A MANUAL OF PRACTICE FOR THE DESIGN OF PUBLIC IMPROVEMENTS IN THE CITY OF BLOOMINGTON, ILLINOIS

Third Addition, July 2005

Adopted by the City Council of the City of Bloomington

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COMPILED BY DEPTARTMENT OF ENGINEERING

Douglas G. Grovesteen, P.E., Director of Engineering

A Manual of Practice for the Design of Public Improvements in the City of Bloomington

UPDATE LOG

For this manual to be effective it is necessary that it be kept current. From time to time additions/revisions will be incorporated into the appropriate sections of the manual. The City does offer a subscription to updates which provides automatic mailing of update material. This service is being offered at this time for $25 per year.

Below is the list of all additions/revisions to date. Please incorporate these additions/revisions into your copy of the manual.

If in using this manual you find items that should be added, deleted or corrected, please submit a written request of the desired modification to the Department of Engineering, City of Bloomington. Your request will come before the Manual Committee for review. Please contact the Engineering Department at (309) 434-2225 should you have any questions.

ISSUE DATE	DATE INCORPORATED	SUBJECT
May, 1998		
October, 2003		
July, 2005		

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in the City of Bloomington

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CHAPTER 1 - Engineering and Administration Procedures

1.01 INTRODUCTION

A major share of what eventually become publicly owned improvements are designed and constructed by private interest. This manual has been prepared for the purpose of insuring that the design of such improvements will result in construction meeting the requirements of the City. The intent of this chapter is to explain the processing requirements and procedures as required by the Municipal Code for the various documents required prior to, during, and after construction in order to accomplish these purposes.

The manual is also intended to provide a uniform design criteria for facilities designed for or directly by the City.

1.02 DEFINITION OF TERMS

The following words and terms, whenever they occur in this manual, shall be interpreted as herein defined.

Abutting (Contiguous, Adjacent). Abutting means have one or more common boundary lines or district lines.

Alley. An alley is a public right-of-way which is 9 m (30 feet) wide or less, and affords a secondary means of access to abutting property. Frontage on an alley shall not be construed as satisfying the requirements related to frontage on a public street.

As Built Plans. (See Record Drawings)

Block. A block is a tract of land bounded by streets, or by a street or streets and any combination of boundary lines of public of institutionally owned lands, railroad rights-of-way, rivers and lakes and/or other lines of demarcation. A block may be located in part within an incorporated city or town.

Building Setback Line. is a line within a lot, or other parcel of land, so designated on the preliminary plan and the final plat, which denotes the area between such line and the adjacent street right-of-way line where an enclosed building, and other obstructions are prohibited, except those permitted obstructions as regulated by the Bloomington Zoning Code, 1960 as amended.

Center Line.

(a) the centerline of any right-of-way having uniform width;
(b) the original centerline, where a right-of-way has been widened irregularly;
(c) the new centerline, whenever a road has been relocated.

City Clerk is the City Clerk of Bloomington, Illinois, or his/her duly authorized representative.

City Manager. The individual occupying that position on the staff of the City of Bloomington, or his/her duly authorized representative.

City Planner. The individual occupying that position on the staff of the City of Bloomington, Illinois, or his/her duly authorized representative.

Collection Tile System. A tile system serving individual lots for the purpose of receiving water discharged from sources such as footing tiles.

Comprehensive Plan. The Official Comprehensive Plan is the composite of the functional and geographic elements of the Comprehensive Plan of the City Of Bloomington, or any segment thereof in the form of plans, maps, charts, textual materials and the Official map, as adopted by the City Council.

Conduit. A buried pipe for the installation of wires or cables or the conveyance of gas, water, storm water or waste water.

Contractor. An individual, company, firm or other party or organization who contracts to physically construct all or a portion of a project for either a developer or the City.

Cradle. Bedding placed under and around a conduit for proper support.

Cross Slope. The degree of inclination measured transversely across pavements rather than longitudinally in the direction traffic moves on the pavement.

Design Engineer. The individual responsible for the design and preparation of plans, specifications, and contract documents. This individual must be a Licensed Professional Engineer in Illinois.

Developer. (See "Owner").

Development. Development means both the act of changing and the state of land after its function has been purposefully changed by man including, but not limited to, construction of structures on the land, and alterations to the land, except grading that does not alter the natural flow of storm water.

Director of Engineering. The individual occupying that position on the staff in the City of Bloomington or his/her designated representative.

Director of Planning and Code Enforcement. The individual occupying that position on the staff of the City of Bloomington, Illinois, or his/her designated representative.

Director of Public Service. The individual occupying that position on the staff of the City of Bloomington or his/her designated representative.

Drainage way, Improved. A portion of a right-of-way or easement used or intended principally for storm, surface or ground water drainage which meets or exceeds the design and construction standards for public drainage ways.

Drainage way, Unimproved. A portion of land used or intended principally for storm, surface or ground water drainage which does not meet or exceed the design and/or construction standards for public drainage ways.

Driveway. A driveway is a private access way for motor vehicles between a public or private street and one or more structures or off-street parking areas.

Easement. A quantity of land set aside over or under which a liberty, privilege, or advantage in land without profit, is dedicated and is distinct from ownership of the land may be granted either to the public, a particular person, a utility company, or a combination thereof.

Engineer. A Licensed Professional Engineer licensed by the State of Illinois.

Field Inspector. An individual, company or firm appointed by the Director of Engineering to inspect construction to insure compliance with approved plans and specifications.

Final Development Plan. A final plan that is required to be submitted to the City as specified in the Planned Unit Development regulations in Land Subdivision Code (Chapter 24).

Final Plat. A map or plan of a subdivision and any accompanying material.

Final Punch List. A tabulation of deficiencies requiring corrective action prior to Final Acceptance of a project.

Flood Route. A designated strip or piece of land which will receive the excess surface runoff not accommodated by storm sewer or other drainage facilities**.**

Frontage. Frontage is the measure of lineal contiguity between a lot or portion thereof and another lot, public street, alley or public way.

Frontage Road. A local street which is parallel and either adjacent to, or within the right-of-way of an arterial street.

Geographic Information System (G.I.S.). A computer system maintained by Bloomington, Normal and McLean County that stores and links non-graphic attributes or geographically referenced data with graphic map features to allow a wide range of information processing and display operations, as well as map production, analysis and modeling.

Illinois Department of Transportation (I.D.O.T.). The division of state government identified by this name.

Live Storage. That volume available in a storm water detention/retention basin for runoff in accordance with the requirements of this Manual.

Lot. A quantity of land capable of being described with such certainties that its location and boundaries may be established and which is designated by its owner or developer as land to be conveyed, used or developed as a unit or which has been conveyed, used or developed as a unit, including any easements within its boundaries. Such lot shall have frontage on public or private street.

Lot, Double Frontage. A lot which has a pair of opposite lot lines along two substantially parallel streets.

Lot of Record. A lot which is part of a subdivision recorded in the office of the McLean County Recorder of Deeds, or a lot or parcel described by metes and bounds, the description of which has been legally recorded.

Lot, Out. A lot depicted on a final subdivision plat which does not meet the requirements of this Code for lots of record and which may not be used for buildings and parking lots.

Lot, Through. A lot other than a corner lot with frontage on more than one (1) street. Through Lots abutting two (2) streets may be referred to as double frontage lots.

Manual. This document entitled “A Manual of Practice for the Design of Public Improvements in the City of Bloomington”.

Median. An area between opposite traffic lanes of a street or roadway or an area between two parallel streets or roadways

Monument.

(a) Public Land Survey Monument and Accessory Monument
Section 765 Illinois Complied Statutes (ILCS) 220/3.03, "Public land survey monument" means any boundary monument or position thereof established on the ground by a Cadastral Survey of the United States Government and made part of United States public land record.

Section 765 Illinois Complied Statutes (ILCS) 220/3.04, "Accessory means any physical evidence in the vicinity of a survey monument of position thereof, the relative position of which is of public record and which is used to perpetuate the location of the monument. Accessories shall be construed to include the accessories recorded in the original survey notes, and additional reference points and dimensions furnished by subsequent land surveyors of attested to in writing by persons having personal knowledge of the original location of monument.

(b) Property Corner Monument
Monument shall be of Steel, Iron, or Aluminum with magnetic cap or core. It shall be a minimum of 760mm (30 inches) long and 13mm (1/2 inch) in diameter. The monument shall be driven to a depth as to prevent frost heave and potential surface damage hazards I.e.:mowing, tilling, grading, fences and other such actions.

(c) McLean County GIS Control Monument
Monument shall be of the type manufactured by Berntsen International, Inc. or it's equivalent. The monument shall be an aluminum sectional rod monument with a minimum length of 1.8m (6 feet) with a 16mm (5/8 inch) diameter. It shall have a magnetic Spherical Datum point top. It shall also be recesses below ground surface by minimum of 150mm (6 inches) with a protective casing installed over monument. The protective casing shall be an Aluminum Access cover of the type provided by Berntsen International, Inc. or it's equivalent. The casing pipe shall be a minimum of 125mm (5 inches) or compatible with access cover. This casing with aluminum access cover shall be flush with the existing ground surface and extend to a depth of minimum of 760mm (30 inches) with sand fill inside and a 50/50 mix of dry sand and cement outside of casing. In rural area witness post will be set near monument.

No-Access Strip. An area of land area at least one meter (3 feet) wide along a lot line within which no vehicular driveways shall be permitted.

Official Map. The Official Map is the map adopted by the City Council as part of the Comprehensive Plan which is designated "Official Map" in that plan.

Outlot. See Lot, Out.

Owner. Any person, firm, association, partnership, private corporation, public or quasi-public corporation, or a combination of any of them, or other legal entity having sufficient proprietary interest fee simple ownership or contract to obtain fee simple ownership in the land sought to be subdivided or developed to commence and maintain proceedings under the provisions of this Code.

Pedestrian Way. A right-of-way or easement across or within a block designated for pedestrian use.

Planned Unit Development. A Planned Unit Development is a lot or group of lots which is developed as a unit under single ownership or unified control, which includes one (1) or more principal buildings or uses, and is processed under the planned unit development procedure of the Subdivision Code (Chapter 24).

Planning Commission. The Planning Commission of the City of Bloomington, Illinois.

Post - Developed Condition. The condition of the land after the construction of all the proposed improvements, including the additions of all impervious surfaces.

Pre - Developed Condition. The existing condition of the land prior to the addition of any impervious improvements such as pavements and rooftops. Existing aggriculteral uses (such as tilling of the soil and growing of crops) may be considered a pre-developed condition. In no instance shall the assumed pre-developed conditions exceed the following:

For the Rational Method: C = 0.25

	Soil Group	A	B	C	D
For the SCS Method:	CN =	64	75	82	85

Preliminary Development Plan. A tentative map or plan of a proposed development as described in the Planned Unit Development regulations, Chapter 24 Division III of the Municipal Code.

Preliminary Plan. A tentative map or plan of a proposed subdivision as described in Chapter 24 of the City Code.

Project. All of the various parts of proposed construction submitted to the Director of Engineering & Water for approval.

Public Improvements. Public improvements includes streets, sidewalks, public utilities and other structures, fixtures or land appurtenances which are or are intended to be dedicated to the City of Bloomington and the public generally.

Release Rate. The controlled rate at which storm water is released from a storm water detention/retention basin; not including overflow.

Right-of-Way. A strip of land dedicated to or used by the public for vehicular and/or pedestrian passage; storm, surface or ground water drainage; or public utility placement.

Roadway. A portion of a right-of-way designated for motorized vehicular use.

Setback. The minimum longitudinal distance between the building line or structure and the related front, side or rear property line.

Sidewalk. A portion of a right-of-way used or intended principally for pedestrian passage, which meets or exceeds the design standards for public sidewalks.

Storm Frequency. The frequency of occurrence of a rainfall represents the number of years in which a rain of that magnitude, or larger, will occur. Statistically, it represents the probability of occurrence of a storm event eg. 100 year frequency storm has 1% probability in any given year, 5 year frequency storm has 20% probability.

Storm Water Detention Basin. A reservoir designed and built for temporary storage of surface runoff, either on, below or above ground surface accompanied by controlled release of the entire stored water.

Storm Water Retention Basins. A wet bottom reservoir designed and built for temporary storage of surface runoff, above normal water level of the reservoir, accompanied by controlled release of the part of the stored water above normal water level of the facility.

Street. A street is that portion of a public right-of-way used and maintained as principal means of access to adjacent lots of record or property and meets the design and construction standards for the classification it holds.

Street, Arterial. An Arterial street has a high average daily traffic (ADT) and is not intended to be a residential street. An arterial street provides connection with major state and interstate roadways and has a high potential for the location of significant community facilities as well as retail, commercial, and industrial facilities.

Street, Boulevard. A street with a non mountable median, usually with a grass surface on the median.

Street, Collector. A collector street functions to conduct traffic between major streets and/or activity centers. It is a principal traffic artery within residential areas and carries moderate volumes of traffic. A collector street has potential for sustaining minor retail or other commercial establishments along its route which will influence the traffic flow.

Street, Cul-de-Sac. A local street with only one outlet which ends with a turn around.

Street, Exterior. A street on the perimeter of a subdivision.

Street, Interior. A street entirely within the confines of a subdivision.

Street, Local. A local street is a short street, cul-de-sac, or court. The primary purpose of a local street is to conduct traffic to and from dwelling units or businesses to other streets within the hierarchy of streets.

Street Standards and Classifications. The current classifications and standards as described in the Illinois Department of Transportation "Design and Environment Manual" as modified by the City Council pertaining to requirements for streets.

Subdivide. To subdivide means (1) the division of land into two or more lots, parcels, or tracts; (2) the dedication of streets, ways, or other areas for use of the public; (3) any development of property which according to City Codes, necessitates the extension of public utilities to such property by main or by service connection; (4) any development of property which requires that a new street be constructed; (5) any development of property that meets the definition of a planned unit development as defined in the Subdivision Code; (6) long term land lease for new development.

Subdivision. Subdivision means the configuration of lots of record, outlots, public rights-of-way and public improvements which result from subdividing land in accordance with the procedures, requirements, and standards of the Subdivision Code.

Trail. A trail is that portion of right-of-way physically separated from motorized vehicles and intended for non-motorized transportation and recreational uses.

Use. The use of property is the purpose or activity for which the land, or building thereon, is designed, arranged, or intended, or for which it is occupied or maintained, and shall include any manner of performance of such activity with respect to the regulations of the Zoning Code.

Walkway. A portion of a right-of-way used or intended principally for pedestrian passage which does not meet the design standards for public sidewalks.

Watershed. That land area from which all runoff from rainfall would eventually reach the point in question by flowing over the surface of the ground or through existing improvements.

Zoning Administrator. The Zoning Administrator is the Director of Planning and Code Enforcement for the City of Bloomington, Illinois, or his/her designated representative.

Zoning Map. The Official Zoning Map is the map adopted by the City Council showing all the zoning district boundaries within the City of Bloomington, Illinois.

1.03 SCOPE

The review and approval of plans, specifications, and contract documents for certain types of improvements is also the legal responsibility of various other public agencies in addition to the City. This Manual is not intended as a substitute for the requirements of such other public agencies. It shall be the Design Engineer's responsibility to see that the proposed plans, specifications, and contract documents meet the legal requirements of all other public agencies and that any and all permits and bonds required by such agencies are secured.

1.04 PRE-DESIGN CONFERENCE

It is recommended that prior to the development of a Preliminary Plan and/or detailed Engineering Plans and Specifications, the Design Engineer meet with the City Planner and the Director of Engineering or their representatives to review City requirements for the proposed project. The request for this preliminary meeting, if desired, shall be instituted by the Design Engineer.

1.05 PLAN PREPARATION REQUIREMENTS

A. Subdivision Preliminary Plan and Supporting Documents

1. Required Form of a Preliminary Plan

a. Plans, drawings, surveys, maps, schematics and comparable material shall be drawn so that clear and legible transparent or contact prints and photostatic (photographic) copies (reproductions) can be made with a maximum width of 594 mm (24 inches), preferably 841 mm x 594 mm (24 inches x 36 inches), but with a maximum length of 841 mm (36 inches). If the total preliminary plan exceeds more than one sheet, then a one sheet comprehensive plan of the entire development and this comprehensive plan sheet will not exceed 1219 mm (48 inches) in width.

b. Digital Submission. A digital computer aided drafting file shall be submitted in accordance with provisions of Section 1.19 of this manual. The official submittal shall be the signed reproducible copy.

2. Required Content of a Preliminary Plan and Supporting Documents.

a. Identification and Description.

i. Name of the subdivision, not duplicating the name of any other subdivision, the final plat of which has been recorded in McLean County, Illinois.
ii. Legal description of all property included in the Preliminary Plan, including a reference to the Section, Township, and Range;
iii. Name and address of the owner or owners of record of all property within the Preliminary Plan;
iv. Name, address, and phone number of the developer of the proposed subdivision;

v. Disclosure of the legal relationship, if any, between the owner and developer, including any of the following:
    1. Agent of owner;
    2. Purchaser under a Contract for Sale with owner, contingent or otherwise;
    3. Unrecorded owner;
    4. Contract purchaser.

vi. Name, address, phone number of the surveyor or engineering firm preparing the boundary survey;

vii. Name, address and phone number of the Licensed Professional Engineer preparing any part of the Preliminary Plan or supporting material;

viii. Name, Address and phone number of attorney(s) representing the owner(s) and/or developer(s);

ix. The source of all topographical data;

x. Total hectares (acres) in the Preliminary Plan.

b. Survey Maps and Drawings Indicating Existing Conditions.

A Professional Illinois Land Surveyor or Licensed Professional Engineer shall prepare graphic presentations of the following in each case, with a north point designated as true North and a date of preparation indicated on the survey map, drawing or plan. Unless otherwise noted, the following shall be drawn to an engineering scale not to exceed 1:1000 (1"=100');

i. Boundary Line Survey Map with accurate distances and angles with a permissible error of closure of 1 in 5000 prepared and certified accurate by a Illinois Professional Land Surveyor;

ii. Topographic map depicting existing contours at vertical intervals of not more than ½ meter (2 feet), with reference to U.S.G.S. Datum, extending to a minimum of 30 meters (100 feet) beyond the boundary of the development;

iii. Location and perimeter of any area designated as a special flood hazard area as defined in Chapter 18 of the City Code. If the property included in the preliminary plan is not in a special flood hazard area the Surveyor or Engineer shall so state on the preliminary plan.

iv. The existing zoning and zoning district lines within the area encompassed by the Preliminary Plan and the area within 30 meters (100 feet) thereof;

v. Specific identification, location and dimensions, if applicable, of the following located within 30 meters (100 feet) of the area included in the Preliminary Plan:
   1. Rights-of-way;
   2. Streets;
   3. Roadways;
   4. Drainage ways; improved;
   5. Drainage ways; unimproved;
   6. Walkways;
   7. Trails
   8. Sidewalks;
   9. Public easements;
   10. Private easements;
   11. Railroad rights-of-way;
   12. Section lines; (if included in the description of the property)
   13. Corporate limit lines;
   14. Parks, schools, and other public lands;
   15. Buildings and structures to remain;
   16. Buildings and structures to be removed.

vi. Identification, location, size, gradient and invert elevation of sanitary sewers, storm sewers, drainage culverts, catch basins and sanitary and storm sewer manholes located within the area included in the Preliminary Plan, the area within 30 meters (100 feet) of the perimeter of the area included in the Preliminary Plan or located elsewhere if such constitutes the nearest existing sanitary sewer, storm sewer, drainage culvert, catch basin, sanitary sewer manhole or storm sewer manhole serving the area included in the Preliminary Plan;

vii. Identification and location of water mains, including all valves and hydrants and any other underground utilities located within the area included in the Preliminary Plan, the area within 30 meters (100 feet) of the perimeter of the area included in the Preliminary Plan or located elsewhere if such constitutes the nearest existing water main, valve or hydrant or other underground utility serving the area included in the Preliminary Plan;

viii. Location of or reference to location of existing monuments or survey markers used in preparation of the boundary line survey map and bench marks;

ix. Location map drawn to any scale showing an area bounded by the nearest arterial or collector street, but not less than 3 kilometers (2 miles) beyond the boundaries of the area included in the Preliminary Plan.

c. Surveys, Maps, Plans and Drawings of Proposed Conditions

A Licensed Professional Engineer shall prepare and certify as accurate to the degree of accuracy specified surveys, maps, plans and drawings with a north point designated as true north and containing a date of preparation depicting the proposed arrangement of the area included in the Preliminary Plan indicating each of the following to an engineering scale not to exceed 1:1000 (1"=100');

i. Identification, location and dimensions of any of the following required or proposed:
   1. Rights of way;
   2. Interior streets with approximate elevation and proposed gradient;
   3. Exterior streets with approximate elevation and proposed gradient;
   4. Exterior roadways with approximate elevation and proposed gradient;
   5. Street and roadways names;
   6. Alleys with approximate elevation and proposed gradient;
   7. Sidewalks;
   8. Trails;
   9. Public easements;
   10. Private easements;
   11. Lots;
   12. Outlots;
   13. Minimum front yard setback;
   14. Other areas proposed for dedication or reservation to the public;
   15. Railroad crossings and rights-of-way;
   16. Bridges.

ii. Identification, location and size of any of the following required or proposed:
   1. Water mains;
   2. Valves;
   3. Hydrants;
   4. Street lights.

iii. Identification, location, size, gradient, invert elevation, and typical cross-section of any of the following required or proposed in the area included in the Preliminary Plan:
   1. Drainage ways, improved;
   2. Drainage ways, unimproved;
   3. Flood routes.

iv. Identification, location, size, gradient, surface elevation, and invert elevation of any of the following required or proposed in the Preliminary Plan:
   1. Sanitary Sewers;
   2. Storm Sewers;
   3. Sanitary manholes;
   4. Storm inlets and manholes;
   5. Sump Pump Drainage Systems.

v. Direction of storm water runoff from each lot and outlot proposed or required in the Preliminary Plan.

vi. The Preliminary Plan shall clearly indicate which portions of the proposed infrastructure (including but not limited to right-of-way, streets, trails, sidewalks, waterways, lakes, detention basins, storm sewers, sanitary sewers, water mains, drain tiles, and lighting) are intended to be privately owned and maintained, and which portions of the proposed infrastructure are to be publicly owned and maintained.

d. The Preliminary Plan shall contain the name(s) and seal or seals of the Licensed Professional Engineer or Engineers preparing all or any portion of the Preliminary Plan. All waivers requested of the City's Codes and Ordinances shall be listed on the Preliminary Plan. Approval of a Preliminary Plan shall not constitute waiver of any applicable City Codes and ordinances unless the waiver is specifically approved by the City Council.

e. If applicable - Accompanying the Preliminary Plan shall be an application for a Special Flood Hazard Area development permit as required in Chapter 18 of the City Code. Application form has been provided as Exhibit L in the Appendix. The Preliminary Plan shall show the limits of the Special Flood Hazard Area, changes in grade resulting from excavation and filling, location and lowest floor elevation of buildings proposed within the Special Flood Hazard Area.

f. The Preliminary Plan shall clearly indicate intended ownership of all public or quasi-public facilities Including street right-of-ways, trail right-of-ways, drainage way right-of-ways, retention and detention facilities and park land

3. Preliminary Plan submission Procedure.

a. Initial Submittal. The owner shall submit to the City Clerk 22 paper copies of a Preliminary Plan in the form and providing all information required by this manual.

b. Final Submittal. Upon approval of a Preliminary Plan by the City Council, the owner shall submit 7 paper and 1 reproducible Mylar copies showing any changes requested by the City Council. The Mylar copy shall be considered the official copy.

