waterways should be installed and maintained as part of the water disposal system to further control water and sediment damage.

7) Permanent vegetation, including the use of sod and structures should be installed and maintained as soon as possible to help control water and sediment damage.

8) Erosion control is to be installed prior to completion of construction. When work is being performed during slow growing or dormant seasons, alternate and/or temporary solutions shall be utilized.

9) All catch basins shall be protected in accordance with the requirement of the NPDES General Permit for storm water discharges from construction activities.

SECTION 9- MAINTENANCE OF DRAINAGE IMPROVEMENTS FOR ALL NEW SUBDIVISIONS

The steps below shall be followed to create a maintenance district for a new subdivision. Steps A1, A2, A3 and A4, are to be completed before the final plat is recorded while the Landowner/Developer owns **all** the parcels of land, including the street(s) right(s)-of-way of the proposed subdivision. The sections of the Ohio Revised Code are shown for reference.

A. 6131.63 - Written Agreement for Construction of Ditch Improvement

1) Landowner/Developer agrees to construct and pay for a drainage improvement (subdivision).

2) Drainage Improvement Plans are developed and signed by a Registered Professional Engineer.
   a) The plans and the final plat must show all easements.
   b) The plans must show all the catch basins, manholes, storm sewers, swales, ditches, detention/retention ponds, meter lines, pump stations and outfall sewers.
   c) A Drainage Maintenance Plan, part of the plans, shall be prepared to show all the drainage maintenance easements and what is actually to be maintained by the Drainage Maintenance Fund.
   d) Plans and calculations are submitted to the County Engineer for review and approval.

3) Landowner/Developer signs and files an "AGREEMENT FOR DITCH IMPROVEMENTS" with the County Commissioners.
   a) Landowner/Developer (sole owners of all parcels) may request a waiver of the final hearing.
   b) Landowners/Developer releases all easements to the County Commissioners.

c) The agreement may require a deposit (amount depends upon the total cost of project) to begin the maintenance fund or be placed on the tax duplicate for collection.
d) Maintenance through ORC 6137 shall include all the drainage improvements as delineated on the "DRAINAGE MAINTENANCE PLAN", except service laterals to the individual houses.

4) The Landowner's/Developer's Engineer shall submit the actual construction costs for the Drainage Improvements.

5) The County Engineer shall review the submitted actual construction costs and calculate the proposed maintenance base used for the maintenance fund collection of the Drainage Improvements placed under maintenance.

6) The Board of County Commissioners pass a resolution accepting the drainage improvement, creating a maintenance district and filing a maintenance base for each of the "Schedule of Landowners" with the County Auditor to establish a maintenance base for each benefiting parcel. The base may be determined by calculating actual costs incurred by the Landowner/Developer for the installation of the Drainage Improvements.

7) The Landowner/Developer shall submit as built plans of the Drainage Improvements.

B. 6137 - Ditch Maintenance Fund
1) 6137.02 - Create the ditch maintenance fund.

2) 6137.03 - Annual Ditch Maintenance Assessment.
a) Percent of original maintenance base listed as a "special assessment" on the tax duplicate.
b) Minimum assessment is two (2) dollars per parcel.
c) Maximum limit allowed in the fund is twenty (20) percent of the original costs of the Drainage Improvements installed.

d) County Commissioners may pass a resolution in any given year if additional funds are needed and if conditions warrant the additional needed funds.

3) 6137.05 - Repair or Maintenance Projects.
   a) Use of the maintenance fund to maintain the Drainage Improvements to provide and maintain the designed capacity of the system.
   b) The County Engineer determines what work will be necessary.
   c) The County Commissioners and the County Engineer decide who will actually perform the work (i.e. County force account or by bidding).

4) 6137.10 - Additional Repair Assessment for Damages
   a) A Landowner may be assessed an additional special assessment for negligent acts or omissions by said landowner.

5) 6137.12 - Permanent Easement for Maintenance and Cleaning of Drainage Improvements
   a) The subdivision Final Plat shall show all and any easements necessary to maintain all the Drainage Improvements as stated in Section A.2.c of this document.

6) There shall be certain language on the recorded Final Plat informing all the lot owners of the required maintenance assessments for the maintaining of the Drainage Improvements.

7) All lots within the subdivision shall be considered the benefiting parcels of the storm water collection facilities within the maintenance district.

SECTION 10- SUBMITTALS

The minimum required submittal package for review for a drainage project for a residential, commercial, or industrial development or subdivision shall contain the following:

1) All drainage areas entering the proposed development area shall be shown with the area in acres and the flow in cubic feet per sec (cfs).

2) An overall site plan delineating each contributing area and subsequent collection points drawn at a minimum scale of one (1) inch =200 feet. Drainage design shall be adequate to support the entire contributing watershed for present as well as future development. If future plans anticipate utilization of the same drainage system, then the overall drainage plan shall be submitted with the initial plan proposal.

3) Times of concentration, rainfall intensities and weighted runoff coefficients used for determining runoff discharges. Discharge volume in cubic feet per second, velocity, and additional data needed to establish that the drainage system will direct the flow to the approved adequate outlet.

4) Complete drainage calculations for storm sewer systems shall be submitted for pipe size determinations, 10-year hydraulic gradient checks, and catch basin type and spacing designs.

5) A complete set of calculations for storm water collection facilities (detention/retention areas).

6) All easements shall be shown and properly labeled (utility, drainage, permanent, temporary, work agreement) on the Drainage Maintenance Plan and the final plat that is to be recorded.

7) Location and elevation of the outfall point of the storm sewer system. If discharging into an open channel or stream, sufficient information must be provided to substantiate calculations for determining the outlet water surface (hydraulic gradient).

8) Sufficient contours and grading details to show that the surface drainage is going to get to the existing or proposed drainage structures.

9) Grading plans shall be required showing the proposed elevations at the right-of-way line, setback lines, swale centerlines and back lot lines.

10) Cross-sections shall show all crossovers, catch basins, manholes, and any additional structures – both existing and proposed.

11) Final minimum and/or maximum grading elevations at all lot setback line intersections. Please note, all grade elevations shall be verified and an as-built grading plan shall be signed and certified by a Professional Surveyor and submitted upon completion of the development.

12) An itemized actual cost for the storm water drainage improvements shall be prepared and stamped by a Professional Engineer.

13) An application to put the drainage improvements under the County Maintenance Program per ORC 6131.63 (subdivisions only).

14) All required approved permits, including, but not limited to NPDES, Right-of-Way, and any needed easements.

15) Lot sizes shall be stated in acres to the third decimal point.

16) A complete set of construction plans.

PAVEMENT AND ROADWAY DESIGN REQUIREMENTS

SECTION 1- GENERAL

1) The standards and requirements in this section shall be used in conjunction and according to the Wood County Subdivision Regulations. Any conflicts, or if the requirements are of greater constraints than the Wood County Subdivision Regulations, those conflicts and greater requirements shall be considered as the preferred method of design.

2) Design standards shall be according to the requirements and specifications of the Wood County Engineer, the Ohio Department of Transportation (ODOT) Location and Design Manuals, and ODOT's Pavement Design and Rehabilitation Manual.

SECTION 2- PAVEMENT

A) SOIL TESTS

1) All new pavement design for streets and roads shall be supported by having a subsurface soil investigation and analysis performed based upon ODOT's requirements.

2) The spacing of soil borings shall be at a maximum interval of 500 feet on level ground. In low areas and/or near ditches, a maximum interval of 300 feet will be used or as directed by the Wood County Engineer.

3) All borings should be made to a minimum depth of six feet below the proposed grade line. One boring shall be taken to refusal or up to a maximum depth of 20 feet below the proposed grade line. If refusal is encountered, notify the Wood County Engineer.

4) Tests from each boring below the proposed grade line shall indicate the following data:
   a) Natural Moisture Content
   b) Moisture-Density Relation
   c) Mechanical (Sieve) Analysis
   d) Liquid Limit
   e) Plastic Limit

f) Plasticity Index

B) DESIGN PROCEDURE

1) All proposed pavements, as a minimum, shall be constructed to one of the typical sections found in the Appendix, Pages AP-9, 10, 11.

2) The minimum design criteria for a residential street shall be; a 20 year design period with 400 vehicles per day including 1% trucks at the legal load of 18,000 pounds per single axle.

3) The current Ohio Department of Transportation Pavement Design and Rehabilitation Manual shall be used in the design of pavements.

4) If a pavement design, based upon ODOT's criteria, is of a lesser structural number than that of the Wood County Engineer's minimum pavement design section structural number, the Wood County Engineer's pavement design section shall be used for construction.

C) MATERIALS

1) All pavement material shall be either concrete or asphalt on a prepared base.

2) All material shall be in accordance with the most current edition of the ODOT Construction and Material Specifications Manual.

3) If asphalt is used for county highways, it shall be specified as "PG 64-22 or better. If asphalt is used for residential subdivision streets, it shall be specified as "PG 64-22" unless directed otherwise by the Wood County Engineer.

SECTION 3- ROADWAY

A) DESIGN REQUIREMENTS

Vertical street profiles shall conform to the maximum and minimum grades listed below. Any deviation shall be approved by the Wood County

Engineer. Note: Consult with the Wood County Planning Commission to determine road classification.

CLASSIFICATION	GRADE
Minor Highways (Arterial)	Maximum Grade 4%
Collectors/Minor Streets/Alleys	Maximum Grade 6%
Intersection Approaches	Maximum Grade 4% (For at least 100')
Rate of Change of Grade	Maximum 4%
Minimum Grade	0.5%

Horizontal street curves shall have the following minimum radii of centerline curvature:

CLASSIFICATION	RADII
Major and Secondary Highways	300 feet
Minor Highways and Collector Streets	200 feet
Minor Streets	100 feet

A minimum tangent length of at least one hundred (100) feet shall be provided between reverse curves on all minor streets. Tangent lengths of at least two hundred (200) feet shall be required on collector, arterial streets and thoroughfares.

B) CUL-DE-SACS

1) The pavement in a cul-de-sac shall be constructed with a minimum radius of fifty-five (55) feet to the edge of pavement, except for industrial park roads the minimum radius shall be sixty (60) feet.

2) For cul-de-sacs with curbs, the minimum radius shall be fifty-five (55) feet plus the width of the curb section, except for industrial park roads, the minimum radius shall be sixty (60) feet, plus the width of the curb section.

3) A minimum right-of-way radius of seventy-five (75) feet is required, except for industrial park roads, the minimum radius shall be eighty (80) feet.

4) The minimum radius for an island in a cul-de-sac shall be twenty (20) feet for a residential street.

5) There shall be no islands permitted for commercial or industrial park roads.