B. Public Improvement Engineering Plans and Specifications

1. Required Form of Public Improvement Engineering Plans and Specifications.

a. Public improvement engineering plans and specifications, drawings, schematics and comparable material shall be drawn with drawing pencil on transparent abelene or black waterproof drawing ink on mylar from which clear and legible transparent or contact prints and photostatic copies can be made, with a maximum width of 594 mm (24 inches) preferably 841 mm x 594 mm (36 inches x 24 inches) but with a maximum length of 841 mm (36 inches). This copy shall be considered the official submittal.

b. Supporting material shall be typed on paper not exceeding 297 mm x 210 mm (8-1/2 inches X 11 inches) in size.

c. Digital Submission: The City encourages but does not require that a digital computer aided drafting file be submitted in accordance with provisions of Section 1.19 of this Manual.

d. General drafting requirements for plan sheets in engineering plans:
   i. Plan sheets shall be drawn to scale. The scale shall not normally be greater than 1:600 (1"=50') horizontal and 1:100 (1"=10') vertical. The scale shall be clearly labeled on the plan.
   ii. Plan sheets shall include a north arrow. The north arrow should normally be oriented to the left, top or right of the sheet.
   iii. Plan sheets shall include a title block, preferably near the lower right of the sheet. The title block shall include the name and address of the Design Engineer preparing the plan, the title of the sheet, the latest revision date , the sheet number, and the total number of sheets in the set.
   iv. Stationing shall normally increase from left to right, south to north and west to east.
   v. The Platted name, addition number, and lot number of any existing lot(s) adjacent to the development shall be shown in every plan view.

2. Required Content of Public Improvement Engineering Plans and Specifications.

a. Title Sheet - To identify and describe the public improvement, the engineering plans and specifications shall include a Title Sheet containing the following information:
   i. The name of the proposed subdivision within which or for which the public improvements are proposed;
   ii. The name, complete address including zip code, and phone number (including the area code) of the developer(s);
   iii. The name, complete address including zip code, and phone number (including area code) of the engineering firm preparing any part of the engineering plans and specifications. If more than one engineering firm is involved in preparing plans, each firm shall indicate which part of the plans they prepared.
   iv. Seal or seals of Licensed Professional Engineer or engineers preparing all or any portion of the engineering plans and specifications certifying that the materials so prepared conform with all applicable City codes and ordinances except as specifically noted as a requested waiver.
   v. Location map drawn to any scale showing area bounded by the limits of the Preliminary Plan for which the engineering plans are all or a portion thereof.
   vi. Two or more benchmark elevations referenced to U.S.G.S. Datum within the boundaries of the project or within 30 meters (100 feet) outside the boundaries of the project.
   vii. An index to all sheets contained within the submitted engineering plans.
   viii. A note instructing the contractor to call J.U.L.I.E. before you dig at 1-800-892-0123
   ix. The section, township, range, and principal meridian which contains the development.

b. Grading Plan - The public improvement engineering plans and specifications shall include a Grading Plan containing (but not limited to) the following information:

i. Existing contours at vertical intervals of not more than 0.5 meters (2 feet), with reference to U.S.G.S. Datum, extending to a minimum of 30 meters (100 feet) beyond the boundary of the development
ii. Proposed finish ground surface elevations on all lot corners.
iii. Directional arrows of flow of surface waters along rear and side lot lines.
iv. Elevation of proposed ground surface at all building sites (or pads)
v. Location, description, and surface elevation of all drainage structures.
vi. Directional arrows of flow for flood routing for design storms (minimum of 100 year frequency design storm) which exceed the capacity of the proposed storm sewers.
vii. Typical cross sections of flood routing channels showing maximum depth of flow (100 year frequency runoff).
viii. Lot Numbers, and street names.

c. Drainage Way Plan - The public improvement engineering plans and specifications shall include a Drainage Way Plan (if applicable) containing (but not limited to) the following information:

i. Existing contours at vertical intervals of not more than 0.5 meters (2 feet), with reference to U.S.G.S. Datum.
ii. Proposed alignment of centerline of right-of- way and right-of-way width for the entire length of the proposed improvement and existing alignment for 60 meters (200 feet) upstream and downstream of the improvement.
iii. Proposed and existing profiles for entire length of improvement and existing profile for 60 meters (200 feet) upstream and downstream of improvement.
iv. Typical cross-section of drainage way improvement at 15 meter (50 feet) intervals..
v. Cross-sections of improvement showing the before and after improvement 100 year flood surface elevation.
vi. Lot Numbers , and street names.
vii. The Drainage Plan shall indicate which portions of the drainage way(s) are to be privately owned and maintained and which portions are to be publicly owned and maintained.

d. Erosion and Sedimentation Control Plan - the public improvement engineering plans and specifications shall include a plan for controlling erosion and sedimentation by one or more of the following methods for the period when site work commences to the completion of the development:

i. Stop erosion on the site by soil stabilization or runoff control measures.
ii. Allow erosion to take place and then control sediment before it leaves the site.
iii. A combination of the two previous methods.
iv. Lot Numbers , and street names.
v. Existing Soil information, which may include data such as soil type, depth of soil layer, soil texture, infiltration (percolation) rate, whether the soil is susceptible to erosion, etc.
vi. Name(s) of receiving waters or municipal sewer system
vii. Stabilized construction entrance
viii. Proposed best management practices in accordance with this manual to divert flows away from disturbed areas, or to store flows, or to limit the discharge of pollutants from the site.
ix. Proposed velocity dissipation devices to protect discharge points or channels from erosion.
x. Proposed maintenance schedule for erosion control features.

e. Street, Sidewalk and Trail Plan - The public improvement engineering plans and specifications shall include a Street, Sidewalk and Trail Plan containing (but not limited to) the following information:

i. Existing and proposed street alignments showing centerline, face-of-curb, right-of-way, and stationing of roadways.
ii. Typical cross sections for existing and proposed streets including street pavement, curb and gutter and sidewalks.
iii. Existing and proposed profiles of pavement referenced to centerline stationing and U.S.G.S. Datum. All proposed vertical curve data shall be shown, including the station and elevation at 15 meter (50 foot) intervals.
iv. Existing and proposed alignment of sidewalks showing edges of sidewalk.
v. Existing and proposed cross sections of roadways on an average horizontal interval of 15 meters (50 feet). (May be omitted for interior streets with curb and gutter.)
vi. Horizontal curve data for all curvilinear alignments of existing and proposed roadways.
vii. Lot Numbers, and street names.
viii. The Street, Sidewalk and Trail Plan shall indicate which portions of the Street(s), Sidewalk(s) or Trail(s) are to be privately owned and maintained and which portions are to be publicly owned and maintained.

f. Storm Sewer Plan - The public improvement engineering plans shall include a Storm Sewer Plan containing (but not limited to) the following information:
   i. Alignment and location of existing and proposed storm sewer conduits and referenced to stationing.
   ii. Location and identification of all existing and proposed drainage structures.
   iii. Size of existing and proposed conduits.
   iv. Profile of proposed conduits showing invert elevations based on U.S.G.S. Datum, conduit slope and crossings of other existing and proposed utilities.
   v. Locations along alignment of proposed conduit of trench back fill placement.
   vi. Lot Numbers, and street names.
   vii. The Storm Sewer Plan shall indicate which portions of the storm sewer(s) are to be privately owned and maintained and which portions are to be publicly owned and maintained.

g. Sanitary Sewer Plan - the public improvement engineering plans and specifications shall include a Sanitary Sewer Plan containing (but not limited to) the following information:
   i. Alignment and location of existing and proposed sanitary sewer conduits and referenced to stationing.
   ii. Location and identification of all existing and proposed manholes.
   iii. Location and identification of all proposed sewer services.
   iv. Size of existing and proposed sewer conduits and services.
   v. Profile of proposed sewer conduits showing invert elevations based on U.S.G.S. Datum, conduit slope and crossings of other existing and proposed utilities.
   vi. Locations along alignment of proposed sewer conduits and services of trench back fill placement. vii. Lot Numbers, and street names.
   vii. The Sanitary Sewer Plan shall indicate which portions of the Sanitary Sewer(s) are to be privately owned and maintained and which portions are to be publicly owned and maintained.

h. Water Main Plan - the public improvement engineering plans and specifications shall include a Water Main Plan containing (but not limited to) the following information:
   i. Alignment and location of existing and proposed water main conduits and service lines referenced to stationing.
   ii. Location and identification of all existing and proposed valves, hydrants and fittings.
   iii. Location and identification of proposed service lines.
   iv. Size of existing and proposed water main conduits and services.
   v. Profile of proposed water main conduit showing elevations based on U.S.G.S. Datum and crossings of other existing and proposed utilities. (May be omitted for water mains interior to the subdivision.)
   vi. Locations along alignment of proposed water main conduits and services of trench back fill placement.
   vii. Lot Numbers, and street names.
   viii. Location of all existing and proposed sewers or tiles.
   ix. The Water Main Plan shall indicate which portions of the Water Main(s) are to be privately owned and maintained and which portions are to be publicly owned and maintained.

i. Street Light Plan - the public improvement engineering plans and specifications shall include a Street Light Plan containing (but not limited to) the following information:
   i. Location and identification of existing and proposed street light installations as they relate to the proposed project.
   ii. In areas where the lighting is to be installed by the developer rather than a utility company, the plan shall include the alignment, size and material of all cable and the location of all existing and proposed power transformers and/or pedestals.
   iii. Lot Numbers.
   iv. The street light plan may be included with another required plan.
   v. The Street Light Plan shall indicate which street lights are to be privately owned and maintained and which street lights are to be publicly owned and maintained.

j. Sump Pump Discharge Plan - The public improvement engineering plans shall include a Sump Pump Discharge Plan containing (but not limited to) the following information:
   i. Alignment and location of existing and proposed sump pump discharge conduits and referenced to stationing.
   ii. Location and identification of all existing and proposed structures including (but not limited to) manholes, junction tees/wyes, and clean outs.
   iii. Size of existing and proposed conduits.
   iv. Profile of proposed conduits showing invert elevations based on U.S.G.S. datum and crossings of other existing and proposed utilities. (May be omitted for sump pump lines located adjacent to and parallel with a proposed street with curb and gutter if shown on the street typical section.)
   v. Locations along alignment of proposed conduit of granular trench back fill placement.
   vi. Lot Numbers, and street names.
   vii. The Sump Pump Discharge Plan shall indicate which portions of the Sump Pump Discharge System are to be privately owned and maintained and which portions are to be publicly owned and maintained.

k. Composite Utility Plan - The public improvement engineering plans shall include a plan showing all existing and proposed improvements including but not limited to:
   i. Conduits;
   ii. Manholes, tees, hydrants, valves, and inlets;
   iii. Size of existing and proposed conduits for water, sewer, storm sewer, and sump pump discharge;
   iv. Lot Numbers, and street names.
   v. The Composite Utility Plan may be included with another required plan.

l. Specific Details - the public improvement engineering plans and specifications shall include specific details containing (but not limited to) the following information:
   i. Typical cross sections of streets and right-of- way.
   ii Intersection details for pavements showing joint locations, elevations, drainage structures and surface water flow.
   iii. Cul-de-sac details showing joint locations, elevations, drainage structures, surface water flow and centerline control.

m. Standard Details - The public improvement engineering plans and specifications shall include standard details containing (but not limited to) the following information:

	Referenced in Chapter of this Manual
1. Pavement, Curb and Gutter Construction	4
2. Sidewalk and Walkway Construction	5
3. Storm/Sump Pump Sewer Construction	6
4. Sanitary Sewer Construction	7
5. Water Main Construction	8

C. Final Subdivision Plats and Supporting Material

1. Required Form of Final Plats.

a. Final plats shall be drawn with black waterproof drawing ink on mylar, from which clear and legible transparent or contact prints and photostatic copies can be made, with a maximum width of 594 mm (24 inches), preferably 841 mm x 594 mm (24 inches x 36 inches) but with a maximum length of 841 mm (36 inches).

b. Supporting material shall be typed on paper not exceeding 210 mm x 356 mm (8-1/2 inches x 14 inches) in size.

c. Digital Submission. A digital computer aided drafting file shall be submitted in accordance with Section 1.19 of this manual.

2. Required Content of Final Plat.

a. Identification and Description.

i. The name of the subdivision, not duplicating the name of any other subdivision, a final plat of which has been recorded in McLean County, Illinois.

ii. The legal description of all property included in the final plat, including a reference to the section, township, and range; References to be tied with G.I.S. Monuments where available;

iii. Name and address of the developer of the proposed subdivision;

iv. Name and address of the Professional Land Surveyor preparing the boundary survey; and

v. Total acreage in the final plat in acres (hectares).

vi. The name of the school district in which the subdivision is located.

b. Lot, Outlot, and Public Improvement Configuration. An Illinois Professional Land Surveyor shall prepare and certify as accurate angular and lineal dimensions of all lines, angles and curvatures to an engineering scale not to exceed 1:1000 (1"=100') necessary to accurately depict the location of the following:

i. Rights-of-way, including the names of any streets or roadways depicted; and if public or private;
ii. Public and private easements;
iii. Proposed lots of record consecutively numbered and keyed on the plat (or on a supplemental sheet) showing the lots platted of the approved preliminary plan (see Exhibit M in the Appendix). Lot numbers within a subdivision shall not be repeated even if lots are resubdivided;
iv. Outlots, indicated consecutively and keyed on the plat (or on a supplemental sheet) showing the outlots platted of the approved preliminary plan;
v. Minimum front yard setbacks;
vi. Areas dedicated or reserved to the public, including trail right-of-ways, drainage way right-of ways, retention and detention facilities and park land;
vii. Railroad rights-of-way;
viii. Boundaries of the subdivision,
ix. Field references to:
    1. The nearest established street lines and monuments which shall be accurately described in the plat by location and size;
    2. Township and section lines if the same are within the boundary of the final plat or within 30 meters (100 feet) therefrom, referenced accurately to the lines of the subdivision by distances and angles. This requirement may be waived for resubdivision of existing final platted lots. This requirement may also be waived if the section lines are not needed for the survey and are not readily recoverable;
    3. All monuments [minimum 15 mm (5/8 inch) diameter 760 mm (30 inches) long rebar or iron pipe] placed at all lot corners, block corners, angle points and at intermediate points installed in such a manner that they may be located by a Professional Land Surveyor.
    4. Reference survey to at least two recorded G.I.S. monuments (if available) in order to incorporate plat into GIS based mapping.
x. A signed statement by an Illinois Professional Land Surveyor or Engineer stating which lots (if any) are located within a Special Flood Hazard Area.

c. Certificates - The final plat shall be accompanied by the following certificates duly and appropriately executed in substantially the form presented in the Appendix of the exhibit specified:

i. Owner's, with notary - Exhibits A1, A2, and A3;
ii. Surveyor's - Exhibit B;
iii. Drainage - Exhibit C;
iv. Clerk's
    1. County Clerk's Certificate - Exhibit D;
    2. City Clerk's Certificate - Exhibit D-1
v. Plat Certification

1. Certificate by Director of Engineering & Water (Exhibit E-1).
2. Outside corporate limits but within the jurisdiction of this code include certificate by County Plat Officer (Exhibit E-2).

vi. (reserved)

3. Final Plat Submittal.
The owner shall submit to the City Clerk two reproducible mylar, sixteen paper and one digital computer aided drafting file copy of the Final Plat in the format and providing all information required by this manual.

1.06 SPECIFICATION REQUIREMENTS

Technical specifications shall be submitted with the public improvement engineering plans as required in Chapter 24 of the City Code and shall be complete in themselves, except that appropriate specific sections of the most recent editions of the "Standard Specifications for Road and Bridge Construction" as published by the Illinois Department of Transportation, and the "Standard Specifications for Water and Sewer Main Construction in Illinois", and the various standard published material specifications prepared by associations such as the "American Society for Testing and Materials" and the "American Water Works Association", may be incorporated by reference.

The specifications shall include (but not limited to) all information not shown on the drawings which is necessary to establish in detail the quality of materials and workmanship required in the project, other parameters for testing the various parts of the project and instructions for testing material and equipment.

The specifications shall include clauses which state:

A. All work shall be in conformance with the approved plans and specifications.
B. All work included in the plans shall be guaranteed by the Contractor to be free from defects in workmanship and materials for a period of twelve (12) months from the date of written acceptance by the Director of Engineering of that portion of the total project which the Contractor has completed to date.
C. The contractor shall replace or repair any work or material found to be defective or in nonconformance within the guarantee period upon written notice from said Director.

Special provisions specific to construction within the City are specified in the various chapters of this manual and are to be used as guide for the preparation of specifications to be submitted to the Director of Engineering for review and approval.

1.07 DESIGN COMPUTATION REQUIREMENTS

Design computations shall be made by the Design Engineer for all phases of the project when such computations are required by this Manual or in the opinion of the Director of Engineering to insure the adequacy and stability of the work and that the work conforms with appropriate standards. Said computations shall be neat and legible and in a form required by this Manual and that can be readily followed and understood by a competent engineer.

Said computations will include (but not necessarily be limited to) the following:

A. Submitted With Subdivision Preliminary Plan: preliminary design calculations used by the Design Engineer for the following:
   1. Detention/Retention Basin Design
   2. Storm Sewer System Design
   3. Sanitary Sewer Design
   4. Bridge, Culvert or Drainage Way

The above may be deferred or waived with mutual agreement between the Developer/Design Engineer and the Director of Engineering at the time of submitting preliminary plans.

B. Submitted With Public Improvement Engineering Plans: detailed design calculations for the following:
   1. Detention/Retention Basin Design
   2. Storm Sewer System Design
   3. Sanitary Sewer System Design
   4. Flood Routing and Waterway Design
   5. Bridge & Culvert Hydraulic Design (if necessary)
   6. Structural Design Data for Pavement (for collector, arterial and local commercial streets)

C. Submitted With Final Subdivision Plats
   1. Boundary closure calculations.
   2. Lot corner coordinate data in digital format.
   3. Ties to G.I.S. monuments where available.

Form and content for each set of detailed design computations submitted with Public Improvement Engineering Plans and Final Subdivision Plats are specified in the following chapters of this manual:

Design Computation	Manual Chapter
Boundary Closure Calculations	3
Lot Corner Coordinate Data	3
Detention/Retention Basin Design	6
Storm Sewer System Design	6
Flood Routing & Open Channel Design	6
Bridge & Culvert Hydraulic Design	10
Sedimentation and Erosion Control Design	13
Site Plan Review	15

1.08 ESTIMATE REQUIREMENTS

The Design Engineer shall prepare a detailed estimate of the cost of the work, categorized to show the various divisions of the work, itemized in such a fashion as to make possible a comparison of the estimated cost with actual cost encountered for similar work in the past.

Estimates of cost will be required as follows:

A. At the submittal of public improvement engineering plans and specifications to the Director of Engineering for approval.
B. Prior to release of funds from escrow accounts posted as security for payment, performance, and workmanship guarantees by the Director of Engineering.
C. Prior to release of funds from cash reserve accounts posted as security for adjacent substandard roadway improvement guarantee and security by the Director of Engineering.
D. Submittal of final subdivision plat for approval.

An example form of estimate of cost is provided as Exhibit N in the Appendix of this manual.

1.09 OTHER PERMIT APPLICATIONS AND APPROVALS

Other governmental agencies may review and approve for construction all or certain parts of the work included in a project and may require a permit or application for a permit for such work. They may also require that such a permit or application for a permit be executed by the City. When such a permit or permit application is required it shall be prepared, ready for signatures, containing all required supporting documentation, by the Design Engineer (with sufficient copies for the City to retain one).

1.10 PUBLIC IMPROVEMENT ENGINEERING PLANS & SPECIFICATIONS SUBMISSION AND REVIEW PROCEDURE

These documents requiring City approval shall be submitted by the Design Engineer to the Director of Engineering, with a letter of transmittal tabulating the items being submitted. The documents to be approved and the number required by the City is set out below. The Design Engineer shall add to the documents the quantity he would like returned to him marked approved on their face, or in the case of permit applications, executed by the City for submitted to other agencies.

The submittal shall be made in two parts. The initial submittal should be made and returned to the Design Engineer prior to the final submittal.

Documents included in the initial submittal are as follows:

Plans	2 sets (4 sets if plan includes traffic signals)
Specifications	1 set
Design Computations	1 set

After completion of the review of the initial submittal, the Director of Engineering will advise the Design Engineer and owner by letter of any items that do not meet the requirements of the City. The Design Engineer may then revise the documents and make the final submission.

Documents in the final submittal shall include the following:

Plans	3 sets + additional sets required by Design Engineer
Specifications	2 sets
Estimate	1 set
Grading Plan	1 set
¼ Size Copy of Grading Plan	1 set
Water Main Plan	2 sets
Street Lighting Plan	2 sets

When the final submittal meets the requirements of this Manual and City Code, the Director of Engineering shall transmit his written approval of the submitted documents to the Design Engineer.

1.11 APPROVAL PERIOD

Approval of the public improvement engineering plans and specifications by the Director of Engineering shall be applicable for a period for which there is a valid preliminary plan. If construction is not commenced within said period, the approval will be void. Reactivation of such voided approvals will require a written request for extension which will be considered with due consideration for any new requirements that may be established by the City in the interim.

1.12 GUARANTEES BY DEVELOPER

Where proposed work is being constructed by a developer, the developer shall guarantee that all work in the project shall be free from defects in workmanship and materials and in conformance with the approved plans and specifications in accordance with Chapter 24 of the City Code.

1.13 PLAN REVIEW, INSPECTION, AND TESTING FEES

In accordance with Chapter 24, Section 3.4.3 of the City Code and prior to the Director of Engineering transmitting his approval of the public improvement engineering plans and specifications and prior to the recording of the final plat, the developer shall pay to the City a fee of two percent (2%) of the approved estimated costs of such improvements excluding engineering costs. Said fee shall be applied as credit against the actual costs incurred by the City for review of said plans and the inspection of said improvements. The balance of the actual costs shall be paid to the City by the Developer at the time such review has been completed by the City and prior to the City accepting the improvements for maintenance.

1.14 REVISIONS TO APPROVED PUBLIC IMPROVEMENT ENGINEERING PLANS & SPECIFICATIONS

Any deviations from approved plans or specifications affecting capacity, stability or operation of the improvements shall be approved in writing by the Director of Engineering before such changes are made. Minor changes not affecting capacity, stability or operation of the improvements will not require formal approval but must be approved by the field inspector representing the City.

1.15 INSTALLATION AND INSPECTION PROCEDURES

Prior to construction commencing, the Design Engineer may arrange with the Director of Engineering to set and conduct a pre-construction meeting with representatives of contractors and utility companies present.

1.16 RECORD DRAWINGS

A. Public Improvement Plans

The Design Engineer shall submit to the Director of Engineering, within 9 months of the City's acceptance for maintenance, record drawings of the public improvement engineering plans. Final release of the subdivision bond will not be made until the record drawings have been received by the Director of Engineering. Record drawings submitted shall be one set of clear and legible transparent mylar, one set of photostatic prints and one set of digital computer aided drafting files in accordance with the provisions of Section 1.19 of this Manual of the entire set of public improvement plans approved except depicting the improvements as actually installed or constructed.

The Design Engineer will receive from the Engineering Department all available inspection reports to prepare the record drawings. The inspection reports will be available to the Design Engineer after the improvements have been inspected.

1.17 PROJECT COMPLETION AND FINAL ACCEPTANCE

Prior to the Director of Engineering accepting the project for maintenance, the Director shall make a final inspection of the completed work. The Director shall then prepare a final punch list, itemizing all items not meeting the requirements of the approved plans and specifications. On the completion of all items listed in the final punch list to the satisfaction of the Director of Engineering, the Director shall accept the project for maintenance and shall notify the developer of such acceptance in writing.

1.18 WAIVER FOR MANUAL REQUIREMENTS

Where conditions so warrant, the City Manager may waive any of the requirements of this Manual.

1.19 ELECTRONIC DRAFTING FILE STANDARDS

A. Purpose. The purpose of these specifications is to provide a standard for the transfer media and the format of the data files for submission to the City of Bloomington Engineering Department. The goal is to save the City, consultants and developers time and money by providing a set of CAD (Computer Aided Drafting) standards that will allow for easier referencing and combining of files from one or more designs or sets of field data. By following these standards, files will be uniform allowing for quicker access and editing of files produced at any time or by different people. It will also allow the City to automate the process of adding data to a GIS (Geographic Information System).

B. Electronic Files Required. The electronic files submitted will be used for two purposes:

1. GIS update - this requires the plat or project to be a homogenous continuous design based in State Plane Coordinates as outlined below in Section D. Notes are not needed.
2. Electronic files - this is the source for each printed page in a plat or plan. Electronic files shall be provided when submitting final copies of:
    a. Approved Preliminary Plans, if preliminary plans are prepared.
    b. Annexation Plats are required unless annexation boundary is shown on a preliminary plan.
    c. Final Plats
    d. Record drawings of Public Improvement Engineering Plans (including title page, grading plan, drainage way, street, sidewalk and trail (except cross sections), storm sewer, sanitary sewer, water main, street lights, sump pump, structures).
    e. Electronic files are requested but not required for record drawings and final plats for subdivisions approved under the expedited procedure.

C. Media. Files may be submitted on 3-1/2 inch diskette, lomega 100 MB Zip Disks, CD-Rom, DVD or other electronic format approved by the Director of Engineering. Files on floppy may be zipped as long as they are self extracting or the extraction utility is provided. All files and media are to be in an IBM compatible format.

D. CAD Standard. This CAD (Computer Aided Drafting) standard is based on the Illinois Department of Transportation drafting standards where feasible.

Files submitted to the city shall be MicroStation DGN files or AutoCAD DWG version 14 or earlier.

The CAD files shall have the following properties:

1. The actual working plat or design project shall use Illinois State Plane East Zone Metric coordinates, USGS Zone 3776, FIPS Zone 1201, Projection will be Transverse Mercator. The USGS Datum will be, horizontal NAD 83 and Vertical NGVD 88. The plat or project shall properly edge match to adjoining plats or designs.
2. Files shall be 3D design files for plans and 2D design files for plats. Individual pages such as the title page or typical sections may be 2D design files.
3. If the CAD files are converted from English units to Metric units use 0.3048 ft/m for the conversion.
4. In addition AutoCAD files shall have:
   a. All unused blocks shall be purged from AutoCAD files.

5. In addition MicroStation DGN files shall have:
   a. The Global Origin shall be set to the lower left of the design plan.
   b. Working units shall be metric. 1000 sub units (mm) per master unit (m). One sub unit per positional unit. Master units shall be designated m for meters. Sub units shall be designated mm for millimeters. (Note: Dimensions placed in the design file may be in English units as required for plats or design projects, but the working units shall be metric.)
   c. Reference files used shall be in the same subdirectory as the active design file. The attachment of the reference files done shall be set with “Save Full Path” off.
   d. Design files shall be compressed, to remove deleted elements, before submittal.
   e. Element attributes/symbology shall be in accordance with the following table:

McLean County GIS

As modified: February, 2003

Feature Type	Feature Description	LEVEL	COLOR	STYLE	WEIGHT
Alignment	Street Center-Line	2	3	0	2
Vegetation	Woodlands	4	20	1	0
	Orchard / Nursery *	4	21	1	0
	Single Tree	4	20	0	0
Water	Detention Basin *	5	39	5	2
	Lake Body Hidden	5	6	7	0
	Lake Boundary *	5	12	Stream	1
	River Hidden	5	12	5	1
	River (Double Line) *	5	12	Stream	1
	Stream / Creek Annotation	5	12	0	0
	Stream / Creek Hidden	5	12	5	0
	Stream / Creek (Single)	5	12	Stream	0
	Swamps / Wetland	5	39	5	1
	Flood Hazard Area	5	5	4	1
Right of Way	Access Control Fencing	6	6	Custom	0
	Easement Limits	6	6	Custom	1
	Markers	6	6	0	0
	Railroad	6	4	0	1
	Street Limits	6	7	0	1
	Street Name Annotation	6	3	0	2
Non-Highway	Area UC *	8	38	2	2
	Athletic Field Body *	8	18	3	0
	Basketball Court *	8	18	2	0
	Bike Trail *	8	34	3	0
	Building	8	10	0	0
	Building Annotation	8	10	0	1
	Cemetery *	8	18	3	0
	Concrete Plant *	8	29	3	0
	Fence	8	3	3	0
	Golf Course Body *	8	18	3	1
	Junkyard *	8	3	3	0
	Landfill *	8	27	3	0
	Paved Airport Runway *	8	37	0	2
	Pool *	8	27	0	1
	Quarry *	8	19	3	0
	Reccreation Park Body *	8	4	3	1
	Silo	8	15	0	0
	Storage Pile *	8	16	3	0
	Storage Tanks *	8	8	0	0
	Tennis Court *	8	20	3	0
	Water Tower / Tank *	8	11	0	0
Politcal Boundaries	Corporate Boundary	10	7	Custom	4
	County Lines	10	10	0	1
	Municipal Boundaries	10	15	0	3
	Township Lines	10	20	0	1
	Ward Boundaries	10	25	0	1
Traffic Signals		11	11	0	0

Private Boundaries	Existing Subdivision Lines	12	12	3	2
	Lot Number	12	3	0	1
	Out Lots	12	6	0	1
	Owner Names	12	12	0	1
	Property Line Dimensions	12	19	0	1
	Property Line Symbol	12	12	0	0
	Property Lines	12	12	0	1
	Property Pins/Pipes	12	12	0	0
	Same Ownership Symbol	12	12	0	0
	Section Corners	12	12	0	0
	Subdivision Annotation	12	3	5	1
	Subdivision Lines	12	12	0	2
	Survey Markers	12	12	0	0
Existing Utilities	Communication Tower	14	36	0	0
	Cross Country Pole	14	35	0	0
	Fire Hydrant	14	4	0	0
	Manhole Combination	14	6	0	0
	Manhole Sanitary	14	1	0	0
	Manhole Storm	14	7	0	0
	Service Valve	14	4	0	0
	Sewer Combination	14	5	0	0
	Sewer Sanitary	14	10	0	0
	Sewer Storm	14	15	0	0
	Substation	14	42	3	0
	Transmission Line (CCTL)	14	42	0	0
	Transmission Tower	14	37	0	0
	Water Main	14	4	0	0
	Water Valve	14	4	0	0
Topography Notes	Annotation of Topography	16	16	0	0
Utility Notes	Annotation of Utilities	18	18	0	0
Alignment Notes	Annotation of Alignment	20	20	0	0
Drainage Notes	Annotation of Drainage Structures	22	22	0	0
Roadside Features	Driveway	25	35	2	1
	Paved Parking Area *	25	53	0	2
	Paved Sidewalk	25	1	1	0
	Unpaved Parking Area *	25	53	3	2
	Wall (Retaining) *	25	25	0	4
	Wall *	25	26	0	4
Contours	Index Contour Line	26	47	0	1
	Index Cont. Depr.	26	53	2	1
	Index Cont. Depr. Hidden	26	53	5	1
	Index Cont. Hidden	26	47	0	1
	Index Cont. Obsc.	26	52	3	1
	Index Cont. Obsc. Depr.	26	52	2	1
	Index Cont. Obsc. Depr. Hidden	26	52	5	1
	Index Cont. Obsc. Hidden	26	53	3	1
	Intermediate Contour Line	26	55	0	0
	Inter. Cont. Depr.	26	56	2	0
	Inter. Cont. Depr. Hidden	26	56	5	0
	Inter. Cont. Hidden	26	55	0	0
	Inter. Cont. Obsc.	26	62	3	0
	Inter. Cont. Obsc. Depr.	26	62	2	0
	Inter. Cont. Obsc. Depr. Hidden	26	62	5	0
	Inter. Cont. Obsc. Hidden	26	56	3	0

Edge of Pavement	Controlled Access	27	53	5	2
	Paved Alley	27	36	0	1
	Paved Road - BOC	27	37	0	3
	Paved Road - BOC - Hidden	27	37	5	3
	Paved Road - EOP	27	36	0	2
	Paved Road - EOP - Hidden	27	36	5	2
	Road UC *	27	38	2	2
	Road Under Bridge	27	36	0	1
	Unpaved Road	27	5	3	1
	Unpaved Road Hidden	27	5	5	1
Roadway Plan	Paved Median	28	10	0	3
AS - Control	FAAT Passpoints	30	3	0	0
	Horizontal and Vertical Control Points	30	2	0	0
	Horizontal Control Points	30	0	0	0
	Vertical Control Points	30	1	0	0
AS - Spot Elevations	DTM Breakline	32	0	0	0
	DTM Point	32	7	0	0
	Spot Elevation	32	50	0	0
	Water Elevation	32	66	0	0
AS - Grid	200 Meter Ticks (Il. St. Plane East)	33	57	0	0
	St. Plane Ticks (Along Section Lines)	33	59	0	0
AS - Map Limits	Map Mask and Title	34	0	0	0
	Section Lines *	34	3	3	0
Existing Drainage	Dams / Wiers *	37	13	0	3
	Ditch	37	12	0	1
	Floodwall / Headwall	37	25	0	2
	Floodway	37	38	3	1
	Flood Plain	37	38	0	2
	Pier *	37	28	0	1
Railroad	Abandoned Railroad	38	24	7	1
	Railroad Annotation	38	24	0	0
	Railroad Centerline	38	24	4	1
	Railroad Centerline Hidden	38	24	5	1
Structures	Bridge Deck Boundary	39	6	0	4
	Major Culvert	39	37	1	1
Coordinate Data	State Plane English	41	57	0	0
	State Plane Metric	41	59	0	0

Chapter 2 - Protection and Restoration

2.01 INTRODUCTION

Public improvements required in connection with a Subdivision or Development are often in or adjacent to areas with existing surface or underground improvements. The intent of this chapter is to codify special City requirements relative to the construction of proposed improvements and restoration of existing improvements affected by the construction. Plans and specifications presented for City approval shall provide for the implementation of the requirements of this chapter.

2.02 SPECIFICATIONS & SPECIAL PROVISIONS

All public improvement projects shall be completed in accordance with all applicable sections of the most current editions of the Illinois Department of Transportation's "Standard Specifications for Road and Bridge Construction", and the "Standard Specifications for Water and Sewer Main Construction in Illinois" and any amendments, additions or other requirements contained herein.

A. PROTECTION

1. Traffic Control - All work within the public ROW shall be completed in accordance with the latest edition of the "Manual on Uniform Traffic Control Devices" (MUTCD) as published by the Illinois Department of Transportation. The provisions of this Manual will be enforced whenever work is in progress within the existing roadway or adjacent to it or as required by the Director of Engineering and Water.

   Lane closures will be required whenever construction is performed or vehicles are parked in a lane normally used for through traffic. A permit must be obtained for all lane and street closures from the Director of Engineering and Water. For major and collector streets, at no time shall traffic be restricted to less than one lane in each direction unless a flagger is present or a detour utilized. At least 48 hours notice is required before closing a lane or street.

   Required traffic control signing shall be in strict conformance with the Manual cited above and/or as shown on the plans. No construction shall commence until such time that all required signs and barricades have been erected.

2. Bracing and Sheeting - Open cut trenches shall be sheeted and braced as required by any governing federal or state laws and city ordinances, and as may be necessary to protect life, property and the work.

3. Trench Side Slopes - The contractor may, where working conditions and right-of-way permit, excavate pipe line trenches with sloping sides above the top of the conduit only.

4. Tunneling - Contractor may utilize short tunnels to avoid obstructions such as trees, fire hydrants, sidewalks and curbs.

5. Stockpiling of Excavated Material - All excavated material shall be stockpiled such that it will not endanger the work and will avoid obstructing streets, sidewalks, driveways, watercourses, fire hydrants, valve pit covers, valve boxes, curb stops and other utility controls.

6. Protection of Property and Structures - Any existing or new property or structures disturbed or damaged during construction shall be replaced or repaired to the satisfaction of the owner, at the contractor's expense.

7. Utilities - The owner or his designee shall notify the utility companies of a proposed project and the plans should indicate the general location of the utility main lines. It shall be the contractor's responsibility before beginning any construction to obtain from all utilities the exact locations of all underground facilities in the area of construction, whether shown on the plans or not. Joint Utility Location Information for Excavators (J.U.L.I.E.) phone number 1-800-892-0123. Any facilities disturbed by the contractor shall be repaired at the contractor's expense.

   Businesses and residents shall be notified a minimum of 24 hours in advance of impending service outages, and no business or residence shall be without service overnight.

8. Work Place Safety - Nothing in this Manual is intended or shall be construed to reduce the responsibility of the Contractor, subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, from full and complete supervision and achievement of work place safety. Any inspection of the work conducted by the Director of Engineering and Water, or his/her designated representatives, whether notice of the results thereof is provided to anyone or not provided to anyone, shall neither establish any duty on their parts nor create any expectation of a duty to anyone, including but not limited to third parties, regarding work place safety.

B. RESTORATION OF PUBLIC FACILITIES

Contractor shall restore all pavements, sidewalks, driveways, curbs, gutters, trees, shrubs, lawns, fences, poles and other structures and property removed or disturbed during or as a result of construction operations to a condition which is equal in appearance and quality to the condition that existed before the work began.

1. Removal of Pavements, Sidewalks, Curbs, Gutters, and Driveways - All removal shall be completed in accordance with all applicable sections of the "Standard Specifications for Road and Bridge Construction", approved development plans and specifications, and any special provisions contained herein. When removal is required for the installation of a conduit, the width of the removal shall exceed the actual trench width by 1/3 meter (1 foot) on each side. Removal of PCC sidewalk, PCC pavement, PCC driveways, PCC curb and gutter shall be to the nearest joint unless otherwise directed by the Director of Engineering and Water.

2. Replacement of Pavements, Sidewalks, Curbs, Gutters, and Driveways - All replacements shall be completed in accordance with all applicable sections of the "Standard Specifications for Road and Bridge Construction", approved development plans and specifications, and any special provisions contained herein. For all PCC replacements, concrete meeting the requirements of the "Standard Specifications for Road and Bridge Construction" shall be used.

   a. Pavement Removal and Replacement Type A, B, C and D - Pavement shall be removed and replaced according to the following standards.

      Types of Patching

      The type of patching required shall depend upon the existing pavement:

      Type A patches shall apply to pavements that have existing aggregate base and bituminous surface.

Type B patches shall apply to pavements that have existing concrete base and bituminous surface, brick base and bituminous surface or bituminous base and bituminous surface.

Type C patches shall apply to existing pavements that have existing brick surface or concrete surface. Reinforcement will be required where the existing pavement is presently reinforced.

Type D patches shall apply to existing pavements that have existing brick surface that the City has designated to be preserved.

b. Driveway replacement - the type of replacement required shall depend on the existing pavement:

Type A - Existing concrete driveway shall be replaced with a minimum of new 150 mm (6 inches) Portland Cement Concrete surface.

Type B - Existing bituminous surface driveway shall be replaced with a minimum of new 200 mm (8 inches) thick aggregate base and 50 mm (2 inches) thick bituminous concrete surface.