C) INTERSECTIONS

1) Where residential streets have a change of direction of approximately ninety (90) degrees ("L" intersection) one of the following shall be provided:

a) A minimum radius of forty (40) feet to the outer edge of the pavement (or forty (40) feet plus width of the curb) from the intersection of the two (2) street centerlines and the reverse of curves at the ends;

b) A street centerline curve having a minimum radius of one hundred (100) feet;

c) A design combining the above two (2) provisions.

2) All other intersections shall have a minimum radius of forty (40) feet to the edge of pavement or back of curb.

D) DRIVEWAYS

1) All driveways in a residential subdivision, between the road/street edge of pavement and the right-of-way line, shall be constructed of a type of hard surface, i.e., asphalt, concrete, or brick. Stone/gravel is not considered a hard surface.

2) All rural driveways shall be permitted and constructed of a hard surface to the right-of-way line if the driveway is accessed off a street that is curbed.

3) All commercial and industrial driveways shall be constructed of a hard surface regardless of the type of street construction and shall have a twenty-four (24) foot throat width as a minimum. See ODOT's standard drawings for driveways for reference.

E) TURNAROUNDS AND BARRICADES

1) Temporary dead-end streets shall be permitted only as a segment of a continuing street plan subject to extension into undeveloped acreage. The length of the temporary dead end street shall be determined on a case-by-case basis by the Wood County Planning Commission. A standard barricade and standard turnaround shall be required to be installed at the end of the temporary dead-end street. Please refer to the Wood County Standard Construction Drawing found in the Appendix, Page AP-17.

F) CURB AND GUTTER STANDARDS

1) ODOT Type 3 curb and gutter or ODOT Type 2 curb and gutter shall be used on residential streets.

2) ODOT Type 6 curb or ODOT Type 2 curb and gutter shall be used on commercial and industrial park streets.

SECTION 4- CONSTRUCTION INSPECTION AND TESTING

1) Construction inspection shall be required and shall be provided by the Office of the Wood County Engineer. All costs associated to the inspection of the project shall be paid by the Owner/Developer.

2) Material sampling and testing shall be performed by a testing firm approved by the Wood County Engineer. All costs associated to the material handling and testing for the project shall be paid by the Owner/Developer.

3) The following required tests shall be required as a minimum for each proposed road/street:

   a) Subgrade compaction - One for every 400 linear feet.
   b) Base compaction - One for every 400 linear feet.
   c) Concrete test - Three (3) concrete cylinders for each day's placement of concrete.

d) Asphalt Concrete – Two (2) samples per day per each type of asphalt concrete.

SECTION 5- SUBMITTALS

1) Pavement design calculations, along with proposed typical section and proposed grade profile.

2) Pavement thickness shall be based on geotechnical data. The minimum allowable thickness for flexible pavement shall be four (4) inches of asphalt concrete over twelve (12) inches of aggregate base or equal.

3) Soil boring locations shall be shown on the topographical survey plan and the plan and profile of the streets/roads.

4) A complete soils report as prepared by a recognized geotechnical laboratory and signed and sealed by an Ohio Registered Professional Engineer.

5) A boring log showing layer thickness, soil descriptions, blow counts, ground water elevations, and a location map of all borings.

6) Groundwater elevations to be recorded between 12-24 hours after being encountered.

7) Certified traffic counts, if used.

UTILITIES

SECTION 1- PUBLIC AND QUASI-PUBLIC UTILITIES AND EASEMENTS

1) Location of all quasi-public (non-governmental) utilities, including but not limited to: electric, telephone, gas, television cable, street lighting and pipelines, shall be located outside the road right-of-way as much as possible. Utilities that are located outside the road right-of-way shall be located within easements.

2) Utility easements may be located along the front, rear or along the side lot lines as necessary for the utility companies to properly install and maintain their respective utilities.

3) Easements shall give access to every lot, park or public grounds, including pump stations.

4) Easements shall be a minimum of sixteen (16) feet wide.

5) Electric, telephone, and television cable shall be provided within each new subdivision. Gas service shall also be provided based upon whether the utility is reasonably accessible. All utility facilities shall be constructed underground according to the standards of the respective utility company.

6) Placement of utility poles shall be placed as far away from the roadway surface that is practical for safety reasons.

7) The developer or the project consulting engineer of a subdivision shall comply with Section 3781.27 (OUPS Law) of the Ohio Revised Code. The proposed locations of all the underground utilities facilities should be researched and obtained where practical from the utility companies serving the area by the developer prior to submitting the preliminary plat.

8) The developer or the project consulting engineer shall be responsible for contacting the utility companies to determine sizes and capacities of the respective utility for the subdivision.

9) Preliminary drawings shall include a separate page showing the locations of all the proposed utilities, including the size and type of all conduits for road crossings.

10) All underground utility facilities shall be installed throughout the subdivision, including all right-of-way crossings and service to every lot in the subdivision, prior to the final plat being recorded. The intent is to have all utility services taps and road crossings, including conduits, installed prior to paving the roadway surface.

11) Underground utilities that are not installed prior to paving the road surface shall be installed by the boring method. Open cutting is prohibited after the paving is completed.

12) The final plat of the subdivision shall include all easements for the respective utilities.

CONSTRUCTION DRAWINGS STANDARDS

SECTION 1- GENERAL

A set of construction plans to delineate the proposed work with sufficient design details, with additional notes, calculations, and quantities, shall be prepared so the project can be clearly and uniformly interpreted by engineers and contractors. Completeness of sufficient data, conciseness and clarity must be provided to avoid misinterpretation and enable the contractor to make an intelligent bid and to perform the work as intended. Each set of construction plans shall serve as the permanent record of the project and shall:

1) Be prepared with black permanent ink on 24 inch x 36 inch sheets of double or single matted polyester (mylar) drafting film with a thickness of 4 mil (3 mil as a minimum).

2) The professional engineer responsible for the preparation of the construction drawings shall affix his signature, seal (stamp) and date to each set of plans.

3) All lettering shall be at least 0.140 inches high. Scale of the drawings shall be based upon good engineering practice. Please keep in mind that the plans will most likely be reduced to 11 inches x 17 inches for distribution and thus choosing the proper scale and using the minimum size lettering height will allow for the readability of the reduced plans.

4) All lettering on plans shall be a combination of upper and lower case.

5) Be prepared in conjunction with the filename conventions, working units, levels and layers, pen tables, etc. of the Wood County Engineer's Office.

6) After the construction plans are reviewed and approved by the Wood County Engineer's Office, the professional engineer shall submit three (3) sets of plans (two (2) sets of 24" x 36" format and one (1) set in 11" x 17" format, plans in an electronic format as a .dwg file and a complete set of mylars, to the County Engineer.

7) As a minimum, a set of construction drawings shall contain the following sheets with the title sheet numbered page one and each sheet thereafter

shall be numbered consecutively:

a) Title sheet.
b) General notes, technical specifications, quantities.
c) Typical sections and quantities.
d) Existing site or topographic plan.
e) Proposed site plan.
f) Storm Water Pollution Prevention Plan (SWP3).
g) Drainage maintenance plan
h) Site grading plan.
i) Signage/pavement marking plan.
j) Plan and profiles.
k) Cross sections.
l) Construction details.
m) Standard drawings.

SECTION 2- TITLE SHEET

The title sheet shall contain the following information:

a) Name of the project.
b) Location of the project.
c) Vicinity map: Scale must be equal to or larger than 1" = 1 mile and show location of project within the County.
d) Whether the traffic shall be maintained or detoured.
e) Approval signature(s) block(s) for the Owner(s) to sign and date the plans.
f) Approval signature block for the County Commissioners to sign and date the plans, where applicable.
g) Approval signature block for the County Engineer to sign and date the plans (where applicable).
h) Approval signature block for the Consulting Engineer to seal, sign and date the plans.
i) Legend of symbols for existing and proposed items.
j) Index of sheets.
k) A general note of what specifications are used.
l) A list of standard construction drawing details used.
m) Bench mark data.
n) Scales of the drawings.

o) Project description.
p) A "Before You Dig" Ohio Utility Protection notification label.

SECTION 3-GENERAL NOTES, TECHNICAL SPECIFICATIONS, QUANTITIES

The general notes and general summary sheet shall contain the following information:

a) General construction notes for roadway, storm sewers, other utilities and grading to clarify construction items.
b) Technical specifications for the above items.
c) The general summary is a table of itemized list of quantities which shall include a column for each heading of: reference number, ODOT item number, quantity, and unit and item description.

SECTION 4- TYPICAL SECTIONS AND QUANTITIES

A typical section shall contain the following information:

a) A dimensioned cross-sectional view of how the roadway is to be built containing information such as: right-of-way widths, easement widths, pavement widths and depths, shoulder widths and depths, curb widths and depths, ditch widths and depths, ditch back and forward slopes.
b) The design materials of the road construction at a larger scale.
c) A quantity table for the typical section to which portion of the roadway it applies.

SECTION 5- EXISTING SITE OR TOPOGRAPHIC PLAN

The existing site or topographic plan shall contain:

a) Items "2f" through "2q", inclusive, of the "PRELIMINARY PLAT CHECKLIST" (see Appendix, Pages AP-18, 19).
b) Bench marks for vertical control.
c) Reference marks for horizontal control.

SECTION 6- PROPOSED SITE PLAN

The proposed site plan shall contain:

a) The existing site or topographic plan with Items "2r" through "2ii", inclusive, of the "PRELIMINARY PLAT CHECKLIST" (see Appendix, Pages AP-18, 19).
b) Bench marks for vertical control.
c) Reference marks for horizontal control.

SECTION 7- STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A Storm Water Pollution Prevention Plan (SWP3) shall be required if you disturb one (1) acre or more of surface area during construction. The purpose of these sheets is to provide information on how storm water runoff is to be controlled and/or treated **during and after** construction and shall:

a) Contain a vicinity map.
b) Contain the limits of clearing and vegetation.
c) Contain the existing vegetation and type.
d) Contain soil boundaries and information.
e) Contain existing drainage patterns with flow arrows and size of drainage areas.
f) Contain special notes for critical areas, i.e., to protect streams, steep slopes, etc.
g) Contain site development, existing and proposed.
h) Contain location of erosion and sediment control practices.
i) Contain surface water locations within 200 feet of site.
j) Contain detailed drawings.
k) Contain specifications for stabilization.
l) Contain a schedule of construction sequence.
m) Contain notes for maintenance and inspections.
n) Contain special notes to aid the contractor.
o) Contain a project description.
p) Contain the receiving waters of the project.
q) Contain storm water runoff coefficients, existing and proposed.
r) Contain dewatering volume required.
s) Contain sediment storage volume required.
t) Be prepared using a scale of 1 inch = 30 feet.
u) Contain project area disturbed in acres.
v) Contain location of construction entrance.
w) Contain construction entrance detail.
x) Contain location of construction washout areas.
y) Contain latitude and longitude.

z) Proposed existing and proposed contours.
aa) Proposed inlet protection details.
bb) Proposed drainage outlet protection details.