Type C - Existing crushed stone driveway shall be replaced with a minimum of new 200 mm (8 inches) thick crushed aggregate surface with the top 100 mm (4 inches) being the same material as the existing driveway.

c. Sidewalk replacement - Sidewalk shall be replaced to the same depth and width as the existing unless otherwise directed by the Director of Engineering and Water. 12 mm (½ inch) thick pre formed expansion joints shall be placed at locations abutting existing work and at 30 meter (100 feet) intervals in the new walk.

d. Curb and Gutter replacement - Curb and gutter shall be replaced to the dimensions and cross-section as the existing. 12 mm (½ inch) thick pre formed expansion joints shall be placed at the junction of new and existing work and at all points of curvature.

Removal Limits

The limits of the pavement repair shall be saw cut in a rectangular pattern to a depth of not less than 75 mm (3 inches). Type A patches shall be a minimum of 1 meter (3 feet) in width. Type B and Type C patches shall be a minimum of 2 meters (6 feet) in width. For Type B and Type C patches the new pavement shall be shouldered a 1/3 meter (1 foot) minimum on either side of the trench on undisturbed ground.

Whenever a series of Type A or Type B patches are made in such a manner so as to leave less than 2 meters (6 feet) of undisturbed bituminous surface between adjacent patches, it shall be required that the bituminous surface between the patches be removed and the entire area resurfaced.

The limits of the pavement removal on all PCC pavements in good condition shall be extended to the nearest contraction or expansion joints.

PCC pavements not in good condition shall be repaired in accordance with typical detail shown for Type C patching. Whenever a pavement patch is less than 1.5 meters (5 feet) from the pavement edge, contraction joint, crack, etc., the pavement patch shall be enlarged to

meet the edge, joint or crack and the entire excavated area paved as one patch. The limits of pavement removal on Type D patching shall be in such a manner that whole bricks will be used in the replacement and that the replaced brick course extends beyond the limits of the concrete base course.

Trench Back fill

All utility trenches on local streets shall be back filled with trench back fill. Material for trench back fill shall comply with the latest edition of "The Standard Specifications for Road and Bridge Construction" except that the maximum aggregate size shall be 75 mm (3 inches), and that no material over 20mm (¾ of 1 inch) shall be used below 300mm (1 foot) over the top of the sewer or watermain. Approved compacted granular material shall be required in all trenches extending two feet either side of all sidewalks, curbs, gutters, driveways and pavements. Trench back fill shall be compacted by mechanical means in 1/3 meter (1 foot) lifts or by jetting.

Jetting of Trenches

Utility trenches on local streets may be compacted by jetting and allowed to drain before the permanent base and surface course are constructed.

Controlled Low Strength Material

All utility trenches on collector and arterial streets shall be back filled with controlled density fill from 1/3 meter (1 ft.) above pipe to bottom of sub grade. Controlled density fill shall meet the requirements of the "Standard Specifications For Road And Bridge Construction".

Temporary Asphalt Surface

After completion of back filling the excavation, a temporary asphalt surface shall be placed as soon as possible or as directed by the Director of Engineering and Water with a minimum thickness of 50 mm (2 inches). This surface shall be maintained by the excavation contractor until the permanent patch is constructed.

Steel plates may be used for Type B patches to bridge the utility trench patch during the curing period for the PC concrete base course in order to open the traffic lane to traffic during this period.

3. Field/Drain Tile - All existing drain tile lines which cross the trench of a proposed sanitary sewer, storm sewer, water main and services shall be accurately recorded and marked in the field by the contractor. The contractor shall furnish a copy of all drain tile locations to the Director of Engineering and Water. The Director of Engineering and Water shall analyze these locations and determine if the tiles should be reconnected, connected in to the proposed storm sewer system and which lines shall be intercepted and reconstructed down property lines to storm sewers. All existing drain tile lines crossing the proposed street rights-of-way shall be removed from a point 2 meters (6 feet) beyond the right-of-way on each side.

   All drain tile lines reconstructed or connected to the storm sewer system shall be constructed of either PVC water main with slip-on joints (up to 300 mm (12 inches)), ductile iron, extra strength vitrified clay, or reinforced concrete storm

sewer pipe of Class 3 or Class 4 as required by depth in accordance with the "Standard Specifications for Road and Bridge Construction". Drain tiles not reconnected shall be plugged in an approved manner as directed by the Director of Engineering and Water.

Drain tiles to be reconnected shall be repaired so that their carrying capacity shall not be impaired. Drain tile shall be repaired with PVC watermain, a minimum of 50 mm (2 inches) larger diameter than the severed tile. The length of the plastic pipe shall be such that it bears a minimum of 0.9m (3 feet) on undisturbed soil on each side of the trench, with each field tile to plastic pipe junction encased in concrete. All repairs shall be inspected and approved by the Director of Engineering and Water prior to back filling. Trench back fill shall be required if under a street or sidewalk. The plastic pipe to drain tile junction shall be wrapped with burlap or other material approved by the Director of Engineering and Water prior to encasement to prevent concrete from entering the flow line of the pipe. For drain tile under streets, use of concrete, ductile iron or extra strength vitrified clay pipe is required.

4. Restoration of Vegetative Areas - All vegetative areas disturbed during construction shall be restored by furnishing and placing topsoil to a minimum depth of 100 mm (4 inches) and seeding of the area in accordance with the "Standard Specifications for Road and Bridge Construction" or as directed by the Engineer.

5. Cleanup - Before acceptance of underground conduit construction, all pipes, manholes, catch basins, fire hydrants and other appurtenances shall be cleaned of all debris and foreign material.

C. Special Provisions Modifying Standard "Specifications for Water and Sewer Main Construction" In Illinois

20-2.18 CONSTRUCTION IN EASEMENTS

The top 150 mm (6 inches) of any ground disturbed due to construction on private property in an inhabited area shall be replaced with topsoil and restored to its original condition.

20-2.18 A. AGRICULTURAL SURFACE RESTORATION

At locations as shown on the plans or designated by the Director of Engineering and Water, the contractor shall restore any and all agricultural areas. Prior to the installation of the proposed pipes, the contractor shall remove all topsoil from the construction area and stockpile it along the edge of the working limits.

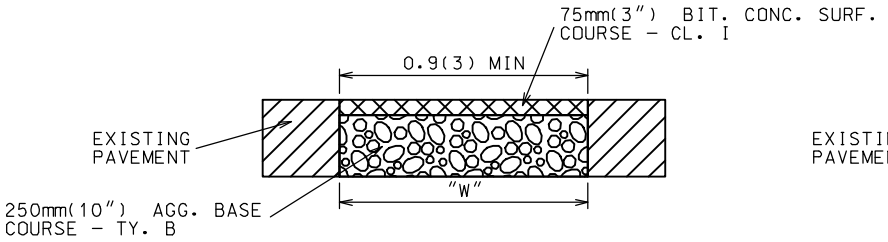
Upon the completion of the installation of the pipes and placing and compacting of the subsoil back fill, the contractor shall replace the original top soil over the top of the disturbed area so that the finished surface shall be level and smooth and contain all of the original top soil at approximately the same depth as prior to construction.

20-2.18 B. REMOVAL OF SOIL FROM AGRICULTURAL AREAS

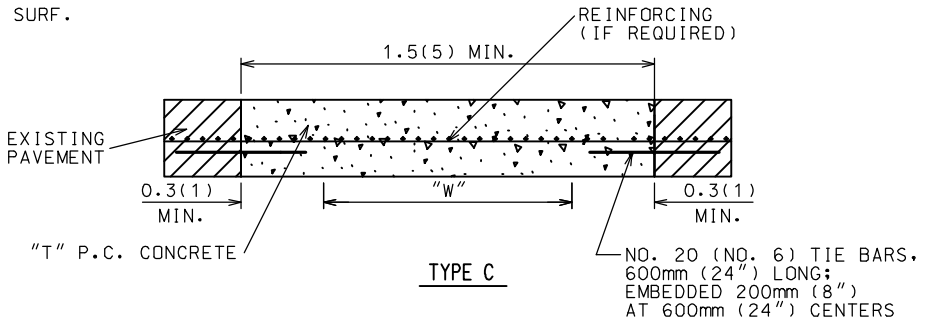
No soil will be removed from the areas designated for agricultural surface restoration unless the owner or his representative gives written consent.

2.03 STANDARD DETAILS

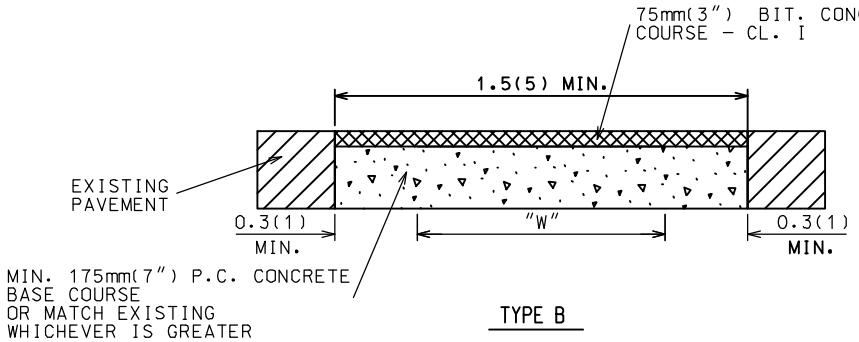
Drawing No.	Title
A	Pavement Patching Details Types A, B & C (Rev. 08/03)
B	Pavement Patching Detail Type D
C	Drain Tile Repair Detail



TYPE A



TYPE C



TYPE B

EXISTING PAVEMENT	"T"
BRICK	175mm(7")
P.C. CONCRETE	SAME AS EXIST. PAVEMENT

CONTRACTION JOINTS: When the patched pavement is not to be resurfaced, transverse contraction joints shall be sawed in all 6M(20') or longer patches:

1. At midpoint of pavement patch or at 4.6M(15') centers, whichever is less;
2. In prolongation of existing contraction or construction joints in the adjacent lane;
3. In accordance with the procedures specified in Article 420.10 of the Standard Specifications;
4. And be sealed in accordance with Articles 420.02(d) and 420.14(a) of the Standard Specifications.

EXPANSION JOINTS: Where expansion joints exist in the portion of the pavement to remain in place, the adjacent new pavement shall provide the same width and type of joint and joint filler in prolongation with the existing joint.

"W" - UTILITY TRENCH WIDTH

All dimensions are in meter (foot) unless otherwise shown.

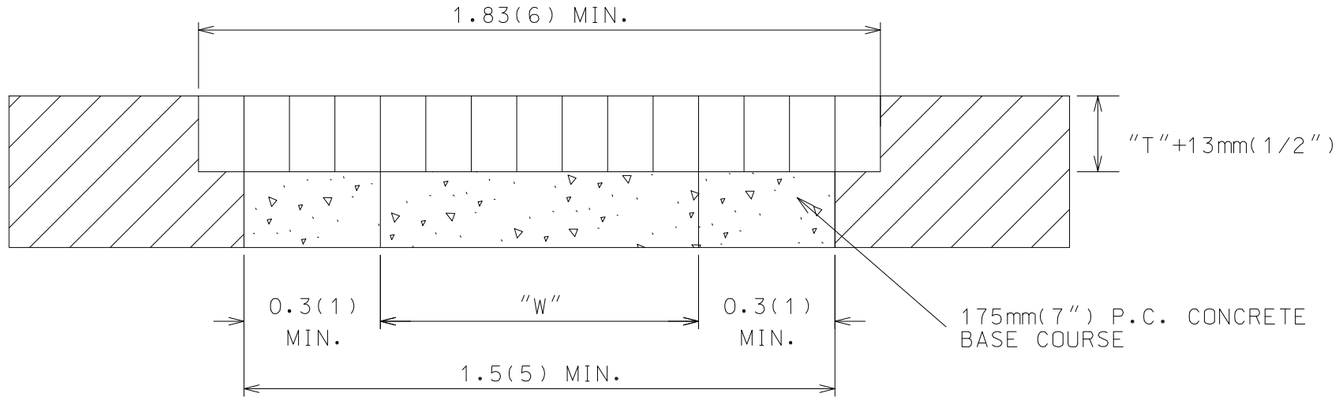
CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN
REVISED : 3-11-2003
APPROVED BY : DGG
DATE : 3-11-2003

PAVEMENT PATCHING DETAILS, TYPE A, B, & C

STANDARD DETAIL 2.03A

SHEET 1 OF 1



TYPE D

"T" = REPLACEMENT BRICK THICKNESS
"W" = UTILITY TRENCH WIDTH

1. Existing Brick removed for excavation are to be salvaged for material in new surface of patch whenever possible.

2. Specimens of New Bricks to be used in surface of patch are to be submitted to the Director of Engineering & Water for approval prior to placement.

3. Replacement Bricks are to be placed in a 13mm(1/2") thick sand bed after concrete base course has cured. Voids between Bricks are to be filled with fine aggregate sand.

All dimensions are in meter (foot) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

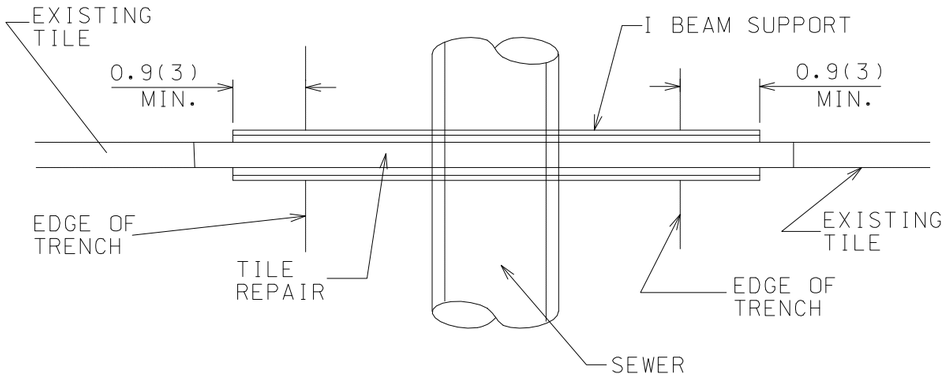
APPROVED BY : DATE :

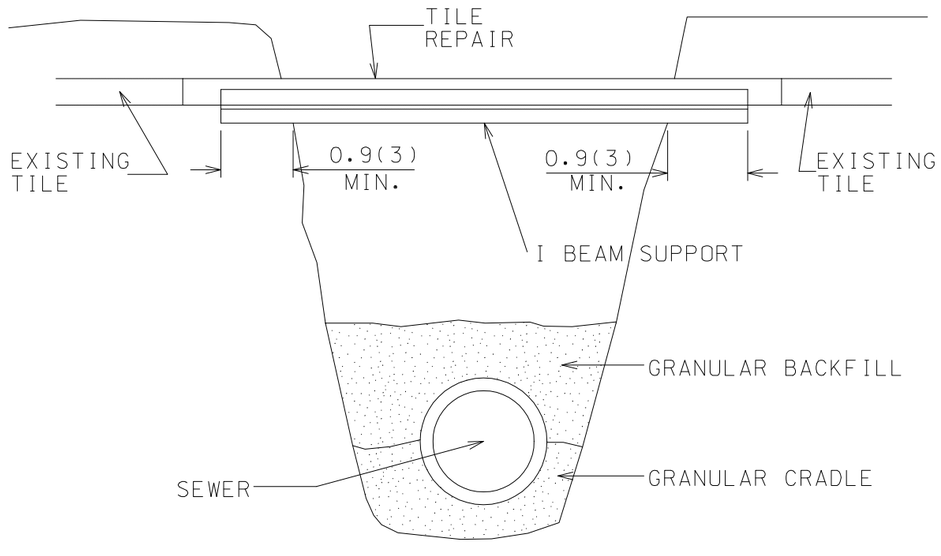
DESIGN BY : DOUG GROVESTEEN REVISED :

PAVEMENT PATCHING DETAIL (TYPE D)

STANDARD 2.03B

SHEET 1 OF 1





TO BE USED IN AREAS DESIGNATED ON PLANS

All dimensions are in meter (foot) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

BY :
APPROVED DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

DRAIN TILE REPAIR DETAIL SUPPORTED WITH I-BEAM

STANDARD DETAIL 2.03C

SHEET
1 OF 1

CHAPTER 3 - General Subdivision Design Standards

3.01 INTRODUCTION

All subdivisions shall be designed to conform with the planning principles, layout and design requirements of this section of the Manual. These principles and design requirements concern entire systems rather than individual elements of the system, and so express concepts rather than specific standards. Specific standards are elaborated in other chapters of this Manual.

3.02 SUBDIVISION PRINCIPLES OF PLANNING

Basic principles exist which should be recognized and heeded in designing circulation and access systems in new subdivisions of conventional layout.

Basic consideration in the design of local circulation systems must recognize the factors of: (1) safety - for both vehicular and pedestrian traffic, (2) efficiency of service - for all users, (3) livability or amenities - especially as affected by traffic elements in the circulation system, and (4) economy - of both construction and use of land.

Each of the following principles is an elaboration on one or more of these four factors. The principles are not intended as absolute criteria, since instances may appear where certain principles conflict. The principles should, therefore, be used as guides to proper systems layout.

A. Adequate vehicular and pedestrian access should be provided to all parcels.

B. Local street systems should be designed to minimize through-traffic movements.

C. Street patterns should minimize out-of-the-way vehicular traffic.

D. Local street systems should be logical and comprehensible, and street names should be simple, consistent, understandable and not duplicative.

E. Local circulation systems and land development patterns should not detract from the efficiency of arterial and collector streets.

F. Elements in the local circulation system should not have to rely on extensive traffic regulation in order to function efficiently and safely.

G. Traffic generators within residential areas should be considered in the local circulation pattern.

H. Planning and construction of local streets should clearly indicate their function.

I. The local street system should be designed for a relatively uniform low volume of street traffic.

J. Local streets should be designed to discourage excessive speeds.

K. Pedestrian-vehicular conflict points should be minimized.

L. An optimum amount of space should be devoted to street uses.

M. The arrangement of local streets should permit economical and practical patterns, shapes and sizes of development parcels.

N. Local streets should be related to topography from the standpoint of both economics, drainage and amenities.

O. Open space areas should be provided, commensurate with the projected population density of the development.

P. Major elements of the street system may be used to help define and buffer different land use areas enhancing their identity and cohesiveness.

Q. The street and pedestrian circulation pattern in a new residential subdivision shall be compatible with the Comprehensive Plan of the City of Bloomington.

R. Subdivision layout should optimize the overall length of streets.

S. Residential area should be conveniently accessible from arterial and collector streets.

T. Access points to arterial and collector street facilities should be limited in number, given special design consideration, and whenever possible, located where other features are not competing for driver attention.

U. Driveway entrances should be minimized on arterial streets and whenever possible on collector streets in residentially zoned areas.

V. Through-traffic on local residential streets should be avoided where practical.

W. Lot layout in residential subdivisions should be designed to reduce the incidence of housing on arterial streets.

X. Public utilities, including water, storm sewer and sanitary sewer facilities, should be existing or proposed by the developer or the City of Bloomington of a size adequate to serve the proposed subdivision and any other future development they may be required to service.

Y. The general land use principles and planning standards should be applied to the subdivision as contained in the Comprehensive Plan of the City of Bloomington.

Z. Cul-de-sac streets shall be limited in number to encourage more equal utilization of local streets.

AA. More than one entrance to a subdivision shall be required where feasible.

BB. Interconnection of adjoining residential subdivisions shall be required where feasible.

3.03 LAYOUT AND DESIGN REQUIREMENTS FOR PROPOSED LOTS OF RECORD AND OUTLOTS

A. Subdivisions shall consist solely and exclusively of lots of record, outlots, easements, public right-of-way and public improvements.

B. All proposed lots of record shall front on and have access to a public street or roadway. Flag lots are not permitted in R1 and R2 Zoning Districts.

C. All proposed lots of record shall meet or exceed the lot size, dimension and area requirements of any applicable zoning regulations of the City of Bloomington and when applicable, the County of McLean.

D. Outlots may not be used for buildings or parking lots.

E. Rear, side and front yard easements shall be dedicated to the City for use by the City and private utility companies (for gas, electricity, Cable TV, water, storm sewer, sanitary sewer, etc.) as provided herein.

F. Where residential lots are platted abutting an arterial major street, the “back-up” treatment should be used and a “no-access” strip depicted on those lots adjacent to the arterial street.

G. Boundaries of the subdivision shall be drawn to meet or exceed the following standards:

1. Error of closure of boundary lines survey shall not exceed 1 in 5,000;

2. Angular error shall not exceed +/- 20 seconds;

3. Lot line dimensions shall be shown in meters and thousandths and in feet and hundredths;

4. Angles occurring in any lot line between lot corners shall be shown in degrees, minutes, and seconds.

H. In general, lots shall be as nearly rectangular in shape as practicable.

I. Side lot lines shall generally be perpendicular to the right-of-way.

2. If the minimum lot width is less than seventy-five (75) feet, corner lots shall be thirty (30) percent wider than the typical width of interior lots or seventy-five (75) feet whichever is the lesser width, except in any subdivision or planned unit development, corner lots of greater width may be required by the Council in order to provide for proper development of street intersection design and traffic safety.

CHAPTER 4 - Design and Construction Standards for Streets

4.01 INTRODUCTION

All lots in any subdivision, regardless of size, shall front on, and have access to, a street. When necessary, streets shall be included as part of the subdivision and shall be designed and constructed in accordance with this chapter.

4.02 GENERAL REQUIREMENTS

All subdivisions shall be designed so the proposed street system accomplishes the following:

A. Conforms with the Comprehensive Plan of the City of Bloomington.

B. Extends arterial and collector streets through the proposed subdivision.

C. Locates and aligns local streets so that use by through traffic is discouraged.

D. Avoids centerline offsets of less than 75 meters (250 feet) from other streets or roadways for local streets. For offsets from collector and arterial streets, a detailed engineering study may be required.

E. Where the angle of deflection in horizontal center lines exceeds five degrees, a curve shall be inserted with a radius of not less than the following dimensions, depending on the classification of the street involved:

1. Local streets where the deflection angle is 60 degrees or more - 20 meters (65 feet)

2. All other - Per “Design and Environment Manual”.

F. So that not more than two streets intersect at any point and so that the angle of intersection of center lines is not less than 80 degrees nor more than 100 degrees.

G. In R-1 and R-2 zoning districts so that cul-de-sacs do not exceed 365 meters (1200 feet) in length or have more than 15 lots fronting thereon, whichever imposes the more demanding standard and in R-3 and two-family zoning districts so that cul-de- sacs do not exceed 120 meters (400 feet) or have more than 8 lots fronting thereon, whichever imposes the more demanding standard.

H. Encourage safe and efficient traffic flow and provide sufficient vehicular storage space for stopping and turning movements so as not to conflict with traffic at intersecting streets or driveway entrances.

I. In residentially zoned areas, access to arterial or collector streets should be provided every 365 meters (1200 feet) to 550 meters (1800 feet) measured along the arterial or collector street.

J. The minimum curb radius where two streets intersect shall be 7.6 meters (25 feet) to face of curb. For arterial, collector, and local commercial streets, curb radii shall be sufficient to accommodate the appropriate design vehicle in accordance with Illinois Department of Transportation “Design and Environment Manual”.

K. Cul-de-sac streets shall not be constructed “back to back.” (Back yards on one cul-de-sac may not be adjacent to back yards of another cul-de-sac).

L. Lots zoned R-1C or R-2 shall have a minimum 18 meter (60 feet) lot width measured at the building set back line if located on the bulb of a cul-de-sac street.

M. Driveways shall not encompass more than 50% of the curb on the bulb of a cul-de-sac street.

4.03 RIGHT-OF-WAY DEDICATION

A. All streets and roadways proposed within the confines of a subdivision shall be located in dedicated public or on private right-of-way as required by this section. All streets are considered public unless specifically stated that they are private on the preliminary plan and final plat.

B. Interior Streets

1. Public Streets. Subdivisions shall be designed so all interior streets are located within dedicated public rights-of-way of the following minimum widths, depending on the street classification, the volume of traffic and the zoning of the abutting property (where side streets abut two or more zoning districts, right-of- way dedication shall be provided so as to meet the requirement of the more demanding zoning district):

Type of Street	R-1 and R-2 Zoning Districts	R-3 Zoning Districts	B, C, M and W Zoning Districts
Arterial			
Over 1200 DHV	29 m (96 ft)	29 m (96 ft)	29 m (96 ft)
Under 1200 DHV	26 m (86 ft)	26 m (86 ft)	27 m (90 ft)
Collector	24 m (80 ft)	24 m (80 ft)	27 m (90 ft)
Local	18 m (60 ft)	18 m (60 ft)	18 m (70 ft)
Cul-De-Sac (dia)	30 m (100 ft)	30 m (100 ft)	34 m (120 ft)
4 Lane w/median	30 m (100 ft)	30 m (100 ft)	30 m (100 ft)
Frontage Roads	18 m (60 ft)	18 m (60 ft)	18 m (60 ft)

Expressway) In accordance with the Comprehensive Plan of the City of Bloomington
) or the standards and requirements of the Federal, State, County
) or Township authorities having jurisdiction, whichever has the
Interstate) greater right-of-way width requirement.

2. Private Streets. Subdivisions shall be designed so all interior streets are located within dedicated right-of-way of the following minimum width:
   a. Street without sidewalk: One meter (3 ft.) back of curb to one meter (3 ft.) back of curb
   b. Street with one adjacent sidewalk: Back at sidewalk to one meter (3 ft.) back of curb.
   c. Street with two adjacent sidewalks: Back of sidewalk to back of sidewalk.

C. Exterior Streets--Subdivisions shall be designed so that the subdivider provides not less than one-half the right-of-way dedication required for a comparable interior street.

D. Supplemental Dedication--where the street design requirements of this ordinance require the provision of turning lanes, turning radii, center median, traffic control devices or other installation which cannot be installed within the right-of-way otherwise required by this Code without the elimination or conflict between such features and other public improvements, the subdivider shall dedicate such additional right-of-way as is necessary to accommodate all such improvements.

4.04 DESIGN STANDARDS

A. Street Width

Pavement width shall be based on street classification, the expected traffic volume and the zoning district (the more demanding standard shall apply) in accordance with the following minimums:

Street	Pavement Width (face to face of curb)	Median Width
Arterial		
Over 855 DHV	15.4 m (51 ft)	1.2 m (4 ft.)
495-855 DHV	14.1 m (47 ft)	0
Under 495 DHV	11.0 m (36 ft)	0
Collector		
Over 495 DHV	14.1 m (47 ft)	0
Under 495 DHV	11.0 m (36 ft)	0
Local	9.0 m (30 ft.)	0
Frontage Roads	9.0 m (30 ft)	0
Boulevards	2 @ 6.6 m (2 @ 22 ft)	3 m (10 ft)
One Way	7.2 m (24 ft)	0
Private Street		
R-1, R-2 Zoning	9.0 m (30 ft.)	
R-1, R-2 Zoning	7.2 m (24 ft.) (if no parking allowed)	
All other zoning	9.0 m (30 ft.)	

B. Pavement Structure

Structural strength shall be based on street classification, the expected traffic volume and designed in accordance with current:

1. Illinois Department of Transportation “Design and Environment Manual”
2. Illinois Department of Transportation “Highway Standards”.
3. Illinois Department of Transportation “Standard Specifications for Road and Bridge Construction”.

Local streets shall be constructed with a minimum of 250 mm (10 inches) of compacted crushed aggregate and 75 mm (3 inches) of bituminous concrete surface, or 150 mm (6 inches) of Portland Cement Concrete, installed in accordance with “Standard Specifications For Road And Bridge Construction” in accordance with the following design and construction standards and specifications:

C. Cul-de-Sac Terminus

Cul-de-sac terminus shall have a minimum diameter measured face-of-curb to face-of-curb of 24 m (80 feet) in areas zoned residential and 30 m (100 feet) in all other areas.

D. Vertical Gradients

Differing connecting street gradients shall be connected with vertical curves. The "Design and Environment Manual" shall govern all vertical curve computations, except when the algebraic difference of the gradient is less than one (1) percent a 15 m (50 foot) vertical curve length shall be utilized . Desirable street gradients shall be not less than a minimum of 0.50% (five tenths of one percent). In no case shall the street gradient be less than 0.40%, or more than 8.0%.

E. Curb and Gutter

All streets which are to be publicly maintained shall have curb and gutter.

1. Curb and gutter shall be Type B 15.45 (B-6.18) in accordance with "Highway Standards" and installed in accordance with the "Standard Specifications of Road and Bridge Construction".

2. All curb and gutter shall be designed so as to facilitate persons using wheelchairs to travel freely and without assistance by providing at each crosswalk a ramp with non-slip surface so that the sidewalk and street blend to a common level. Such ramp shall be designed and constructed in accordance with the "Highway Standards".

F. Trench Backfill

Any excavation in a proposed street shall be back filled with trench backfill.

4.05 SPECIFICATIONS & SPECIAL PROVISIONS

All streets and curb and gutter shall be constructed in accordance with all applicable sections of the "Standard Specifications for Road and Bridge Construction" for the Illinois Department of Transportation, the current edition as then modified, supplemented and amended by this Manual or the Director of Engineering and Water. These modifications, amendments and amplifications have been provided in this Chapter of the Manual.

Street Special Provisions

Curb marking of Water and Sewer Services: At the time the curb and gutter is poured, the contractor shall permanently mark the top of the curb with an "S" for sewer and "W" for water to mark location of said services.

Adjustment of Frame of Grate: Final grade for all manhole castings will be determined after the curb and gutter has been poured and the sub grade and/or base has been constructed. Final adjustment of the frame and grate shall be made in the following manner: After the curb and gutter has been poured and the base constructed the final elevation will be determined by the Director of Engineering & Water. The frame and grate will be adjusted to this elevation in accordance with the "Standard Specifications For Road And Bridge Construction". Any material disturbed while adjusting the frame and grate will be disposed of and all fill made with lean concrete. A maximum of 200 mm (8 inches) of adjusting rings shall be allowed.

Coarse Aggregate: Shall comply with "Standard Specifications For Road And Bridge Construction".

Combination Concrete Curb and Gutter: Concrete curb and gutter shall be sawed or scored at intervals coinciding with the joint intervals of the adjoining pavement. The minimum joint depth for the gutter shall be 50 mm (2 inches), and 25 mm (1 inch) for the curb. The curb and gutter may be jointed instead of sawed provided the stated joint depths are obtained. If the curb and gutter is adjacent to bituminous pavement it shall be jointed at 4.5 m (15 foot) intervals.

The sawing of the curb and gutter shall commence within four (4) hours of the start of the pour unless otherwise directed by the Director of Engineering And Water. Sawing shall continue until all joints are completed.

Asphaltic type expansion joints 25 mm (1 inch) thick shall be placed at all P.C.'s, P.T.'s and R.P.C.'s and at maximum 150 meter (500') intervals.

Test Rolling of Sub grade and Base Course: The contractor will provide at his own expense a loaded truck and test roll the compacted earth sub grade in the presence of the Director of Engineering and Water or his designee before any sub-base, base, or surface is placed. The truck shall be loaded as follows: 12,000 kg (27,000 lbs) on two axles and 20,000 kg (45,000 lb.) on three axles, plus or minus ten per cent.

The truck shall make one pass over the entire length of each traffic lane to be constructed. Areas which show rutting, cracking or rolling will not be accepted. The contractor will recompact and/or reconstruct the sections that fail and test role again for acceptance.

When bituminous surface courses or concrete pavement are to be placed over an aggregate base, the base shall be test rolled prior to placement of the surface course or pavement.

Portland Cement Concrete Pavement: The distance between sawed transverse joints shall not be greater than 30 times the thickness of the pavement apart or a maximum of 6 meters (20 ft.) and shall conform with the details in the plans. All equipment and labor required to perform the necessary jointing operation shall be available to begin sawing no later than four (4) hours after the paving operation begins, unless excess raveling occurs. The contractor shall provide the necessary equipment and labor needed to complete the sawing at the same rate per longitudinal foot as the paving operation.

The contractor shall stop the paving operation at 4:30 P.M. unless approved otherwise by the Director of Engineering & Water. Sawing shall continue at the same rate as stated above until the sawing is complete or the pavement has stopped curing.

Trucks and mixer trucks will be allowed to operate on the sub grade; however, should the sub grade show any signs of distress, all operations will cease until these items are corrected to the satisfaction of the Director of Engineering & Water. Curb and gutter formed monolithically with the pavement will be permitted provided the slip form paving equipment used is approved by the Director of Engineering.

Final finish shall be Type B (artificial turf drag) as described in "Standard Specifications For Road And Bridge Construction".

Portland Cement Concrete Driveway Pavement: Pavement shall be a minimum of 150 mm (6 inches) in depth. Sawed transverse and longitudinal joints shall conform to the following table:

Driveway Width at Widest Point		No. of Longitudinal Saw Cuts
0 M - 4 M	(0 -12 ft)	0
4 M - 8 M	(12 ft - 24 ft)	1
8 M - 12 M	(24 ft - 36 ft)	2

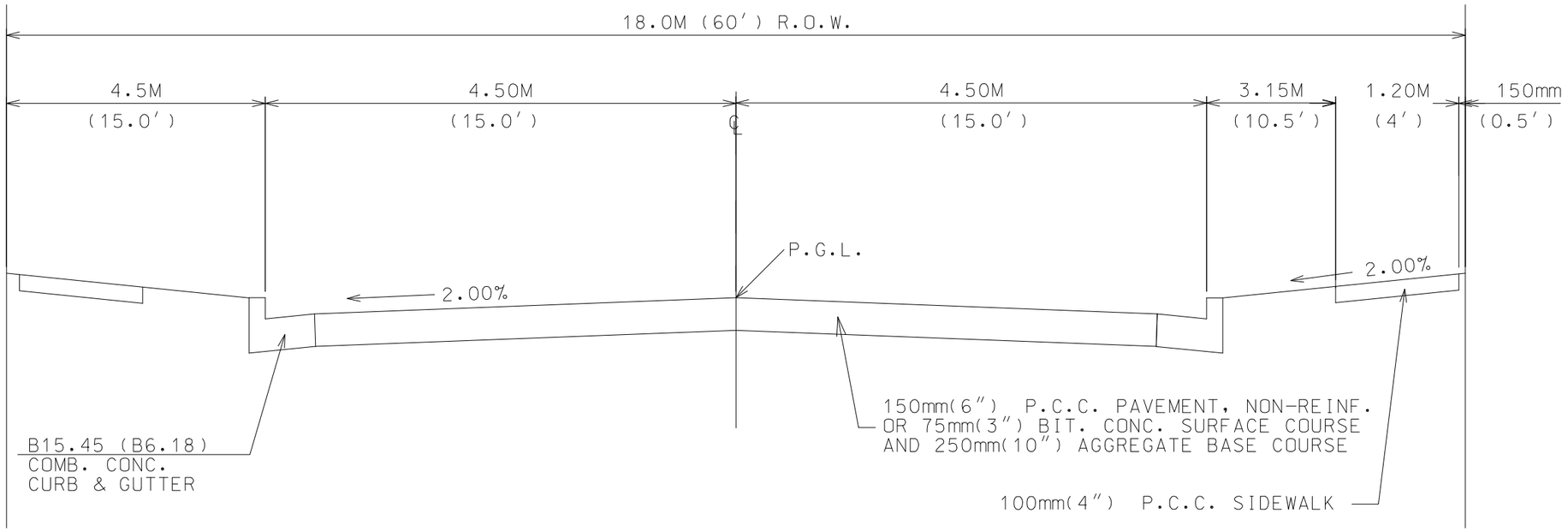
Maximum Driveway Length		No. of Transverse Saw Cuts
0 M - 4 M	(0 - 12 ft)	0
4 M - 8 M	(12 ft - 24 ft)	1
8 M - 12 M	(24 ft - 36 ft)	2

The sawed joints shall be spaced evenly throughout the driveway. The joints shall be 3 mm (1/8 inch) wide with a minimum depth of one-fourth the depth of the pavement and sealed with the same material and in the same manner as Portland Cement Concrete Pavement.

20 mm (¾ inch) thick expansion joints shall be placed between driveway pavement and sidewalks and between driveway pavement and curb and gutter.

4.06 STANDARD DETAILS

Standard Drawing	Title
A	Typical Pavement Section - Minor Street
B	Standard Joint Details
C	Barrier Curb & Gutter Detail
D	Typical Intersection Joint Detail
E	Typical Cul-de-sac Joint Detail
F	Driveway Entrance Detail
G	Typical Monolithic PCC Pavement Section - Minor Street



TYPICAL PAVEMENT SECTION - MINOR STREET

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

TYPICAL PAVEMENT SECTION - MINOR STREET

STANDARD DETAIL 4.06A

SHEET
— OF —

1. When a joint falls within 5 ft. of or contacts basins, manholes, or other structures, shorten one or more panels either side of opening to permit joint to fall on round structures and at or between corners of rectangular structures.

2. All transverse joints must extend through curbs and must be continuous across pavement. Asphaltic expansion joints, 25mm(1inch) thick shall be placed at all P.C.'s, P.T.'s, and R.P.C.'s and at maximum 150M(500') intervals.

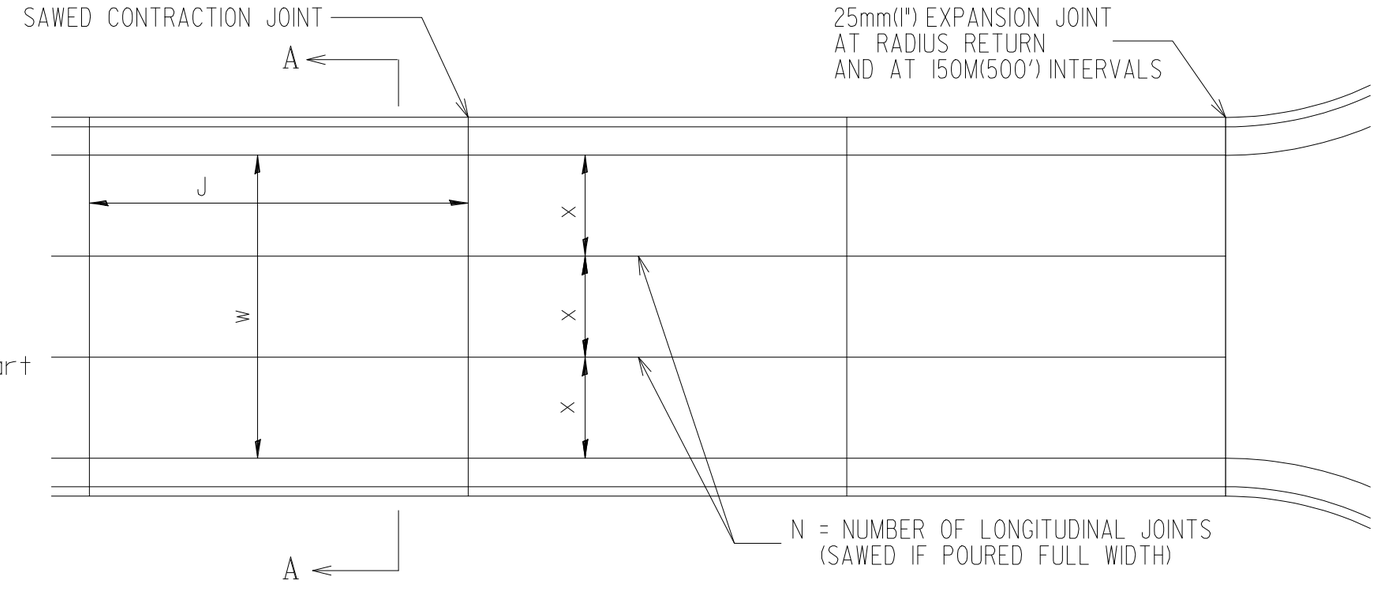
3. The distance between sawed traverse joints shall not be greater than 30 times the thickness of the pavement apart or a maximum of 6M(20').

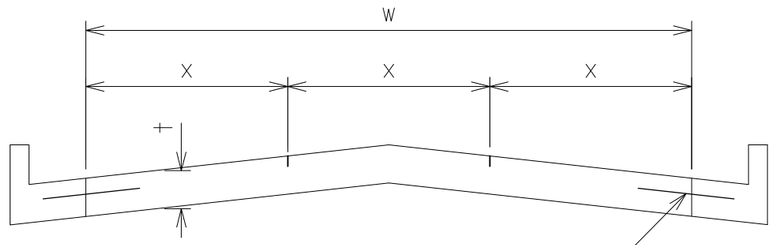
4. Sawed joints shall be sealed with hot poured material meeting the requirements of tenative specification for concrete joint sealer hot poured elastic type ASTM designation: D3405 or sealed with a cold applied ready-mixed concrete joint sealing compound meeting the requirements of Article 1050.01.

5. Transverse construction joint must be at a contraction or expansion joint.

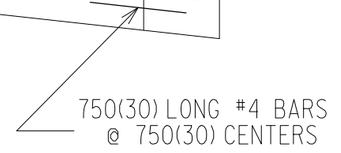
6. All saw joints, longitudinal or transverse shall be nonreinforded.

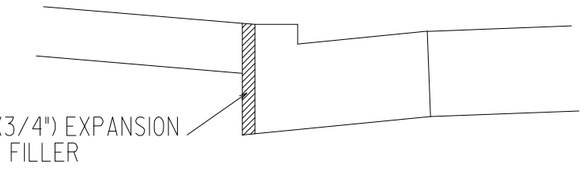
7. For rigid bases (CAM), the expansion joint material need not extend 25mm (1inch) below the pavement.