SECTION 8- DRAINAGE MAINTENANCE PLAN

The proposed drainage maintenance plan shall:

a) Contain the existing site or topographic plan.
b) Contain the proposed site plan.
c) Contain all the existing drainage systems and all the proposed drainage systems that are to be put under the Ditch Maintenance Program.
d) Contain all the existing and proposed easements for the drainage systems that are to be put under the Ditch Maintenance Program.

SECTION 9- SITE GRADING PLAN

The proposed site grading plan shall:

a) Contain the existing site plan, on a separate layer, with sufficient contours and grading details to show how the surface drainage is going to get to the existing or proposed drainage structures.
b) Contain the proposed elevations at the right-of-way line, setback lines, swale centerlines and back lot lines. Grading from the front setback line to the right-of-way line or the back of the sidewalk, shall have a minimum slope of two (2) percent.
c) Contain the proposed minimum grade elevation for each lot at the setback lines.
d) Contain the maximum finished floor elevation of the first floor.
e) Contain the location of the soil borings.
f) Contain the areas of each lot in acres to the third (3rd) decimal.

SECTION 10- SIGNAGE/PAVEMENT MARKING PLAN

The proposed signage plan shall:

a) Contain the location of all the stop/yield signs.
b) Contain the location of all road name signs.
c) Any other signage per the Wood County Engineer's Office.
d) Contain the location and type of all the pavement markings.

SECTION 11- PLAN AND PROFILES

The plan and profile sheets shall be used to show roads and other infrastructure shown on a standard plan and profile sheet with the plan view on the top half and the profile view on the bottom half.

The plan view shall:

a) Be drawn at a horizontal scale of 1 inch = 20 feet.
b) Contain the road centerline, stationing, right-of-way lines, horizontal curve data, road names, lot lines, lot numbers, and easements.
c) Pavement, curbs, gutters, storm sewers with taps and structures, sanitary sewers with taps and structures, water mains with taps and structures, bridges, culverts, guardrails, and any other existing and proposed utilities.
d) Topographic features within the general area and any obstruction within the right-of-way or construction area.
e) Contain site bench marks with description and elevations.
f) Contain site reference marks with description and ties.
g) Contain the location of the soil borings.

The profile view shall:

a) Be drawn at a horizontal scale of 1 inch = 20 feet.
b) Be drawn at a vertical scale of 1 inch = 5 feet.
c) Contain the road centerline stationing.
d) Contain the original ground profile of the road/street centerline.
e) Contain the proposed ground profile of the road/street centerline.
f) Contain vertical curve data and site distance data.
g) Contain storm structures, sanitary structures, culverts, and bridges with assigned numbers. Numbers will be assigned by the County.
h) Contain existing and proposed other utilities.
i) Contain the location of the soil borings.
j) Contain the elevation of bedrock.

SECTION 12- CROSS SECTIONS

Cross sections shall be shown for each 100-foot station and other needed station locations (i.e., grade breaks, end of typical sections, etc.) to be used primarily to determine the amount of earthwork required on the project and shall:

a) Be drawn at a one (1) inch = five (5) feet horizontal scale and a one (1) inch = five (5) feet vertical scale.
b) Contain the existing ground line as a dashed line and the proposed ground line as a solid line.
c) Contain the stationing, with the existing elevation at the centerline below the stationing and the proposed elevation at the centerline above the stationing.
d) Contain road centerline, stationing, right-of-way lines, easement lines.
e) Provide a cross section at every crossover, structure (catch basins and manholes for both existing and proposed) with the structure's assigned number, the type and size of the structure and all elevations pertaining to that structure.
f) Contain all existing and proposed utilities in their correct horizontal and vertical locations.
g) Each cross section sheet, on the right side or left side, shall have columns for end areas in square feet and volumes in cubic yards for both cut and fill.
h) Each sheet shall have a space for the summation of the volumes for both cut and fill at the sheet bottom.

SECTION 13- CONSTRUCTION DETAILS

The construction details sheet shall be used to show details that do not fit under any other of the above referenced sheets such as details for: intersections, cul-de-sacs, driveways, guardrails, pavement, superelevations, drainage, prefabricated drainage structures and shall:

a) Be drawn at an appropriate scale to show the required detail to construct.

SECTION 14- STANDARD DRAWINGS

a) ODOT Standard Drawings.
b) Wood County Standard Drawings.

FEES

SECTION 1- SUBDIVISION PLAT AND IMPROVEMENT REVIEW FEES

In an effort to assure consistency in our review process, we have established the following approval criteria. When a set of construction plans for any development has six (6) or more items that are not properly addressed based upon the requirements of this manual, then, the plans will be disapproved. Similar mistakes in one (1) category, (i.e., no arrow heads, misspellings, distances missing, etc.) will be considered as a single deficiency. The County Engineer may waive this number under certain circumstances and at his discretion.

The cost of reviewing and checking the subdivision plats and construction improvement drawings submitted to the Engineer for approval shall be paid by the Owner/Developer at the rate of $50.00 per hour to cover such items as employee benefits, plan review, office expenses, etc.

The County Engineer will mail an itemized invoice to the Owner/Developer with timely payment expected. The minimum charge will be $150.00 per review and all fees shall be paid prior to the County Engineer signing the final construction drawings and the final plat.

The cost for a Wood County Bench Mark Disk for subdivisions shall be $20 each.

SECTION 2- INSPECTION FEES

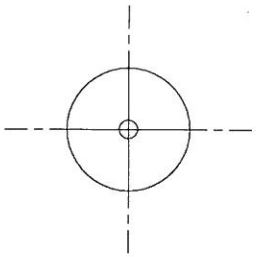
The cost of field inspection performed by the Engineer's Office shall be paid by the Owner/Developer at the rate of $75.00 per hour to cover such items as employee benefits, travel time, field time, field expenses and mileage.

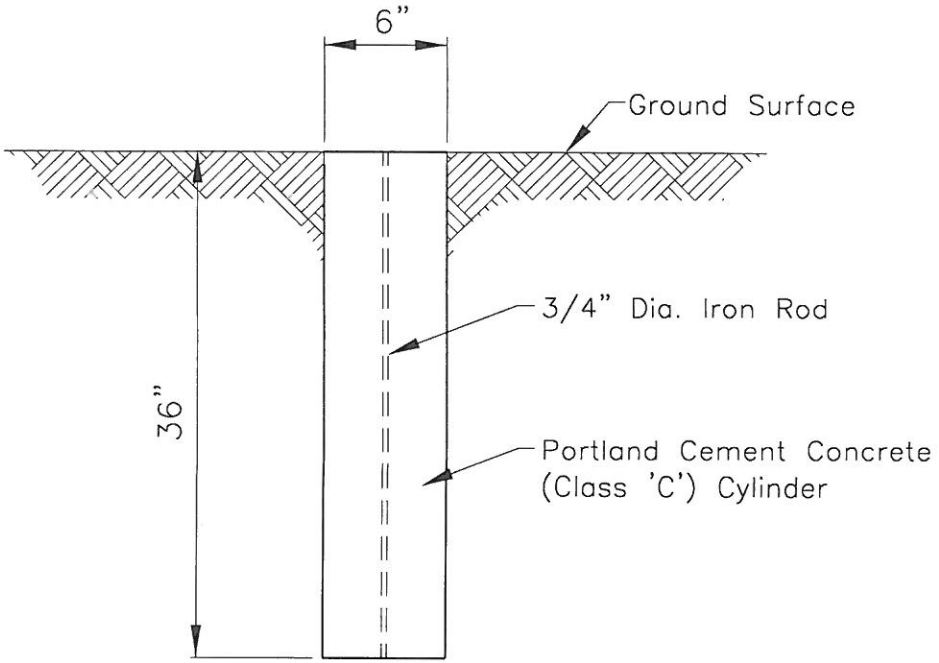
1) The Field Inspector will be utilized to observe and verify basic construction and installation process associated with a subdivision development to ensure compliance with the approved drawings.

2) Again, the County Engineer will mail an itemized invoice to the Owner/Developer with timely payment expected. All fees shall be paid prior to the County Engineer signing the final plat.

APPENDIX

TYPE 'A' MONUMENT





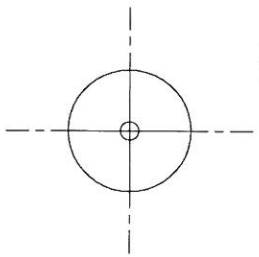
A cylindrical concrete marker six (6) inches in diameter and thirty-six (36) inches in length with a three-quarter (3/4) inch iron rod cast at the central axis of the cylinder. Said marker shall be placed in a vertical position with its top being level with the surface of the surrounding ground.

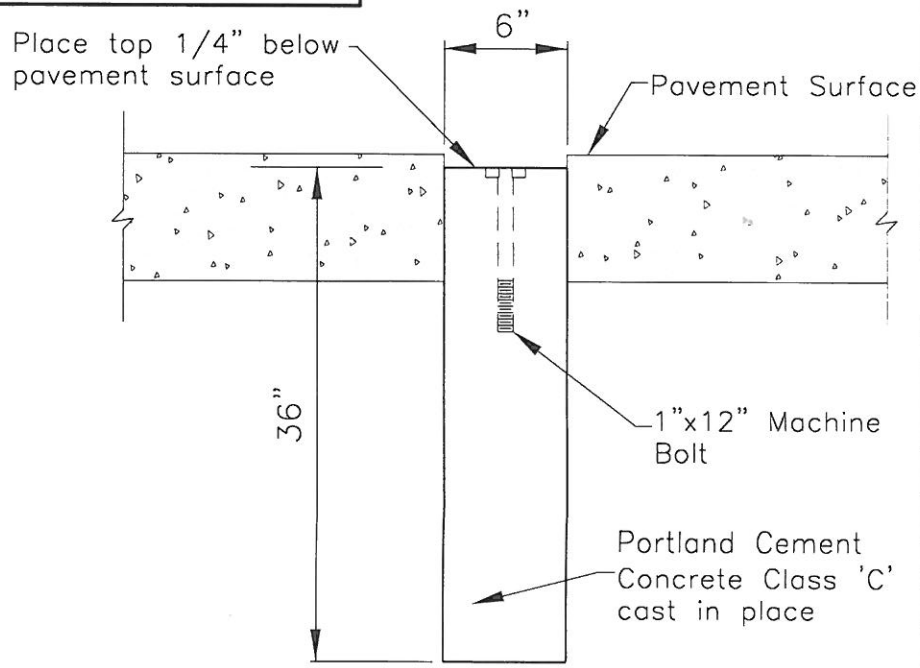
MONUMENTS

A monument shall be placed at each change in direction on the boundary of the plat, and one such monument shall be placed on the centerline of right-of-way of each street intersection, and at the beginning and end of all street curves.

A Type 'A' monument shall be placed in all unpaved areas.
A Type 'B' monument shall be placed in all paved areas.