SECTION A-A



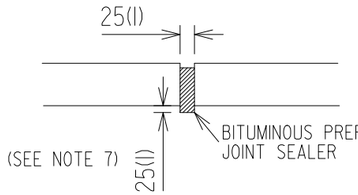


CURB AT DRIVEWAY OR CROSSWALK

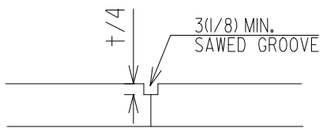
w	N	x
6.7M (22')	1	3.4M (11')
7.0M (23')	1	3.5M (11.5')
7.3M (24')	1	3.7M (12')
8.2M (27')	2	2.7M (9')

w	N	x
10.1M (33')	2	3.4M (11')
10.7M (35')	2	3.6M (11.75')
12.5M (41')	3	3.1M (10.75')
13.4M (44')	3	3.4M (11')

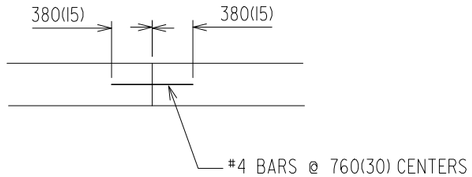
w	N	x
14.0M (46')	3	3.5M (11.5')
14.6M (48')	3	3.7M (12')



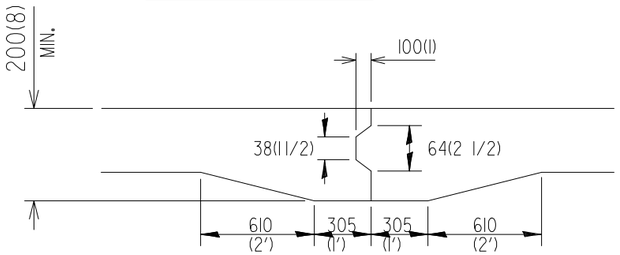
EXPANSION JOINT



SAWED JOINT



TIED CONSTRUCTION JOINT



KEYED CONSTRUCTION JOINT

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

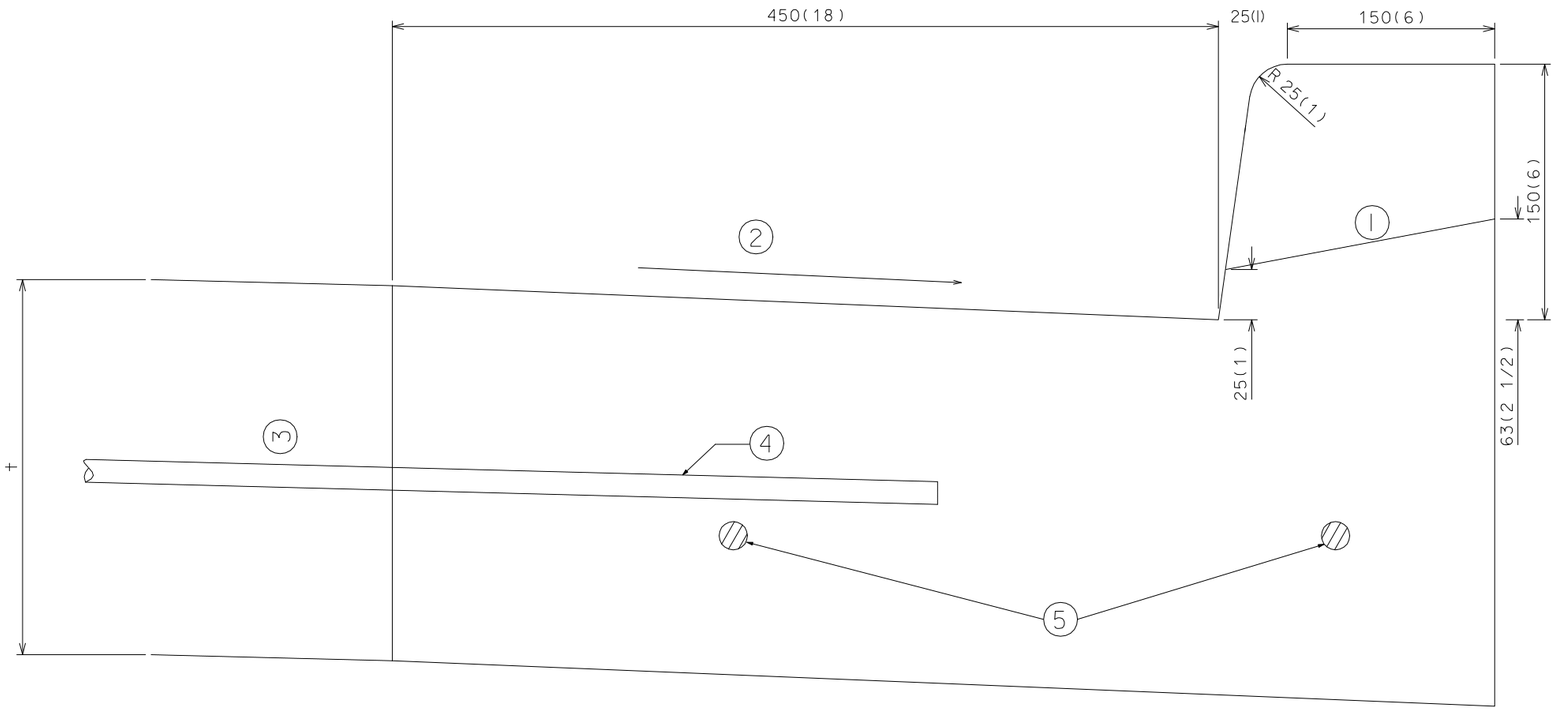
DESIGN BY : DOUG GROVESTEEN
REVISED :
BY :
APPROVED
DATE :

STANDARD JOINT DETAILS

STANDARD DETAIL 4.06B

SHEET
1 OF 1

COMBINATION CONCRETE CURB AND GUTTER
TYPE B 15.45 (B 6.18)



GENERAL NOTES

① DEPRESS AT DRIVEWAYS
② SLOPE 62mm/M (3/4 IN/FT) EXCEPT AT INTERSECTIONS
③ X = 200(8) OR DEPTH OF PAVEMENT WHEN ADJACENT TO P.C.C. PAVEMENT, WHICHEVER IS GREATER.
X = 200(8) WHEN ADJACENT TO P.C.C., AGGREGATE, BITUMINOUS OR BRICK BASE COURSE.

④ 760mm(30") LONG #4 REBARS AT 760(30) SPACING (USED ONLY WHEN ADJACENT TO P.C.C. PAVEMENT OR P.C.C. BASE)
⑤ #4 REBARS CONTINUOUS THROUGHOUT (USED ONLY WHEN ADJACENT TO BITUMINOUS, BRICK OR AGGREGATE BASE)

+ = THICKNESS OF PAVEMENT.

ALL DIMENSIONS ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SHOWN.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

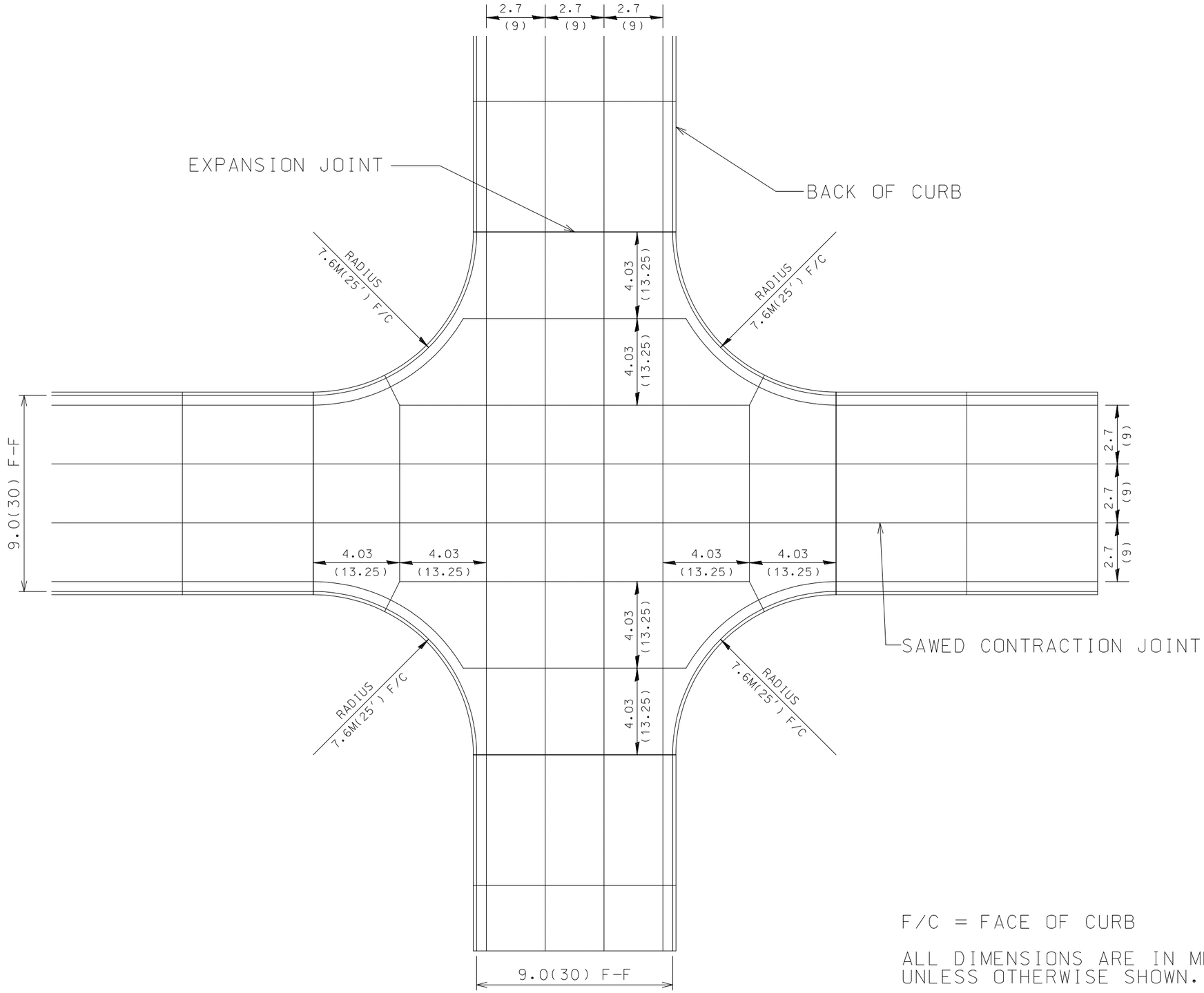
APPROVED BY :
DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

BARRIER CURB & GUTTER DETAIL

STANDARD DETAIL 4.06C

SHEET
1 OF 1



F/C = FACE OF CURB

ALL DIMENSIONS ARE IN METER (FOOT) UNLESS OTHERWISE SHOWN.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

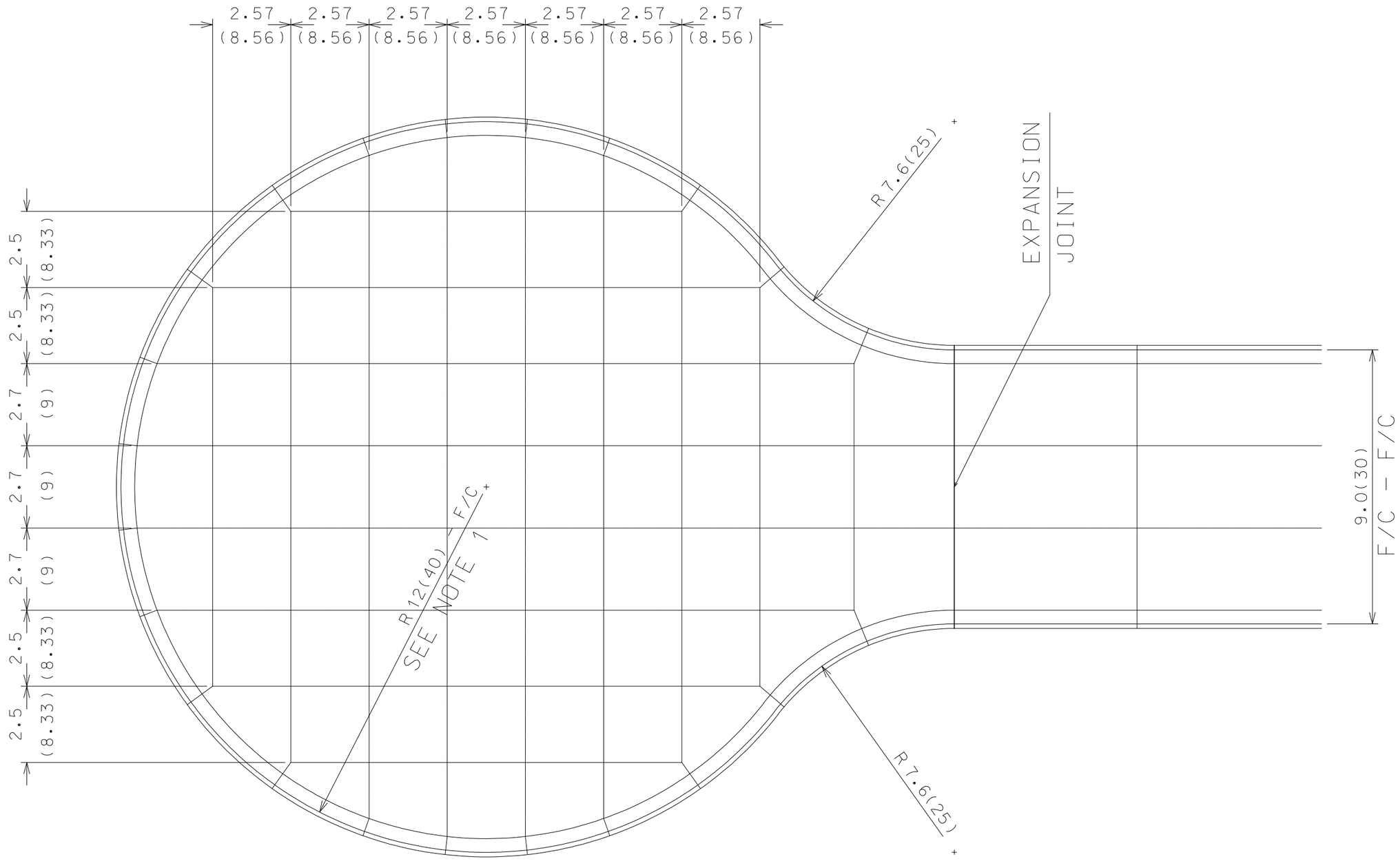
APPROVED BY :
DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

TYPICAL INTERSECTION JOINT DETAIL

STANDARD DETAIL 4.06D

SHEET
| OF |



1. Cul-de-sac terminus shall have a minimum diameter measured face-of curb to face-of-curb of 24 meters (80 feet) in areas zoned residential and 30 meters (100 feet) in all other areas.

2. All dimensions on this sheet are in meters (feet) unless otherwise noted.

3. Sawed joint dimensions shown are for a typical 30M(100') dia. cul-de-sac.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

CITY OF BLOOMINGTON 1856 ILLINOIS

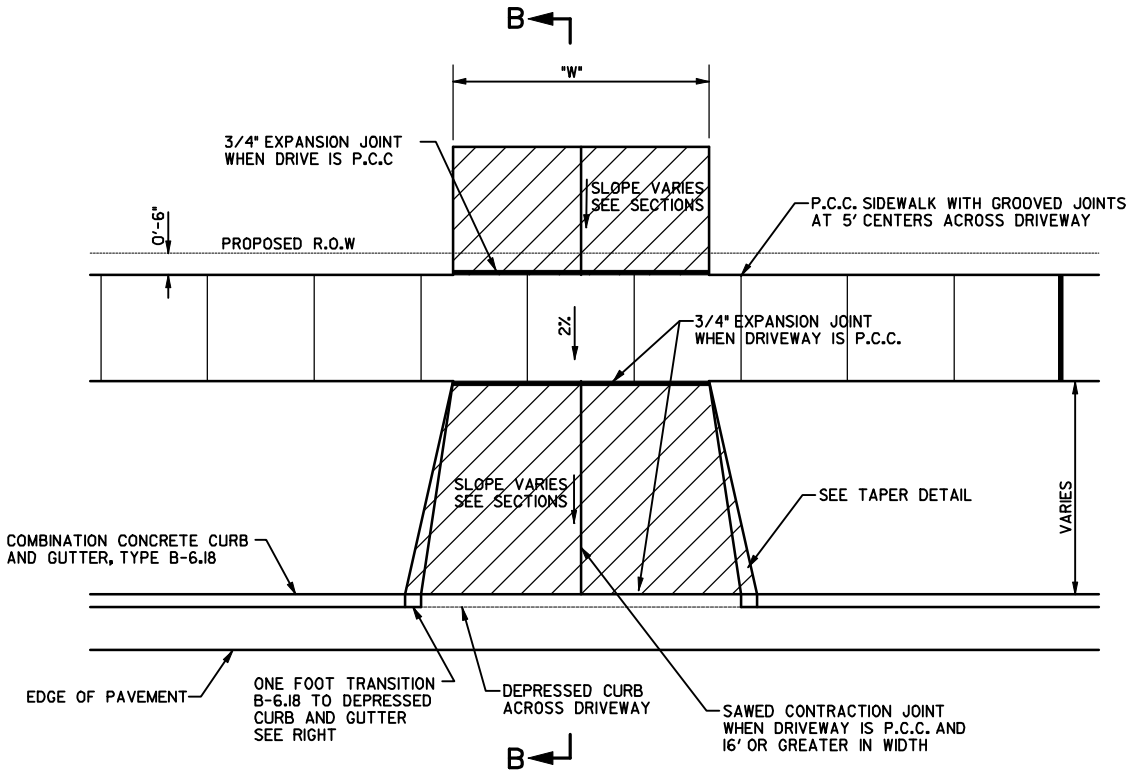
BY :
APPROVED DATE :

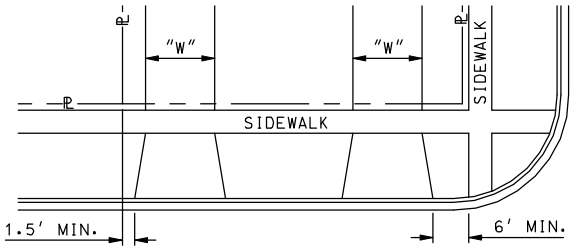
DESIGN BY : DOUG GROVESTEEN REVISED :

TYPICAL CUL-DE-SAC JOINT DETAIL

STANDARD 4.06E

SHEET
1 OF 1





RESIDENTIAL

"W" = 16 ft Max. for Single Driveway

"W" = 20 ft Max. for Double Driveway

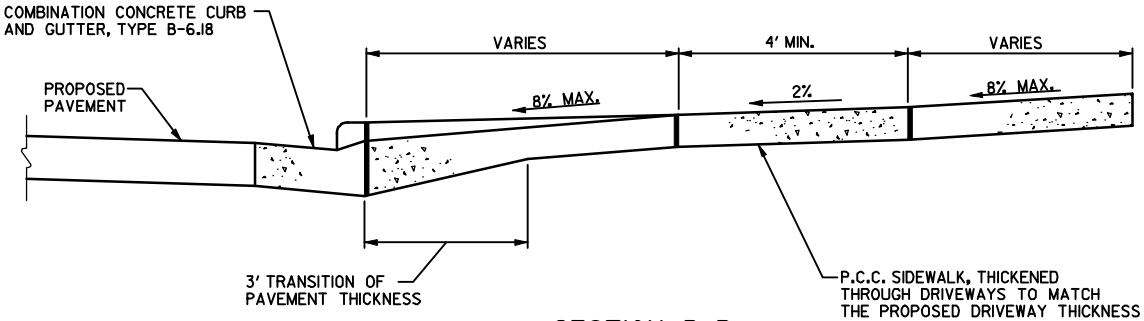
MULTI-FAMILY, COMMERICAL
AND INDUSTRIAL

"W" = 40 ft Max. for Single Driveway

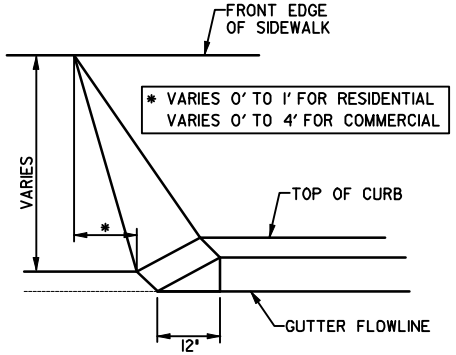
"W" = 35 ft Max. for Double Driveway
w/Min. 6 ft Median between
laydowns

NOTES:

1. In Residential Areas, one driveway will be allowed if total street frontage along the lot is less than 100 ft and two driveways will be allowed if total street frontage along the lot is more than 100 ft.
2. A permit is required to establish a curb opening for a driveway. The permit shall be obtained from the Engineering & Water Department prior to beginning construction.
3. New or rebuilt driveways must have a paved surface across the parkway.



SECTION B-B



TAPER DETAIL

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

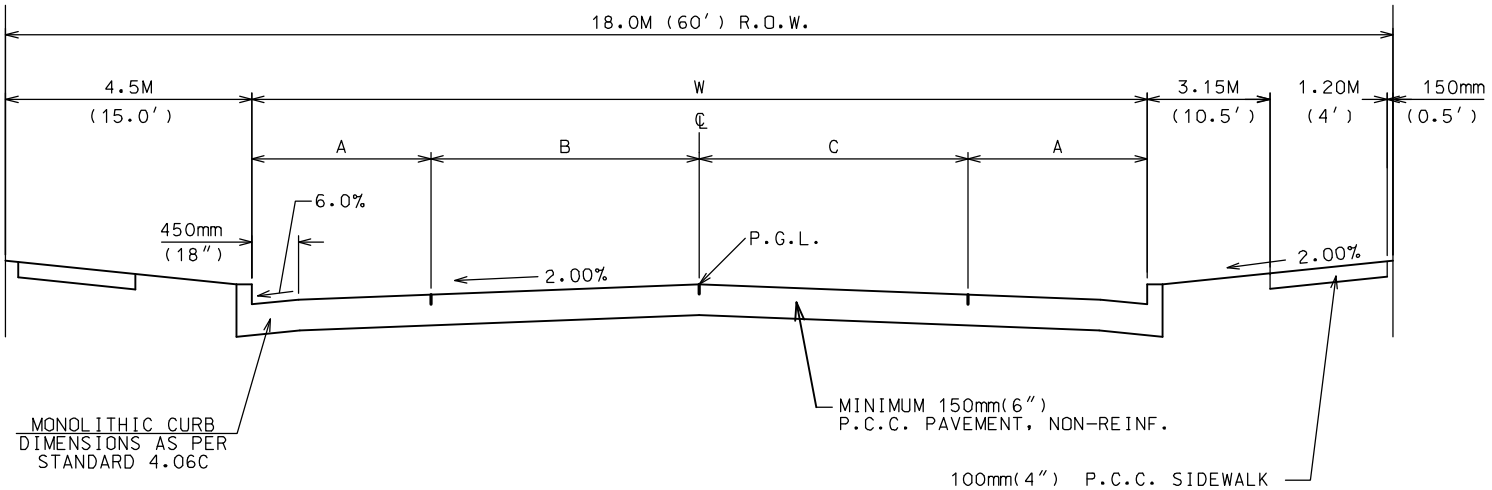
BY: DGG
APPROVED DATE: 2-20-2003

DESIGN BY : DOUG GROVESTEEN REVISED:

DRIVEWAY ENTRANCE DETAIL

STANDARD 4.06F

SHEET
1 OF 1



W	N	A	B	C
7.3 M (24')	2	1.8 M (6')	3.7 M (12')	0
7.9 M (26')	2	2.1 M (7')	3.7 M (12')	0
9.1 M (30')	3	1.8 M (6')	2.75 M (9')	2.75 M (9')
11.0 M (36')	3	1.8 M (6')	3.7 M (12')	3.7 M (12')

TYPICAL MONOLITHIC P.C.C. PAVEMENT SECTION

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN REVISED : 3-12-2003
APPROVED BY : DGG DATE : 3-12-2003

TYPICAL MONOLITHIC P.C.C. PAVEMENT SECTION

STANDARD DETAIL 4.06G

SHEET
1 OF 1

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CHAPTER 5 - Design and Construction Standards for Sidewalks and Pedestrian Ways and Trails

5.01 INTRODUCTION

Sidewalks shall be installed in all subdivisions regardless of size, unless a waiver is granted from the City Council at the time of submission of a Preliminary Plan. Sidewalks and pedestrian ways shall be designed and constructed in accordance with the requirements set forth in this chapter.

Trails shall be installed in all subdivisions where indicated on the City Comprehensive Plan and should be installed in other areas to compliment the existing trail system.

5.02 DESIGN STANDARDS

Subdivisions shall be designed so that sidewalks or pedestrian ways are provided in such locations and in such a manner as to do and accomplish the following:

A. Sidewalks offset from the back of curb by 0.6 m (2 feet) or more shall be not less than 1.2 m (4 feet) in width; except in the B-3, Central Business District, where sidewalks shall not be less than 1.8 m (6 feet) in width. Sidewalks adjacent to the back of curb shall be not less than 1.8 m (6 feet) in width. Where sidewalk exceeds 60 m (200 feet) in length without the interruption of a drive, etc., then a minimum 2 m (6.5 feet) length of 1.5 m (5 feet) wide sidewalk is required.

B. In all zoning districts, sidewalks shall be located within dedicated street right-of-way and shall be roughly parallel to the street or roadway. Sidewalks shall be located on both sides of all public streets.

C. Where the street design and parallel sidewalk arrangement does not provide reasonably direct pedestrian access to and from school sites, park sites, neighborhood commercial centers and other pedestrian traffic generators, pedestrian ways shall be provided in dedicated right-of-way so as to permit reasonably direct pedestrian access to and from such sites.

D. All sidewalks shall conform to all current Americans With Disabilities Act standards.

E. Trails shall be designed in accordance with current American Association Of State Highway and Transportation Officials standards. Trail pavement widths shall be 3 - 3.6 m (10 - 12 feet) wide.

F. Transverse slope on sidewalks, pedestrian ways and trails should not be less than 2% nor greater than 4%.

5.03 RIGHT-OF-WAY DEDICATION

A. All public sidewalks shall be installed in dedicated public right-of-way. Such dedication shall extend not less than 150 mm (6 inch) on each side of the sidewalk surface. The back of the sidewalk shall be located 150 mm (6 inches) off of the right-of-way line unless otherwise approved by the Director of Engineering and Water.

B. All trails shall be installed in dedicated public right-of-way a minimum of 7.5 meters (25 feet) in width.

5.04 SCHEDULE OF INSTALLATION

Sidewalk in front of a lot may be installed at any time up to the time an occupancy permit is granted for a building on the lot except that all sidewalk in a subdivision shall be completed within five (5) years of the date of the Final Plat being filed or by the time 90% of the lots in the

subdivision have been granted Occupancy Permits. In no case shall an occupancy permit for a building be issued before the sidewalk adjacent to the lot is completed.

5.05 SPECIFICATIONS & SPECIAL PROVISIONS

A. All sidewalks and trails shall use materials and be installed in a manner meeting or exceeding the requirements, standards and specifications contained in the most recent edition of the "Standard Specifications for Road and Bridge Construction" and all Special Provisions contained herein.

B. Special Provisions

1. Sidewalk Thickness--All sidewalks shall be a minimum of 100 mm (4 inches) in depth, except that the minimum thickness shall be 150 mm (6 inches) in areas zoned commercial, business or manufacturing. All sidewalks through driveways shall be a minimum of 150 mm (6 inches) thick.

2. Transverse Expansion Joints: Asphaltic transverse expansion joints, 13 mm (½ inch) thick, shall be placed in the sidewalk at intervals not to exceed 30 m (100 feet).

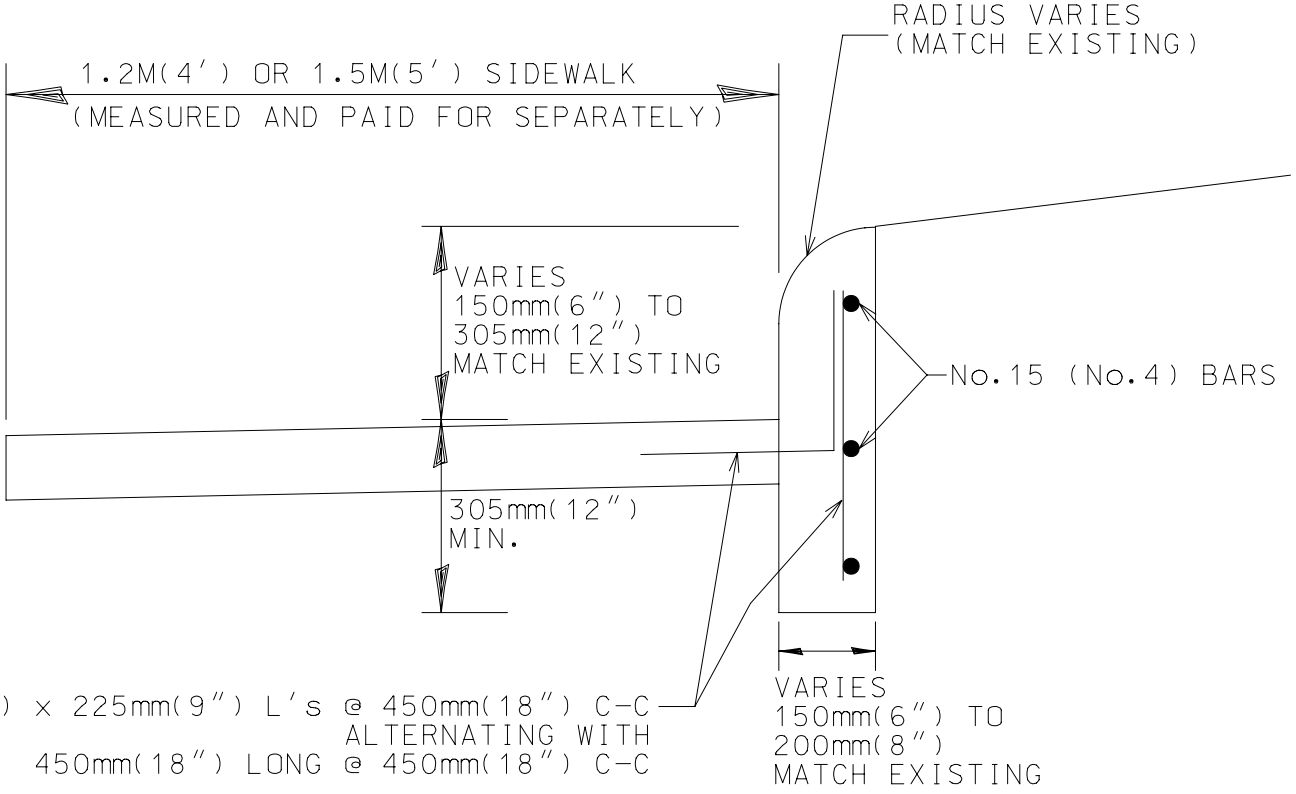
3. PCC Sidewalk Special: Where existing ground surface adjacent to back of sidewalk is 150 mm (6 inches) or more above the elevation of the walk, PCC Sidewalk Special shall be constructed in accordance with Standard No. 5.06 A.

4. Wheelchair Ramps: Wheelchair ramps shall be constructed in accordance with the "Illinois Department of Transportation Highway Standards.".

5. Trail Thickness: All trail pavements shall have a minimum of 50 mm (2 inches) bituminous surface course over a 150 mm (6 inch) aggregate base. Where appropriate and approved by the Director of Parks and Recreation, a 150 mm (6 inch) PCC pavement may be installed. When PCC pavement is used, all contraction joints shall be sawed.

5.06 STANDARD DETAILS

Standard Drawing	Title
A	PC Concrete Sidewalk Special (Rev. 02/03)



No.15 (No.4) BARS: 305mm(12″) x 225mm(9″) L's @ 450mm(18″) C-C
ALTERNATING WITH
No.15 (No.4) BARS: 450mm(18″) LONG @ 450mm(18″) C-C

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW

PC CONCRETE SIDEWALK - SPECIAL

STANDARD 5.06A

SHEET
— OF —

CHAPTER 6 - Design & Construction Standards for Storm Sewers, Drainage Ways, Sump Pump Discharge Lines and Storm Water Detention Facilities

6.01 INTRODUCTION

All subdivisions, regardless of size, within the corporate limits or under the control of the City, shall include a storm water drainage system designed in such a way as to do and accomplish the requirements of this chapter of the Manual. The design of all storm water facilities proposed and funded by the City shall also meet the requirements of the Chapter.

Developers shall be allowed to tap into any existing portion of the City's storm water drainage system if the requirements of this Chapter have been or will be met. The requirements for tap-on or hook-up to the City system may include payment of fees as determined by the City.

The owner shall pay the total cost of the installation of storm sewers in conformance with Bloomington's Comprehensive Plan for storm drainage systems. The owner may negotiate with the City to share the cost of the installation of required storm system which exceeds the normal size requirements for the subdivision or PUD, however, all the engineering costs for such storm sewer systems shall be borne by the developer.

6.02 DESIGN STANDARDS

All subdivisions shall include a storm water drainage system designed in such a way to provide that all lots and outlots in the subdivision will be graded and shaped so as to drain property within the subdivision and such additional land as is in the natural drainage way by gravity to catch basins, inlets, detention/retention facilities and drainage ways with adequate outlet.

A. Storm Sewers

1. In all new developments except those zoned R-1, R-2 or R-4 the Developer will be required to provide a minimum 300 mm (1 foot) diameter storm sewer lateral to a point on each lot; said point to be a point that will accommodate the natural drainage of the lot served. The lateral shall be attached to the primary sewer at a drainage structure.

    a. Design formula: Unless otherwise approved by the Director of Engineering, formulas to be used in connection with the calculation of run-off reasonably expected from the minimum design storm shall be the Rational Method for total contributing areas of 8 hectares (20 acres) or less and the Soil Conservation Service Method as outlined in their Technical Release No. 55 for areas greater than 8 hectares (20 acres). Calculations are to be submitted substantially in the form provided in Exhibit P of the Appendix.

    b. Minimum Design Storm: The minimum design storm used in calculating run-off in the Design Formula will be the average rainfall intensity associated with an average recurrence interval of five (5) years for the storm period calculated by the Time of Concentration as outlined by the latest Technical Letters of the Illinois State Water Survey for rainfall frequencies. The corresponding charts and tables have been provided in Exhibit P of the Appendix for time of concentration, run-off factors and coefficients and frequency intensities for use in either method for run-off estimation.

    c. Match 0.9 points of diameter when changing sewer sizes where feasible.

d. For storm sewer pipes flowing full, the minimum velocity allowed shall be two and five-tenths (2.5) feet per second and the maximum velocity allowed shall be fifteen (15) feet per second.

e. Designed to prevent installation of storm sewers in rear yard easements and to permit only when necessary installation in side yard easements.

2. The storm water drainage system shall connect all inlets and catch basins to a storm sewer, pipe or conduit of sufficient size, grade and capacity to carry the run-off reasonably expected from the Minimum Design Storm on the area in the natural drainage area if that area is improved with the type of improvements permitted and to a maximum density authorized by the then-existing zoning ordinances of the City for property within the corporate limits and the land use element of the Bloomington's Comprehensive Plan for property outside the corporate limits provided, however, no storm sewer shall be less than 300 mm (1 foot) in diameter.

3. The storm water drainage system shall connect all storm sewers to other storm sewers or improved drainage ways of sufficient size, grade, and capacity to carry the runoff reasonably expected from the Minimum Design Storm on the area in the natural drainage area if that area was improved with the type of improvements permitted and to the maximum density authorized by the then-existing zoning ordinances of the City for property within the corporate limits and the land use element of the City's Comprehensive Plan for property outside the corporate limits.

4. Manholes

a. Public manholes shall be installed at the end of each storm sewer line, at all changes in grade or alignment, at all intersections and at distances not greater than 120 m (400 feet). Greater spacing may be permitted in larger sewers.

b. Public manholes in improved streets or other hard surfaced public rights-of-way accessible to vehicular traffic, shall be not more than 240 m (800 feet) apart.

c. Minimum drop between influent and effluent pipes in a manhole shall be 30 mm (0.1 ft.) and the desirable maximum drop in a manhole shall be 600 mm (24 inches).

d. Manholes shall be designed in accordance with Standard Drawing 6.07 A or B.

5. Inlets

a. Inlets for local streets shall be provided for all low points and the maximum spacing shall not exceed 120 m (400 feet), except that the first inlet shall be spaced approximately 120 m (400 feet) from the high point or at no greater distance than 180 m (600 feet) when approved by the Director of Engineering. Inlet spacing for all other streets must meet Illinois Department of Transportation Design and Environment Manual criteria.

b. Inlets shall be designed in accordance with Standard Drawing 6.07 C or D.

6. A flood route shall be provided through the proposed development. The flood route shall be designed for the runoff expected from a 100 year storm frequency in post development conditions or pre development conditions, whichever generates higher flow.

B. **Drainage Ways**

1. All drainage ways through the proposed development, if approved by the city, shall be improved to a size and in a way adequate to carry the runoff reasonably expected from the Minimum Design Storm on the area in the natural drainage area if that area was improved with the type of improvements permitted and to the maximum density authorized by the then-existing zoning ordinances of the City for property within the corporate limits and the land use element of the Bloomington's Comprehensive Plan for property outside the corporate limits.

a. Design Formula: Unless otherwise approved by the Director of Engineering, formulas to be used in connection with the calculation of runoff reasonably expected from the Minimum Design Storm shall be the Rational Method for total contributing areas of 8 hectares (20 acres) or less and the Soil Conservation Service Method as outlined in their Technical Release No. 55 for areas greater than 8 hectares (20 acres). Calculations shall be submitted substantially in the form provided in Exhibit P of the Appendix.

b. Minimum Design Storm: The Minimum Design Storm used in calculating runoff in the Design Formula will be the average rainfall intensity associated with an average recurrence interval of one hundred (100) years for the storm period calculated by the Time of Concentration as outlined by the latest Technical Letters of the Illinois State Water Survey for rainfall frequencies. The corresponding charts and tables have been provided in Exhibit P of the Appendix for Time of Concentration, runoff factors, and coefficients and frequency intensities for use in either method for runoff estimation.

2. Drainage ways shall have a flat bottom, maximum 3:1 side slopes, the top of the bank shall be constructed 0.3 meter (one foot) above computed water surface elevation for the Minimum Design Storm, and have a 3 m (10 foot) maintenance/access lane on each side of the drainage way.

C. **Retention and Detention Facilities**

1. No development shall be authorized in the City unless there is an adequate outlet or the City has approved retention or detention facilities. The applicant shall show by his detailed calculations that the outlet is adequate, and the calculations must be acceptable to the City. In the event the City determines the outlet is not adequate, the developer shall construct retention or detention facilities. Detention and retention facilities shall be privately owned and maintained unless the preliminary plan or annexation agreement specifically states the City will accept ownership. The entity responsible for the maintenance of private detention basins shall supply to the City evidence of financial capability. Such facilities shall be designed based on the Design Formula. In lieu of providing retention or detention facilities, the developer may be asked at the option of the City to pay a fee.

   a. Design Formula: Unless otherwise approved by the Director of Engineering, formulas to be used in connection with the calculation of runoff volumes and allowable release rates reasonably expected from the Minimum Design Storm shall be the Rational Method as outlined on the latest Illinois Department of Transportation "Drainage Manual" for total contributing areas between 8 hectares (20 acres) and 2 hectares (5 acres) and the Soil Conservation Hydrograph Method for areas greater than 8 hectares (20 acres). The corresponding instructions, charts, tables and forms have been provided in Exhibit P of the Appendix of this Manual for use in either method of calculation.

   b. Design Table: For areas of development less than 2 hectares (5 acres), the following storage and release rates will be required:

AREA	REQUIRED STORAGE RATE	MAXIMUM RELEASE RATE ALLOWED
up to 0.4 hectare (1 acre)	750 cu.m./hectar (10700 cu. ft./acre)	0.073 cu.m./hectare (1.05 cfs/acre)
up to 0.8 hectare (2 acre)	640 cu.m./hectare (9100 cu. ft./acre)	0.063 cu.m./hectare (0.90 cfs/acre)
up to 1.2 hectare (3 acre)	545 cu.m./hectare (7800 cu. ft./acre)	0.055 cu.m./hectare (0.78 cfs/acre)
up to 1.6 hectare (4 acre)	480 cu.m./hectare (6900 cu. ft./acre)	0.045 cu.m./hectare (0.64 cfs/acre)
up to 2.0 hectare (5 acre)	435 cu.m./hectare (6200 cu. ft./acre)	0.042 cu.m./hectare (0.60 cfs/acre)

   c. Minimum Design Storm:
      i. Storage Volume when using the Soil Conservation Hydrograph Method will be determined from inflow hydrographs generated by the Design Formula using a minimum design storm with a range of rainfall intensities associated with an average recurrence interval of one hundred (100) years and an assumed coefficient for the particular post development zoning district as set forth in Exhibit P of the Appendix of this Manual.
      ii. Storage Volume when using the Rational Method will be the volume generated by the difference between average runoffs of 100 year rainfall frequency in post development condition and three year rainfall frequency in pre development condition, assuming such difference occurs for one hour. The average discharge being half of the peak discharge calculated by the Rational Method.

iii. Allowable Release Rate will be determined by the Design Formula using a minimum design storm with an average rainfall intensity associated with an average recurrence interval of three (3) years for the storm period calculated by the Time of Concentration as outlined by the latest Technical Letters of the Illinois State Water Survey for rainfall frequencies. Runoff coefficients or CN numbers used shall reflect pre developed condition of the watershed.