TYPE 'B' MONUMENT





A cylindrical concrete marker as described under Type A except that a machine type iron bolt (without nut) of one (1) inch diameter by twelve (12) inches in length shall be placed in a vertical position with the head of the bolt upward and a quarter (1/4) inch below the level of the surface of the pavement. A point shall be marked on the head of the bolt to indicate the exact point referred to on the Final Plat.

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD TYPE 'A' AND 'B' MONUMENT ASSEMBLIES

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-1
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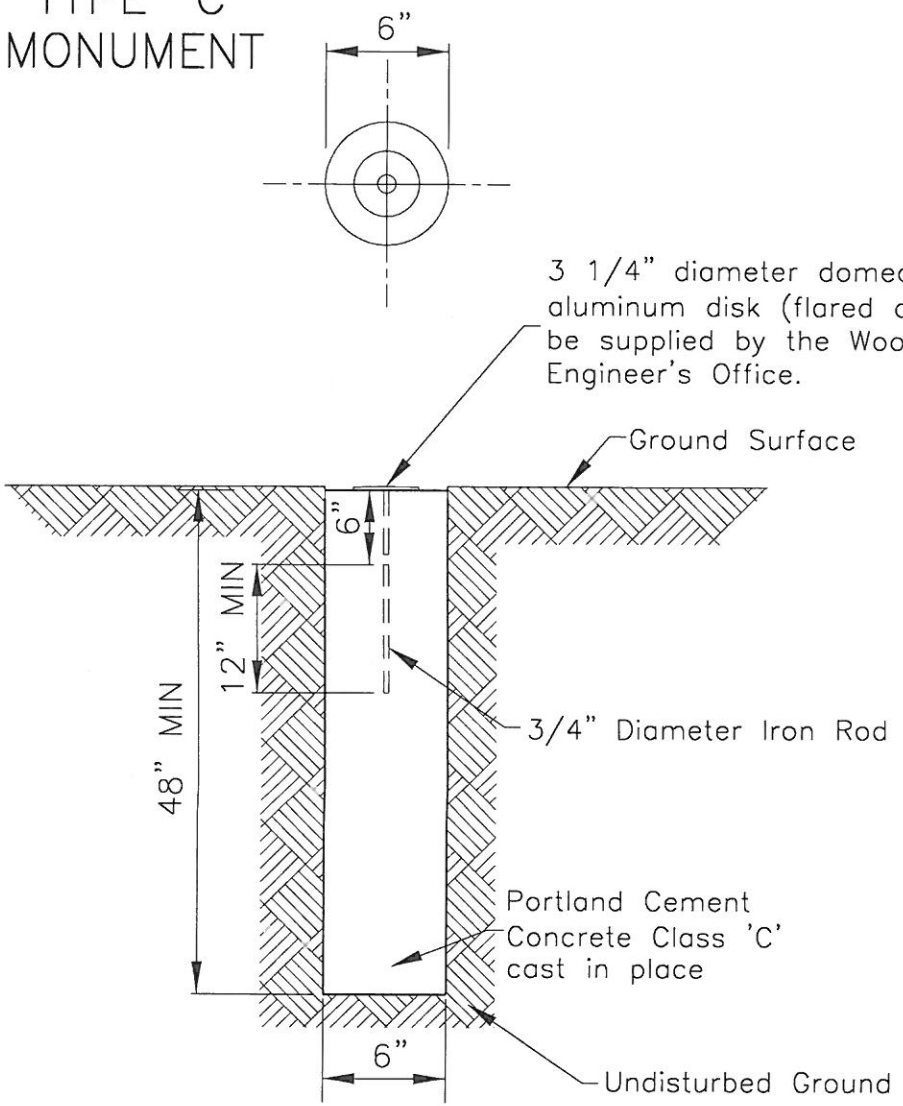
TYPE 'C' MONUMENT



BENCH MARK MONUMENTS

Bench mark monuments shall be cast in place to in minimize any settlement.

Disks can either have a flared stem, or a horizontal anchor pin placed through the stem.

A cylindrical concrete marker six (6) inches in diameter and forty–eight (48) inches in length with a three–quarter (3/4) inch diameter iron rod cast at the central axis of the cylinder and at least six (6) inches below the top of the monument. The disk shall be placed in a vertical position with its top being 1/2" below the surface of the surrounding ground.

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD
TYPE 'C'
MONUMENT ASSEMBLY

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP–2
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RAINFALL INTENSITY ZONE MAP

1101-3

REFERENCE SECTION
1101.2.4

General Notes – Figures 1101-2 through 1101-3

The Rainfall Intensity-Duration-Frequency curves are based upon data obtained from United States Weather Service Technical Paper No. 40 Rainfall Frequency Atlas of The United States.

Federal Highway Administration Hydraulic Engineering Circular No. 12 Appendix A offers a methodology for converting I-D-F data points to an equation of the general form:

$$i = a/(t+b)^c$$

Where: i = rainfall intensity (inches/hour)
t = time of concentration (minutes)
a = constant
b = constant
c = constant

Using the above referenced methodology the curves in Figure 1101-2 can be expressed using the above general equation utilizing the constants shown below.

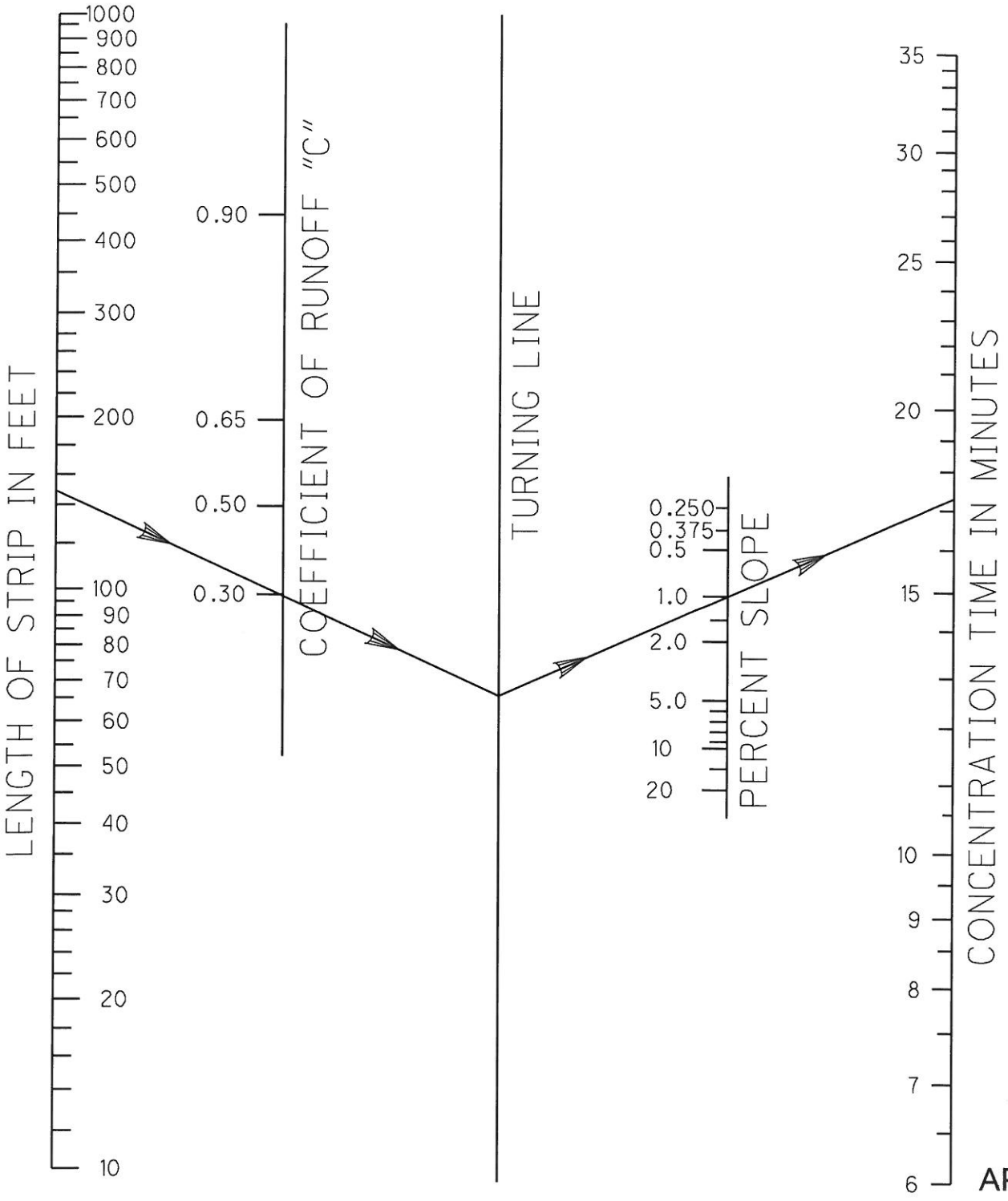
Intensity Zone (Figure 1101-3)	Frequency (Years)	Constant "a"	Constant "b"	Constant "c"
A	2	44.150	8.900	0.853
	5	150.271	18.400	1.062
	10	70.474	10.200	0.874
	25	96.280	11.100	0.899
	50	51.622	5.100	0.747
	100	85.930	8.000	0.834
B	2	140.596	25.099	1.015
	5	81.276	18.800	0.855
	10	275.649	29.499	1.070
	25	294.909	28.099	1.044
	50	117.148	16.700	0.849
	100	293.888	26.699	1.000
C	2	64.387	14.300	0.896
	5	184.940	21.699	1.075
	10	83.828	12.500	0.887
	25	58.733	7.400	0.771
	50	79.945	9.300	0.818
	100	196.039	16.300	0.978
D	2	85.568	16.500	0.950
	5	118.822	18.700	0.969
	10	112.172	16.800	0.923
	25	198.920	19.300	1.004
	50	206.025	19.600	0.990
	100	355.551	23.199	1.076

Revised July, 1999

OVERLAND FLOW CHART

1101-1

REFERENCE SECTION
1101.2.2



Form LD-34
(Revised July 1999)

STORM SEWER COMPUTATION SHEET

Calculated by.....Date.....
Checked by.....Date.....

Just Full Capacity .....Yr. Frequency
Hydraulic Gradient .....Yr. Frequency
Interstate Sag .....Yr. Frequency

Project.....
Sheet.....of.....

Manning's "n" for ..... Year Design Frequency.....
Manning's "n" for ..... Year H.G. Frequency.....

MH CB or I	Station	Side	Drainage Area In Acres		Time of Concentration In Minutes		Rainfall in Inches/Hour		Runoff Coef.	Column 7 x Column 4		Discharge in cfs (Col.6 x Col.8)		Size of Pipe in Inches	Length of Pipe in Feet	Slope of Pipe in Ft./Ft.	Inlet F/L of Pipe	Outlet F/L of Pipe	Mean Velociy in Ft./Sec.	Just Full Capacity (.....Year Q)	Friction Slope in Ft./Ft.	Head Loss in Feet	Elevation of Hyd. Gradient (for 25 year Q)	Grate or Cover Elev.	Cover Elev (21) minus H.G. Elev. (20)
No.			ΔA	ΣA	Δt	Σt	i...	i...	C	ΔCA	ΣCA	Q...	Q...	ø	L	S_o	Elev.	Elev.	V_m	cfs	S_f	H	Elev.	Elev.	

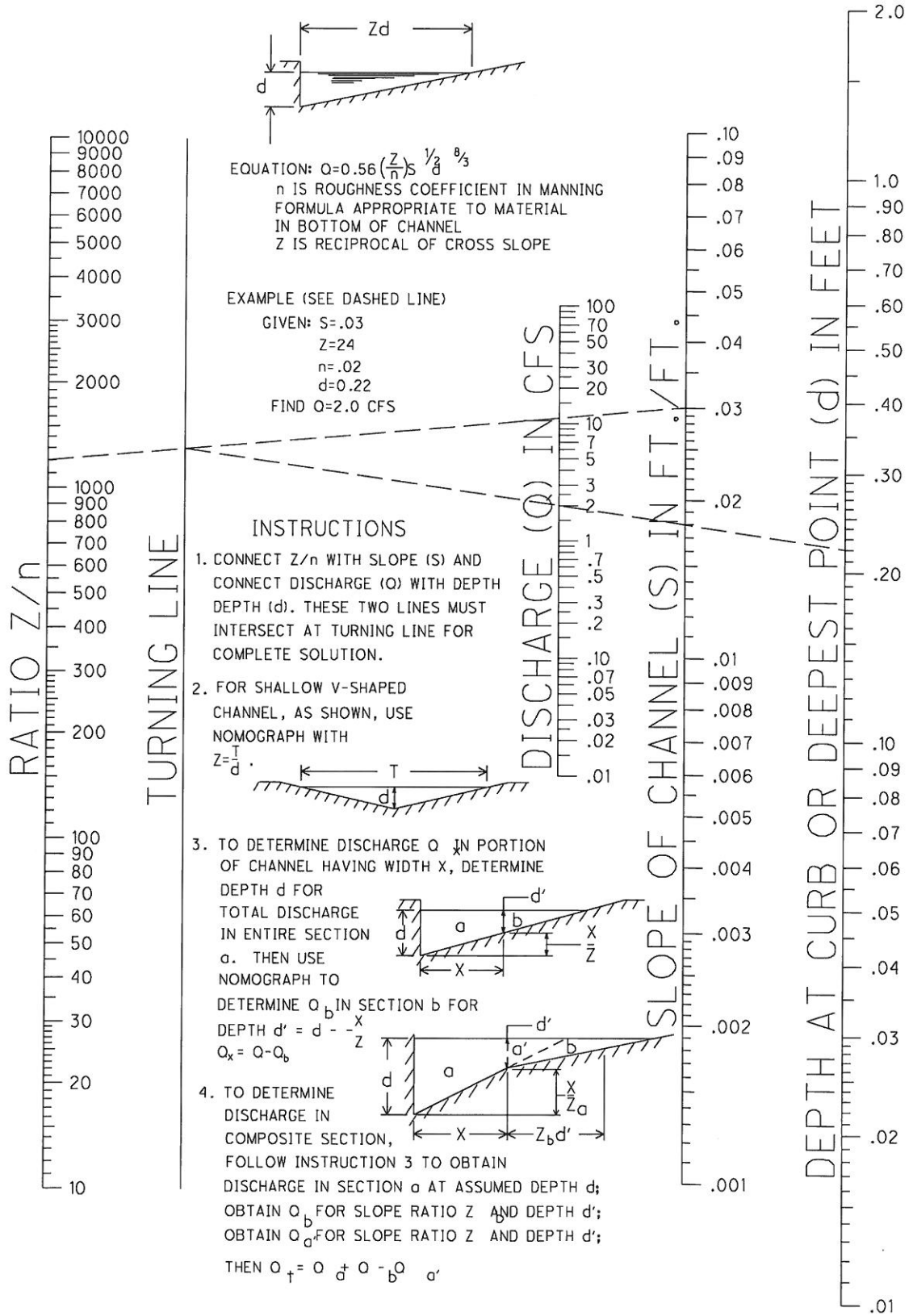
AP-6

Revised July, 1999

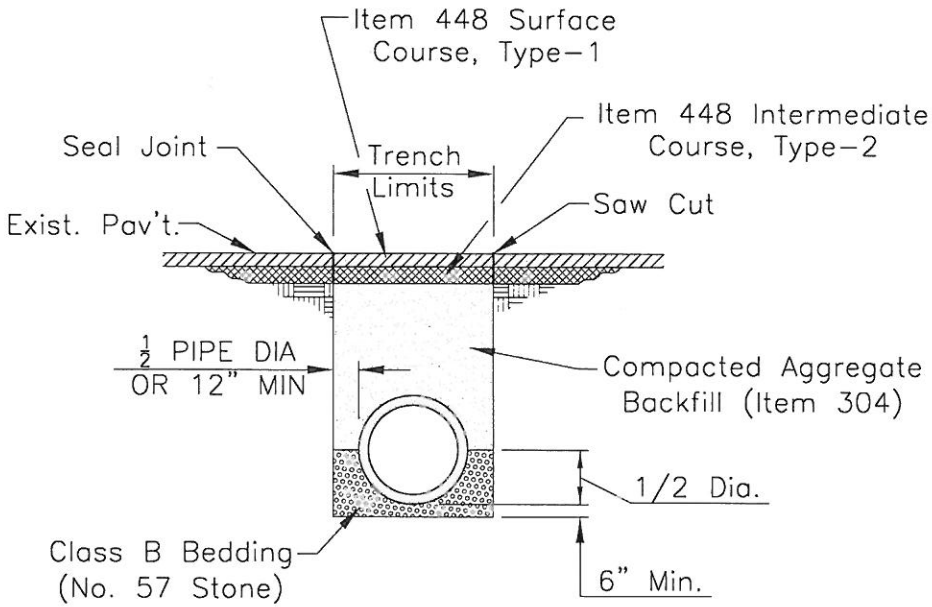
NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS

1103-1

REFERENCE SECTION
1103.4

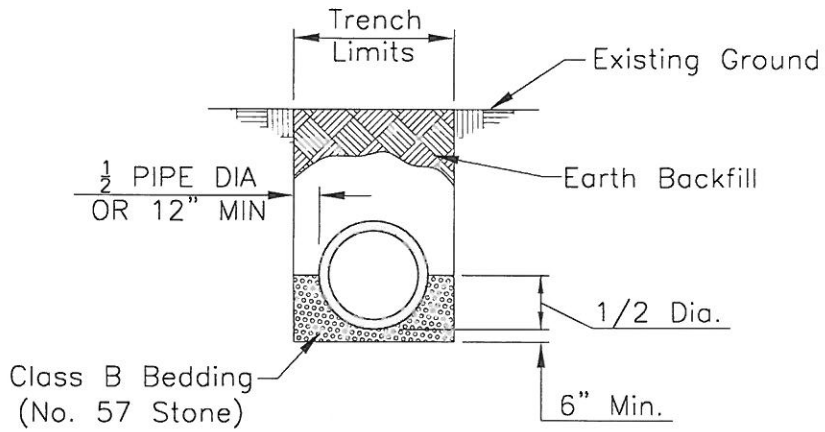


AP-7



TRENCH DETAIL

(FOR USE WITH TYPE 'A', 'B' AND 'D' CONDUITS)



TRENCH DETAIL

(FOR USE WITH TYPE 'C', 'E' AND 'F' CONDUITS)

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD TRENCH DETAILS

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP–8
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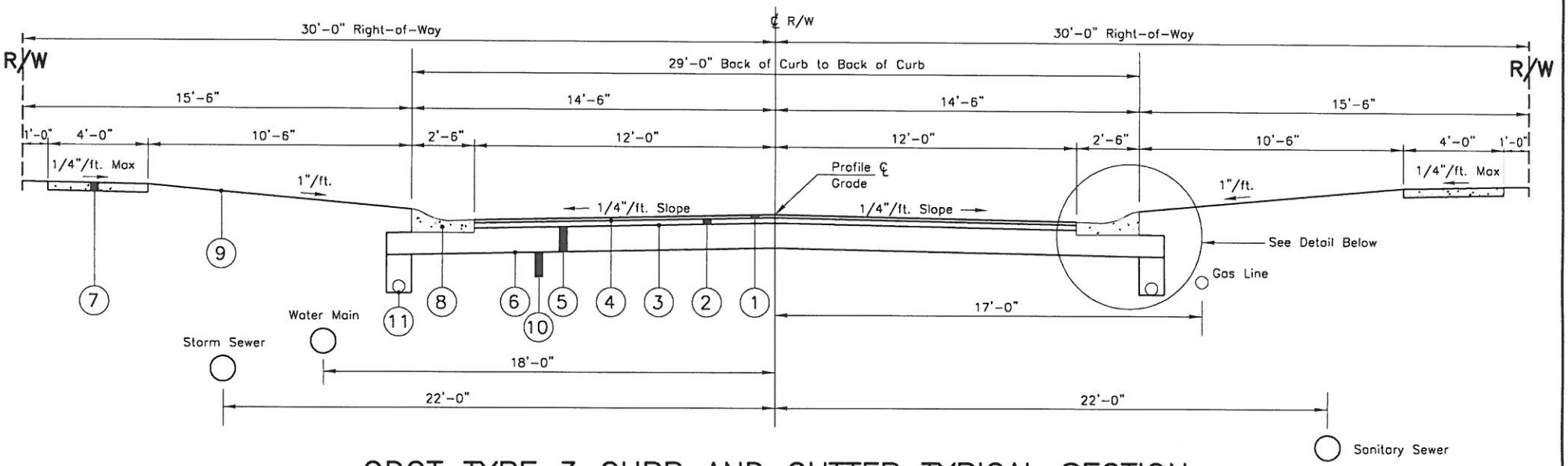
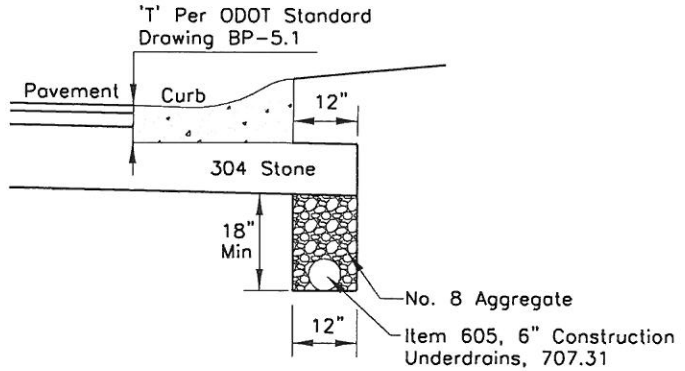


ODOT TYPE 3 CURB AND GUTTER TYPICAL SECTION

LEGEND

(1) Item 448: 1 1/2" Asphalt Concrete, Surface Course Type-1, PG64-22
(2) Item 448: 2 1/2" Asphalt Concrete, Intermediate Course Type-2, PG64-22
(3) Item 408: Prime Coat @ 0.40 Gal/SY
(4) Item 407: Tack Coat for Intermediate Course @ 0.05 Gal/SY
(5) Item 304: 12" Aggregate Base (2~6" Lifts)
(6) Item 204: Subgrade Compaction
(7) Item 608: 4" Concrete Walk, 6" at Drives (By Others)
(8) Item 609: Combination Curb and Gutter, ODOT Type 3
(9) Item 659: Seeding, Mulching and Commercial Fertilizer
(10) Item 651: 9" Topsoil Stockpiled
(11) Item 605: 6" Construction Underdrain (707.31)



CONSTRUCTION UNDERDRAIN DETAIL

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD TYPICAL SECTION WITH ODOT TYPE 3 CURB AND GUTTER

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-9
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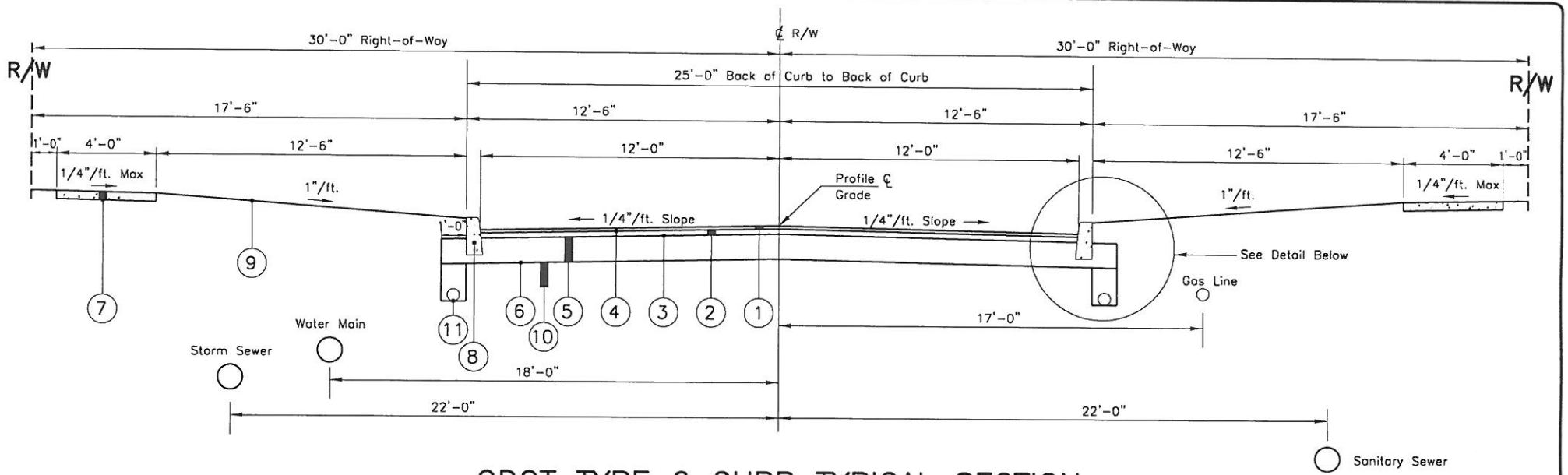
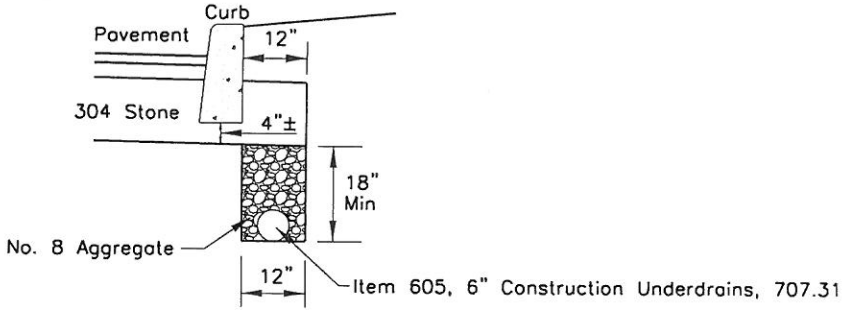


ODOT TYPE 6 CURB TYPICAL SECTION

LEGEND

1. Item 448: 1 1/2" Asphalt Concrete, Surface Course Type-1, PG64-22
2. Item 448: 2 1/2" Asphalt Concrete, Intermediate Course Type-2, PG64-22
3. Item 408: Prime Coat @ 0.40 Gal/SY
4. Item 407: Tack Coat for Intermediate Course @ 0.05 Gal/SY
5. Item 304: 12" Aggregate Base (2~6" Lifts)
6. Item 204: Subgrade Compaction
7. Item 608: 4" Concrete Walk, 6" at Drives (By Others)
8. Item 609: Curb, ODOT Type 6
9. Item 659: Seeding, Mulching and Commercial Fertilizer
10. Item 651: 9" Topsoil Stockpiled
11. Item 605: 6" Construction Underdrain (707.31)



CONSTRUCTION UNDERDRAIN DETAIL

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD TYPICAL SECTION WITH ODOT TYPE 6 CURB

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-10
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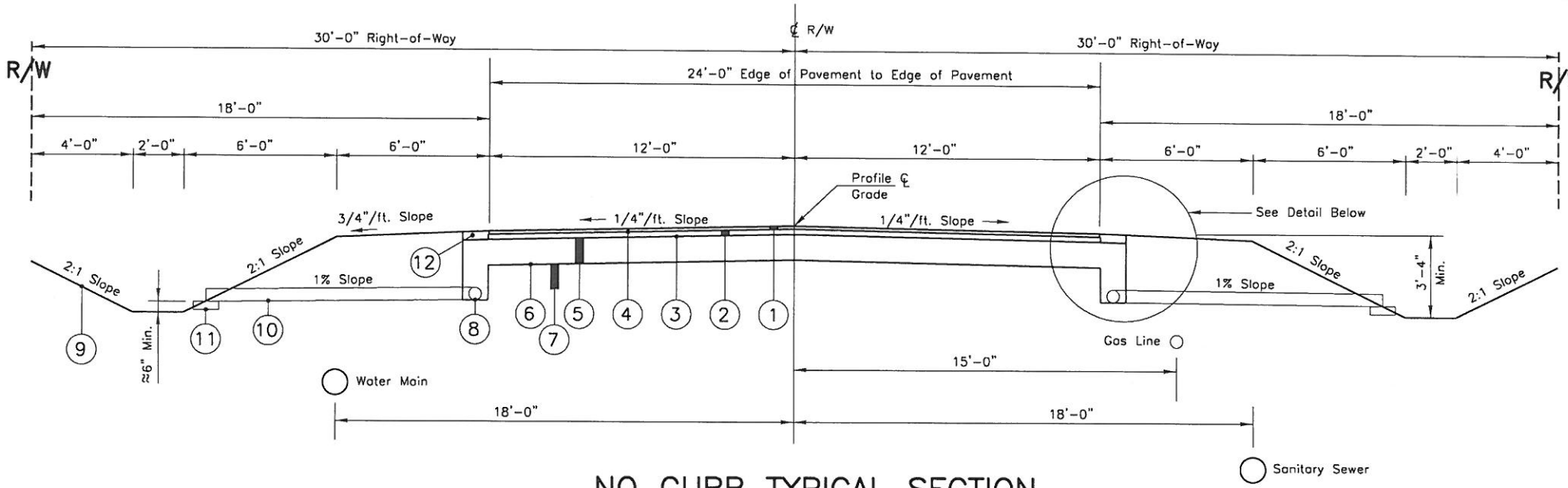
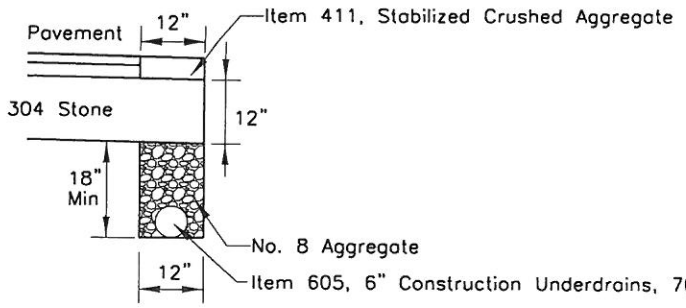


NO CURB TYPICAL SECTION

LEGEND

1. Item 448: 1 1/2" Asphalt Concrete, Surface Course Type-1, PG64-22
2. Item 448: 2 1/2" Asphalt Concrete, Intermediate Course Type-2, PG64-22
3. Item 408: Prime Coat @ 0.40 Gal/SY
4. Item 407: Tack Coat for Intermediate Course @ 0.05 Gal/SY
5. Item 304: 12" Aggregate Base (2~6" Lifts)
6. Item 204: Subgrade Compaction
7. Item 651: 9" Topsoil Stockpiled
8. Item 605: 6" Construction Underdrain (707.31)
9. Item 659: Seeding, Mulching and Commercial Fertilizer
10. Item 611: 6" Conduit Underdrain Outlet, Type F (707.33)
11. Item 611: Precost Reinforced Concrete Outlet
12. Item 411: Stabilized Crushed Aggregate



CONSTRUCTION UNDERDRAIN DETAIL

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD
TYPE 'C' TYPICAL SECTION
W/ NO CURB

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-11
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Form LD-42

PROJECT: _____ DESIGNER: _____

STATION: _____ DATE: _____

CHANNEL INFORMATION

CHANNEL SLOPE _____

ROUGHNESS COEFFICIENT _____

HYDROLOGIC AND TAILWATER INFORMATION

Q_1 = _____ TW_1 = _____

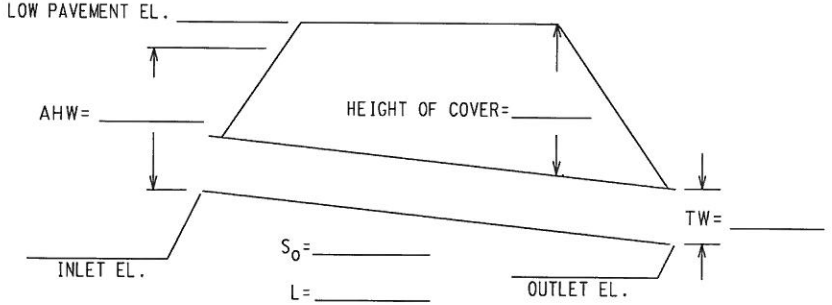
Q_2 = _____ TW_2 = _____

Q_1 = DESIGN DISCHARGE (Q_{10}, Q_{25}, or Q_{50})
Q_2 = CHECK DISCHARGE (Q_{50} OR Q_{100})

DITCH BREAK EL. _____

LOW PROPERTY EL. _____

CONTROLLING HEADWATER CRITERION (SECTION 1006) _____



CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW (IC or OC)	OUTLET VELOCITY	COMMENTS:
			INLET CONTROL		OUTLET CONTROL HW = H + h_o - LS_o										
			$\frac{HW}{D}$	HW	k	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW			

STREAM pH _____ IS THE SITE ABRASIVE? _____ DESIGN SERVICE LIFE (SECTION 1002.3.1) _____

SUMMARY & RECOMMENDATIONS:

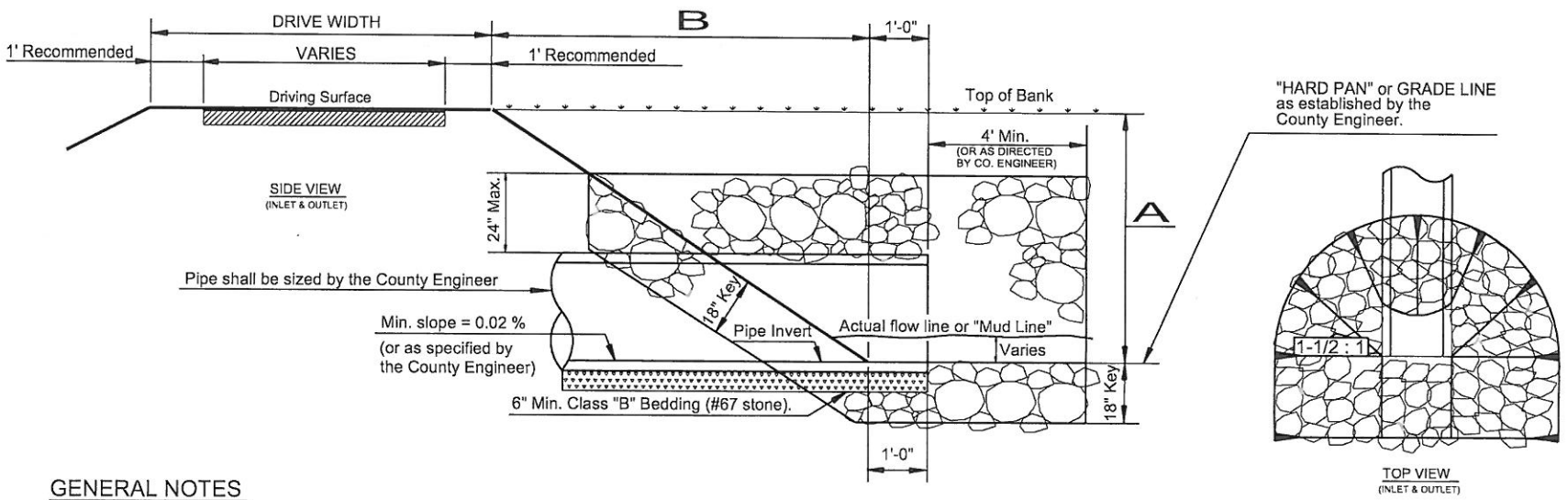
TABLE II

(For use with Sec. 8)

Waterway Area Required According to Dunn's Table

The following table of suggested waterways is taken from a table prepared by the late James Dunn for the A. T. & S. F. Ry. Values given in the table were prepared by Mr. Dunn from observations of streams in a region in which steep slopes prevail and the soil absorbs but a small percentage of the rainfall. The map shows the State of Ohio divided into several parts with each part given a percentage which, when multiplied by the value in the table, indicates the waterway in square feet that, in the absence of more reliable data, may be assumed as required for *ordinary* flood conditions. It is to be expected that, in using this table, other features of the drainage basin, such as its shape, etc., will be taken into consideration and the percentage varied accordingly. *Where a part of the flood flow is expected to go through spillways or over the road adjacent to the bridge, the waterway under the bridge may be less than that indicated by this table.*

Area Sq. Mi.	Waterway Sq. Ft.	Area Sq. Mi.	Waterway Sq. Ft.	Area Sq. Mi.	Waterway Sq. Ft.
1.0	100	16	865	300	3,615
1.2	120	18	920	350	3,900
1.4	140	20	970	400	4,165
1.6	160	25	1,080	500	4,610
1.8	180	30	1,180	600	5,030
2.0	200	35	1,270	700	5,420
2.5	250	40	1,350	800	5,800
3.0	300	50	1,510	900	6,080
3.5	349	60	1,650	1,000	6,380
4.0	388	70	1,780	1,200	6,960
4.5	424	80	1,900	1,400	7,480
5.0	455	90	2,015	1,600	7,960
6.0	509	100	2,120	1,800	8,390
7.0	556	120	2,315	2,000	8,820
8.0	601	140	2,500	2,500	9,790
9.0	641	160	2,665	3,000	10,640
10.0	679	180	2,820	4,000	12,160
12.0	740	200	2,970	5,000	13,500
14.0	805	250	3,310	6,000	14,520



GENERAL NOTES

All work done in the public right-of-way shall be done according to the Ohio Department of Transportation, Construction and Materials Specifications manual (current edition).

Rock Channel Protection (Item 601.09),Type "C" or Type "D" ,as directed by the County Engineer, shall be placed at a Max. side slope of 1-1/2 : 1 and 18" deep. When Rock Channel Protection is not used, the side slope shall be no greater than 2 : 1 & seeded.

All Rock Channel Protection, when used, shall be keyed into the channel bottom and side slopes as shown on this drawing.

All side slopes without Rock Channel Protection as well as any disturbed yard area, within the public right-of-way, shall be seeded in accordance with Item 659 or as directed by the Wood County Engineer.

Pipe invert elevations (inlet & outlet) shall be determined by the County Engineer and established by the County Surveyor or an authorized agent of the County.

All driveway pipe (conduit) greater than 36" in diameter shall be classified as "Type A" conduit (Item 611.02).

All driveway pipe (conduit) 36" or less in diameter shall be classified as "Type B" conduit (Item 611.02).

Backfilling shall be done in accordance with Item 703.11 for Type A & Type B conduit.

HOW TO DETERMINE DRIVEWAY CULVERT LENGTHS

WITH RIP-RAP	WITHOUT RIP-RAP
If A = 2ft. then B = 3ft.	If A = 2ft. then B = 4ft.
If A = 4ft. then B = 6ft.	If A = 4ft. then B = 8ft.
If A = 6ft. then B = 9ft.	If A = 6ft. then B = 12ft.
If A = 8ft. then B = 12ft.	If A = 8ft. then B = 16ft.
If A = 10ft. then B = 15ft.	If A = 10ft. then B = 20ft.

EXAMPLE: Drive Width = 12', A = 6', Rip-Rap used
Minimun Culvert length = (2 x B) + Drive Width + 2ft.
Minimun Culvert length = (2 x 9ft.) + 12ft. + 2ft. = 32ft.

NEW DRIVEWAY CULVERT PIPE DETAIL

OFFICE OF THE WOOD COUNTY ENGINEER

APPROVED BY: Raymond A. Huber

Raymond A. Huber, P.E., P.S.
Wood County Engineer

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD
NEW DRIVEWAY
CULVERT PIPE DETAIL

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-14
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Form LD-41
(Revised July 1999)

DITCH COMPUTATION SHEET

Project.....

Sheet.....of.....

Calculated by.....Date.....

Checked by.....Date.....

DESIGN FREQUENCY FOR:

Velocity.....Yrs.

Depth.....Yrs.

DITCH INFORMATION

MANNING'S "n" FOR:

Seeded lining.....

Sod or Jute Mat Lining.....

Paved Lining.....

Dumped Rock Channel Protection.....

ALLOWABLE VELOCITY FOR (in f.p.s.)

Seeded lining.....

Sod or Jute Mat Lining.....

Dumped Rock Channel Protection.....

DITCH CALCULATIONS

Ref. No.	Station		Side	Drainage Area in Acres		Time			Intensity		Runoff Coef.	Coe. x A		CiA		Slope Ft./Ft.	Velocity in f.p.s.	Depth in ft.	Ditch Time Check	Treatment		
	High Point	Point of Solution		ΔA	ΣA	Over-land	Ditch	ΣT	Vel.	Depth		ΔCA	ΣCA	Qv	Qd					Lining	Station From	Station To

AP-15

MASTER STORM METER LINE
FOR
JOB NAME
SECTION XX, XXXXXXXXXX TOWNSHIP, WOOD COUNTY, OH

Calc By: XXX Date: XX/XX/XXXX Job No:XXXXXX
Chkd By: XXX

DATA

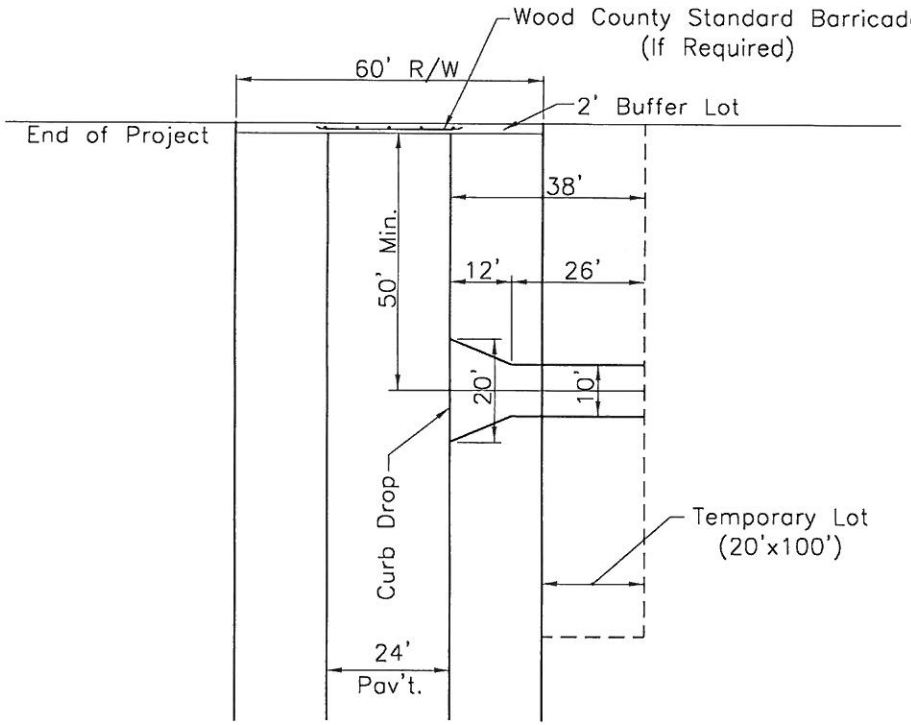
1. Length of meter line (ft) =		450.00
2. Slope of meter line (% grade) =		0.711
3. Size of meter line (inches) =		6.000
4. Type / pipe Concrete	Pipe n=	0.013
5. Entrance Coeff (Ke = 0.5) =		0.50
6. Hydraulic Radius (R) ft. =		0.1250
R4/3 =		0.0625
7. 1+Ke+(29n^2L)/R^(4/3) =		36.7872
8. Area of Pipe (sq. ft.) =		0.1964
9. Upper flow line of meter line =		97.20
10. Upstream water elevation =		100.00
11. H to top downstream end of meter line =		5.50
12. Elevation of downstream water level =		95.00
13. H between upper and lower W.L. =		5.00

Note: Use smallest H from (11) or (13) Above!

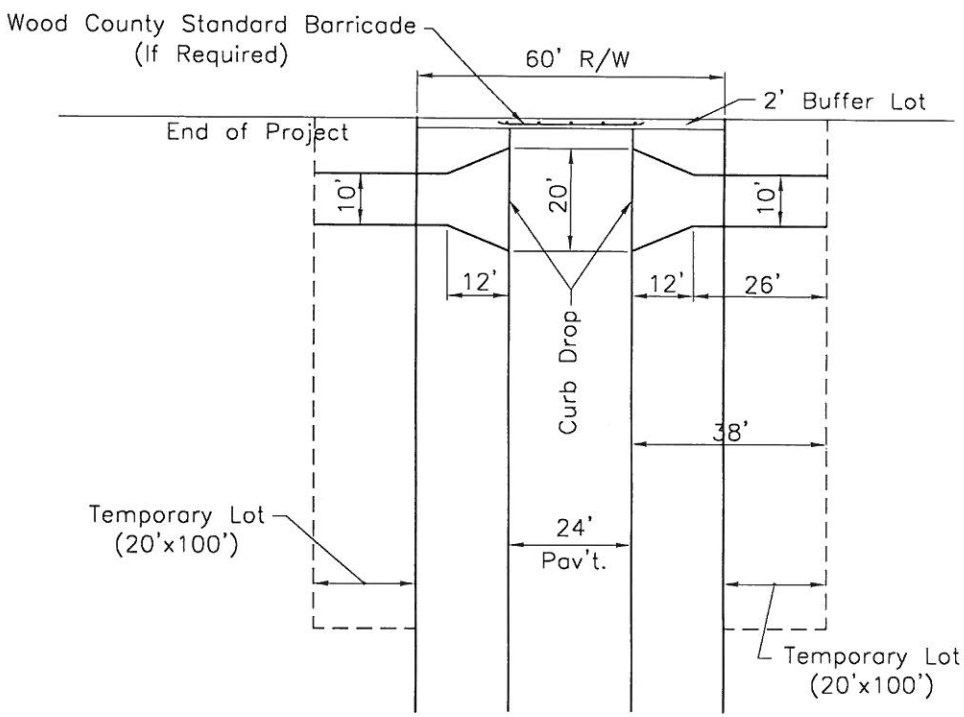
Assumed Head (ft)	V2	V (ft/s)	A Pipe (sq.ft.)	Flow cfs	Q avg (cfs)
0.50	0.875	0.936	0.196	0.184	0.184
1.00	1.751	1.323	0.196	0.260	0.222
1.50	2.626	1.620	0.196	0.318	0.254
2.00	3.501	1.871	0.196	0.367	0.282
2.50	4.377	2.092	0.196	0.411	0.308
3.00	5.252	2.292	0.196	0.450	0.332
3.50	6.127	2.475	0.196	0.486	0.354
4.00	7.002	2.646	0.196	0.520	0.374
4.50	7.878	2.807	0.196	0.551	0.394
4.84	8.473	2.911	0.196	0.572	0.412
5.00	8.753	2.959	0.196	0.581	0.427
5.50	9.628	3.103	0.196	0.609	0.442
6.00	10.504	3.241	0.196	0.636	0.457
6.50	11.379	3.373	0.196	0.662	0.472
7.00	12.254	3.501	0.196	0.687	0.486
7.50	13.130	3.623	0.196	0.711	0.500
8.00	14.005	3.742	0.196	0.735	0.514

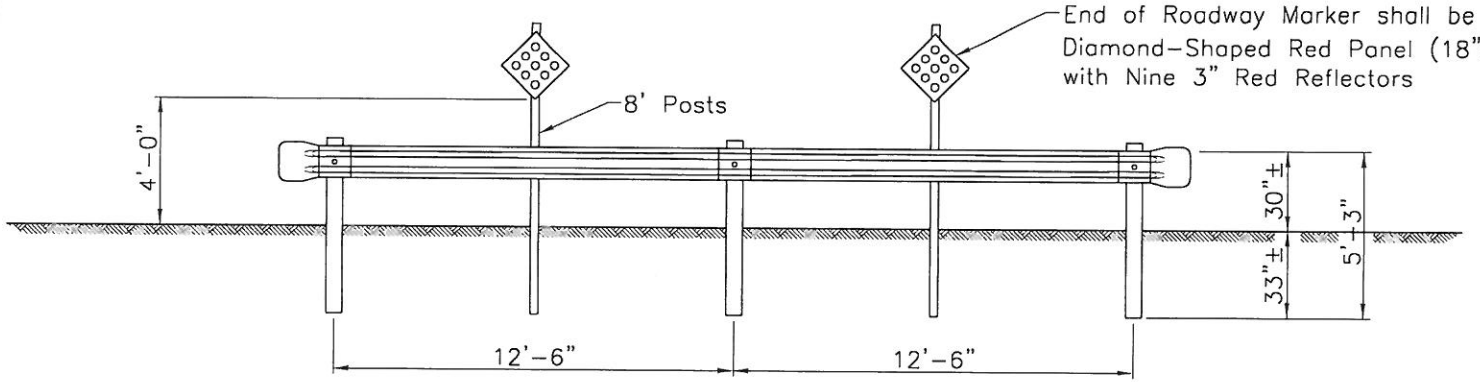
NOTE: All Red cells are inputed values; all other cells are calculated!

TURNAROUND TYPE 'A'



TURNAROUND TYPE 'B'





STANDARD BARRICADE

DESIGNED	REVIEWED	JOB NUMBER
JMM	JMM	
DRAWN	APPROVED	PROJECT NUMBER
SPJ	RAH	

WOOD COUNTY STANDARD BARRICADE AND TURNAROUNDS

WOOD COUNTY ENGINEER'S OFFICE
Raymond A. Huber, County Engineer
Bowling Green, Ohio

AP-17
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PRELIMINARY PLAT CHECKLIST

Project Name _____

Checked by _____ Date _____

Does	Does Not		
		1.	**General**
_____	_____	(a)	Transparency and ten (10) copies of plat submitted.
_____	_____	(b)	The application form was properly completed.
_____	_____	(c)	The plat was prepared at a scale of not less than 1 inch = 100 feet.
_____	_____	(d)	Graphical scale shown.
_____	_____	(e)	Sheets are 24 inches x 36 inches in size with 1/2-inch border and 1-1/2-inch left binding edge with lettering size no smaller than 0.125 inches with pen width of at least 0.013 inches.
_____	_____	(f)	No ditto (") marks used.
_____	_____	(g)	Submittal of disk with drawing file.
		2.	**Plat Detail**
_____	_____	(a)	Name of subdivision (does not duplicate another subdivision in Wood County).
_____	_____	(b)	Location of subdivision by River Tract, Section, Town, Range, and Township.
_____	_____	(c)	Name and address of owner/developer.
_____	_____	(d)	Name and address of engineer/surveyor preparing plat.
_____	_____	(e)	Date.
_____	_____	(f)	Northpointe.
_____	_____	(g)	Vicinity map at 1 inch = 400 feet or larger scale.
_____	_____	(h)	Existing FEMA flood plain boundaries with the 100 year flood elevation.
_____	_____	(i)	Existing soil information and boundaries.
_____	_____	(j)	Existing zoning of the abutting lands to proposed subdivision.
_____	_____	(k)	Existing building setback lines of adjacent parcels to proposed subdivision.
_____	_____	(l)	Existing boundary lines of adjacent lands with names of owners and parcel numbers.
_____	_____	(m)	Existing locations, widths, centerlines and names of streets, railroads, rights-of-way and easements. Please note right-of-way deficiencies.
_____	_____	(n)	Existing contours with one (1) foot intervals and tied to U.S.G.S. datum.
_____	_____	(o)	Existing parks, open spaces, wooded areas and significant topographic features (natural or man-made) in the plat or adjacent to site.
_____	_____	(p)	Existing structures.
_____	_____	(q)	Existing sewers, water mains, culverts, other utilities, with sizes.

Does	Does Not	
		2. Plat Detail, cont.
_____	_____	(r) Proposed boundary line of subdivision indicated by solid heavy line.
_____	_____	(s) Proposed zoning.
_____	_____	(t) Proposed building setback lines. A typical lot may be shown.
_____	_____	(u) Proposed locations, widths, centerlines and names of streets, rights-of-way and easements. Duplication of street names is not allowed.
_____	_____	(v) Proposed parks and open space.
_____	_____	(w) Proposed sanitary sewers, manholes, pump stations, etc.
_____	_____	(x) Proposed water mains, manholes, fire hydrants, flush hydrants, meter pits, etc.
_____	_____	(y) Proposed storm sewers, catch basins, manholes, culverts, pump stations, detention/retention drainage basins, etc. with the ultimate outlet(s).
_____	_____	(z) Proposed central water system.
_____	_____	(aa) Proposed central waste water treatment plant (WWTP). *
_____	_____	(bb) Proposed on-lot water system (wells).
_____	_____	(cc) Proposed on-lot sewerage system (septic tanks and leach fields).
_____	_____	(dd) Percolation Tests.
_____	_____	(ee) Proposed lot layout with lot numbers and lot dimensions.
_____	_____	(ff) Proposed areas of lots, open spaces, streets and total.
_____	_____	(gg) Proposed dedication or reservation of land for public or private purposes.
_____	_____	(hh) Proposed tree planting plan.
_____	_____	(ii) Proposed sidewalks.
		Additional Requirements for Commercial and Industrial Plats
_____	_____	(ii) Proposed ingress and egress.
_____	_____	(jj) Proposed locations and dimensions of parking areas.
_____	_____	(kk) Proposed locations and dimensions of loading areas.
_____	_____	(ll) Proposed locations and dimensions of pedestrian walkways.
		3. Certifications
_____	_____	(a) The certification of the Surveyor.
_____	_____	(b) The certification of approval of the Planning Commission.
		4. Comments

_____

_____

_____

* A connection to a central facility shall be mandatory when one becomes available.