2. Bank Stabilization

a. Retention facilities shall be provided with wave shelves along the entire perimeter in accordance with the standards in this manual.

b. Retention and detention facilities shall have a maximum 3:1 bank slope. If the facility is to be dedicated to the public or is to be located in a residentially zoned area, then the slope shall be a maximum of 4:1.

c. Retention shoreline surfaces subject to wave action shall be stabilized with structural material such as rip rap, revetment matting, retaining walls, etc.

3. Under Drains: Detention facilities to be dedicated to the public for ownership and maintenance by the City shall include a system of under drains to insure a dry bottom.

a. Pipe Materials: Under drains shall be constructed of rigid perforated PVC pipe, SDR 35 or stronger.

b. Fabric Envelope: Under drain pipe shall be encased in a envelope of fabric weighing not less than 120 grams per square meter (3.5 ounces/square yard) meeting the requirements for Geotechnical Fabric for Pipe Underdrains as specified in the Standard Specifications for Road and Bridge Construction.

c. Pipe Size: minimum 150 mm (6 inch)

d. Clean outs: At ends of runs, junctions, and maximum every 90 m (300 feet) as per standard drawing 6.07 - J

e. Tracer Wire: all under drains shall be buried with a tracer wire. Trace wire shall be #12 THWN single conductor solid copper cable. Tracer wires shall be terminated at clean outs as shown in Standard Drawing 6.07-J .

4. Earthen Dams: when dedicated to the public for ownership and maintenance by the City, earthen dams shall meet the following criteria:

   a. Side Slope: 4:1 or flatter

   b. Minimum 3 m (10 foot) wide flat crest for access by maintenance equipment.

      All earthen dams, whether public or privately owned and maintained shall meet the following:

   c. Freeboard: All earthen dams shall be constructed with a minimum of 300 mm (one foot) of freeboard over the maximum anticipated water level in the emergency spillway.

   d. All earthen dams shall include at a minimum, an impervious compacted clay core. The core shall be of sufficient width to allow for mechanical compaction and of sufficient depth to penetrate the overburden of topsoil, keying into the underlying strata of virgin clay.

   e. The developer shall be responsible for obtaining all construction permits required by governmental agencies.

5. Emergency Spillway: all detention and retention facilities, whether publicly or privately owned and maintained shall include an emergency spillway.

   a. Emergency spillways shall, wherever feasible, be constructed in virgin ground.

   b. Erosion Protection: emergency spillways shall be protected from erosion with approved surface paving or vertical cutoff walls appropriate for the size of the impoundment and the height of the spillway crest.

   c. Capacity: emergency spillways shall be sized for no less than 75% of the maximum peak inflow into the basin.

D. Flood Routes

1. Required to be designated on the grading plan when any one of the following criteria are met:

   a. Contributing drainage area exceeds 1.2 hectares (3 acres)

   b. Rate of flow exceeds 0.14 cubic meters per second (5 cubic feet per second) during a 100 year storm event.

   c. When flood route drainage from a public right-of-way containing a street flows across private property.

2. Flood Routes shall be designed according to the following criteria:

   a. They shall be sized to convey the runoff of the contributing drainage area generated by a 100 year storm.

   b. Building pads for adjacent buildings shall be elevated so that the finish grade at the building, or the lowest entry to the building (window, door, etc.), whichever is lower, is a minimum of one foot above the 100 year high water level in the adjacent flood route.

   c. The side slope of a flood route, perpendicular to the water flow, shall not exceed 4:1.

E. <u>Sump Pump Discharge</u>

1. In all new developments zoned R-1A, R-1B, R-1C, R-1H, and R-2, the developer will be required to provide a minimum 50 mm (2 inch) diameter sump pump discharge lateral to a point on each lot; said point to be a point that will accommodate the subsurface discharge from around the foundation of the building served. The lateral shall be attached to the primary sump pump discharge conduit by the installation of a tee or wye connection.

2. The primary sump pump discharge system shall connect all laterals to a storm sewer, pipe or conduit of sufficient size, grade and capacity to carry the discharge reasonably expected from the area improved with the maximum density authorized by the then-existing zoning ordinances of the City. No primary sump pump discharge conduit shall be less than 150 mm (6 inches) in diameter or greater than 250 mm (10 inches) in diameter.

3. The primary sump pump discharge system shall connect all conduit to other storm sewers, inlets or catch basins, manholes or improved drainage ways of sufficient size, grade and capacity to carry the discharge reasonably expected.

4. <u>Cleanouts</u>:

   a. Cleanouts shall be installed at the end of each primary sump pump discharge line, at all changes in grade or alignment, and at distances not greater than 120 m (400 feet) between clean outs or between clean outs and manholes or inlets. Inlets or manholes may be substituted for clean outs located within the public right-of-way.

5. No sump pump discharge lateral or primary conduit shall be installed beneath a public street pavement. The City will not accept for maintenance any primary sump pump discharge line located along rear or side lot lines.

6. Tracer Wire. All sump lines not constructed of metallic material shall be installed with tracer wire. Tracer wire shall be #12 THWN single conductor solid copper cable. Tracer wire shall be terminated at clean outs as shown in Standard Drawing 6.07- J.

7. Sump Pump Service Markings: The contractor shall place 50 mm x 100 mm wood studs (2x4's) extending from the bottom of the sump pump service to 0.6 m (2 feet) above the ground at the location where each sump pump service terminates. A minimum of the upper one (1) foot of each wood stud (2x4) shall be painted white. These markers shall be installed at the time the services are constructed.

8. Curb Marking of Sump Pump Services: If the sump pump service line is in the front yard or parkway, at the time the curb and gutter is poured, the contractor shall mark the top of the curb with a permanent "T" to represent the location of sump pump services.

F. Grading Plan

1. The minimum slope of side yard or rear yard swales shall be 1.0 %, unless the invert is paved, in which case the minimum slope shall be 0.5%.

2. The elevation of the proposed ground surface at all residential building sites (or pads) shall be a minimum of 150 mm (0.5 feet) above the flowline of the adjacent sideyard swale and a minimum of 300 mm (1.0 feet) above the 100 year high water level in adjacent flood routes.

6.03 DESIGN CALCULATIONS REQUIREMENTS

Calculations required to demonstrate compliance with the design standards enumerated in the previous section of this Manual shall be submitted substantially in the form and content as shown and provided in Exhibit P of the Appendix. Calculations submitted with Preliminary Plans are not required to be of as great of detail as the calculations required to be submitted with Public Improvement Engineering Plans and Specifications. Calculations shall include a scalable exhibit delineating the drainage areas used in the calculations.

6.04 RIGHT-OF-WAY DEDICATIONS

A. Drainage Ways shall be located in dedicated public rights-of-way. Right-of-way for drainage ways shall be a minimum of 30 m (100 feet) wide. This minimum width shall be increased if the Director of Engineering shall determine that the drainage way's hydraulic capacity is inadequate to properly serve its drainage function.

B. Storm Sewers which are to be publicly maintained shall be located in public easements or in dedicated public rights-of-way. Storm sewer laterals (services) to individual lots, which are to be privately maintained, shall not be located in easements across adjacent lots, except for short distances to reach the public sewer located in a side yard easement contiguous to the lot being served or to reach the public sewer located in a front yard easement on the opposite side of, and adjacent to, the street right-of-way from the lot being served. Easements and rights-of-way shall be of sufficient width and the storm sewer shall be installed at such locations therein as to permit open cut installation, maintenance and repair within the confines of the easement or right-of-way without relocation or other unreasonable interference with other public utilities located therein and so as to meet the following minimum standards:

1. For storm sewers 600 mm (24 inches) in diameter or less, 4.5 m (15 feet) in width plus 1.5 m (5 feet) for each additional utility other than a water main and 3 m (10 ft.) additional for a water main utility.

2. For storm sewers greater than 600 mm (24 inches), 0.6 m (2 feet) in additional easement width for each additional 300 mm (12 inches) or portion thereof, of additional storm sewer diameter provided in excess of 600 mm (24 inches).

3. Additional width may be required if storm sewers exceed 4.5 m (15 feet) in depth.

C. Sump Pump Discharge Line shall be located in public easements or dedicated public rights-of-way. Such easements and rights-of-way shall be of sufficient width and the conduit shall be installed at such locations therein as to permit open cut installation, maintenance and repair within the confines of the easement or right-of-way without relocation or other unreasonable interference with other public utilities located therein and so as to meet the following minimum standards:

1. 3 m (10 feet) in width plus 1.5 m (5 feet) for each additional utility.

D. Flood Routes shall be located in either public right-of-way, or a dedicated public drainage easement of sufficient width to contain and maintain the channel.

6.05 CITY'S PARTICIPATION IN COST

A. Storm Sewers and Drainage way. Where it is necessary to construct storm sewers and drainage ways through land not being developed, the City may contribute a percentage of the cost of the storm sewer or drainage way, provided funds are available, based on the percentage of the drainage area contributing to the storm sewer or drainage way not included in the development. The Developer's percentage shall be based on the percentage of the drainage area coming through and including his/her development. The Developer is required to pay tap-on fees for trunk line storm sewers already installed.

B. Detention/Retention Facilities. In all developments not already served by an adequate existing or proposed storm water detention/retention facility, the developer shall provide a storm water detention/retention facility complying with this manual or, at the option of the Director of Engineering, the Developer shall pay a fee in lieu of providing said detention/retention facility. In those locations already served by an existing storm water detention/retention facility or where the City is contemplating constructing a detention/retention facility to serve upstream watersheds not yet fully developed, or where the Developer cannot provide adequate storage capacity in a detention/retention facility within his/her development, at the option of the Director of Engineering, the Developer shall pay a fee in lieu of providing said detention/retention facility, or the deficient volume thereof.

Facilities shall be designed so that local storm sewer systems and drainage ways will discharge directly to proposed or existing detention/retention facilities, or to an adequate trunk line storm sewer and flood route, or drainage way feeding same, which discharges into a proposed or existing storm water detention/retention facility. Where adequate storm sewer or drainage way capacity is not available to convey design runoff to an existing downstream detention/retention facility, an on-site detention/retention facility shall be required.

C. Engineering Costs. The Developer will be responsible for all engineering costs for design of storm sewers, drainage ways and detention/retention facilities within his/her development.

6.06 SPECIFICATIONS & SPECIAL PROVISIONS

A. Storm Sewers shall use materials and be installed in the manner meeting or exceeding the requirements, standards, and specifications contained in the "Standard Specifications for Road and Bridge Construction", then current edition as modified, supplemented and amended by this Manual or the Director of Engineering. These modifications, amendments and amplifications have been provided in this Chapter of the Manual.

B. Drainage Ways & Retention or Detention Facilities shall be constructed in the manner meeting or exceeding the requirements, standards and specifications contained in the applicable sections of the "Standard Specifications for Road and Bridge Construction", then current edition as modified, supplemented and amended by this Manual or the Director of Engineering. These modifications, amendments and amplifications have been provided in this Chapter of the Manual.

C. Sump Pump Discharge Lines shall be constructed in the manner meeting or exceeding the requirements, standards and specifications contained in the applicable sections of the "Standard Specifications for "Road and Bridge Construction", the current edition as then modified, supplemented and amended by this Manual or the Director of Engineering. These modifications have been provided in this chapter of the Manual.

D. Materials:

1. Storm Sewer. Materials shall be in accordance with Section 550 of the Standard Specifications for Road and Bridge Construction and shall conform to one of the following:
   a. Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
   b. Reinforced Concrete culvert, Storm Drain and Sewer Pipe.
   c. Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
   d. Ductile Iron Pipe Class 150 conforming to A.N.S.I./A.W.W.A. C-151/A21.51, with single gasket joints meeting A.N.S.I./A.W.W.A. C-111/A21.11, with standard cement lining as per A.N.S.I./A.W.W.A. C-104/A21.4 and with bituminous coating as per Section 51-8.1 of A.N.S.I./A.W.W.A. C-151/A21.51.

2. Sump Pump Discharge Lines not under pavements shall be constructed of rigid P.V.C., SDR 35 or stronger, conforming to Section 1040.10 of the "Standards Specifications for Road and Bridge Construction". Sump Pump Discharge Lines under pavements shall be constructed of the same materials as storm sewers.

E. Special Provisions Modifying Standard Specifications for Water and Sewer Main Construction In Illinois

1. Storm Sewer Special Provisions

Adjustment of Frame of Grate: Final grade for all manhole castings will be determined after the curb and gutter has been poured and the sub grade and/or base has been constructed. Final adjustment of the frame and grate shall be made in the following manner: After the curb and gutter has been poured and the base constructed the final elevation will be determined by the Director of Engineering.

The frame and grate will be adjusted to this elevation in accordance with the "Standard Specifications For Road And Bridge Construction". Any material disturbed while adjusting the frame and grate will be disposed of and all fill made with lean concrete. A maximum of 200 mm (8 inches) of adjusting rings shall be allowed.

No bitumastic material shall be used on the inside of manholes. Inside of all joints shall be finished with non-shrink type grout and rubber gaskets.

Granular Cradle: A granular cradle bedding material will be required for all storm sewers as shown in the Standard Details. Material for the granular cradle shall comply with either FA1 or FA2, except the percent passing the 75 um (No. 200) sieve shall be 2 ± 2, in accordance with the "Standard Specifications for Road and Bridge Construction"

.

Trench Backfill: . Material for Trench Backfill shall comply with Article 1003.04 of the Standard Specifications, except that the following graduations may be used. In addition to FA6; CA6, CA10, CA13, and CA16 and except that the maximum size shall be 75 mm (3 inches) and that no material over 20 mm (3/4 inch) shall be used below 300 mm (1 ft.) over the top of the sewer.

Inlet Type A w/Type 3 Frame and Grate: Section 602 of the "Standard Specifications For Road And Bridge Construction" shall govern the construction of Inlets Type A. Construction shall be built in accordance with the Standard Details for Inlets Type A. Section 604 of the "Standard Specifications For Road And Bridge Construction" shall govern the construction of Frame and Grate Type 3. Frame and Grate Type 3 shall be equal to Neenah No. 3010. The curb box shall be of the open type and the grate shall be Type A. Only cast iron grates shall be used.

Inlet Type H w/Type 50 Frame and Grate: Section 602 of the "Standard Specifications for Road and Bridge Construction" shall govern the construction of Inlets Type H. They shall be built in accordance with the Standard Details for Inlets Type H. Inlets shall be constructed of either cast in place concrete or pre cast concrete. Section 604 shall govern the construction of Inlet Type H with Type 50 Frame and Grate. Frame and Grate Type 50 shall be equal to Neenah No. R-3067. Grates shall be Type A. Only cast iron grates shall be used.

2. Sump Pump Discharge Special Provisions

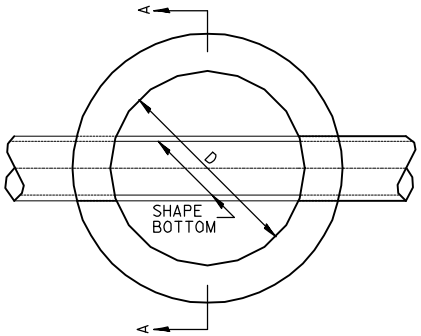
Sump Pump Discharge Lines shall be constructed in accordance with Standard Drawings 6.07-J.

3. Utilities: The owner or his designee shall notify the utility companies of the impending project and the plans shall indicate the general location of the utility main lines. The Contractor shall have the responsibility before any construction work has begun, of obtaining from all utilities the exact location of any underground facilities in the area of construction, whether indicated on the plans or not. Any facilities disturbed by the Contractor shall be restored by him at his own expense. The Contractor shall coordinate with the proper utility the relocation of any facility designated on the plans or deemed necessary to be relocated by the Director of Engineering in order to complete construction of the project.

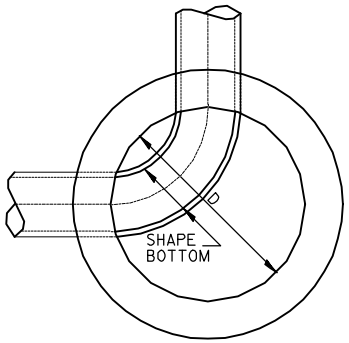
   Residents shall be notified a minimum of 48 hours in advance of impending service outages, and no residence shall be without service overnight.

6.07 STANDARD DETAILS

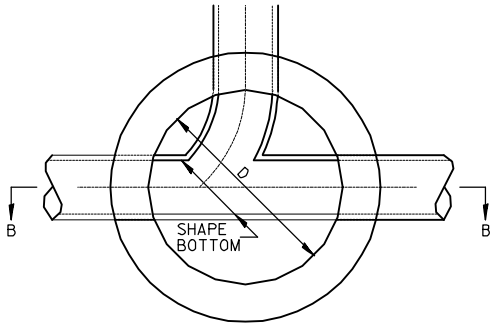
Standard Drawing	Title
A	Standard Manhole Details (Rev. 08/03)
B	Manhole Details Sewers 1.2 m (48 inches) dia. & Larger (Rev. 08/03)
C	Inlet Type A Details
D	Inlet Type H Details
E	Standard Concrete Collar and Pipe Bedding & Excavation Details
F	Water & Sewer Separation Requirements (Vertical)
G	Water & Sewer Separation Requirements (Vertical)
H	Water & Sewer Separation Requirements (Horizontal)
I	Slope Wall Detail
J	Sump Pump Discharge Cleanout Detail
K	Detention Underdrain Clean out and Junction (Rev. 08/03)



STRAIGHT MANHOLE



CORNER MANHOLE



JUNCTION MANHOLE

STANDARD MANHOLE PLANS

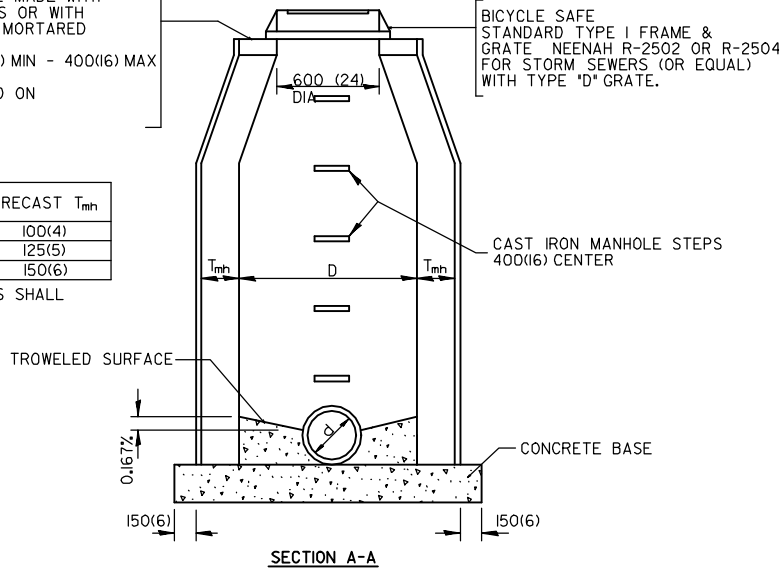
FINAL ADJUSTMENT TO BE MADE WITH PRECAST ADJUSTING RINGS OR WITH BRICKS LAID RADIALLY & MORTARED

ADJUSTMENT RANGE: 100(4) MIN - 400(16) MAX

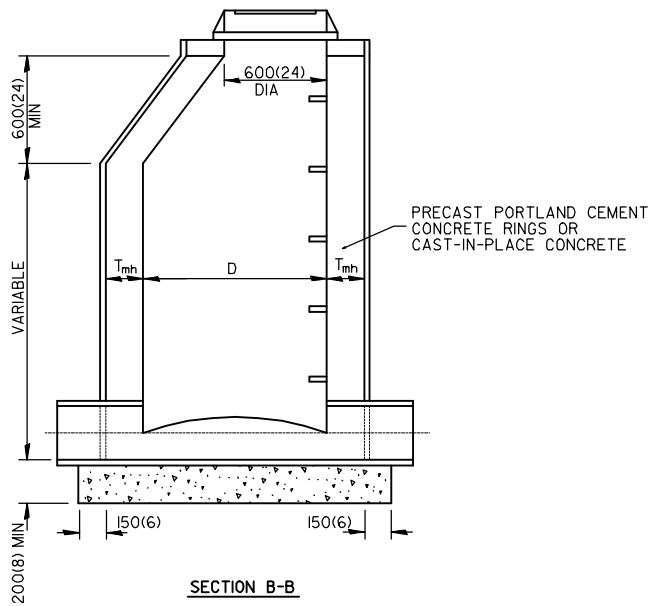
MASTIC IS NOT PERMITTED ON ADJUSTING RINGS

DIA OF SEWER	DIA OF MANHOLE	PRECAST T_{mh}
200(8) THRU 750(30)	1200(48)	100(4)
825(33) THRU 1200(48)	1500(60)	125(5)
1350(54)	1800(72)	150(6)

ALL CAST-IN-PLACE MANHOLES SHALL BE T_{mh} =150(6) THICK



SECTION A-A



SECTION B-B

All dimensions are in millimeters (inches) unless otherwise shown.

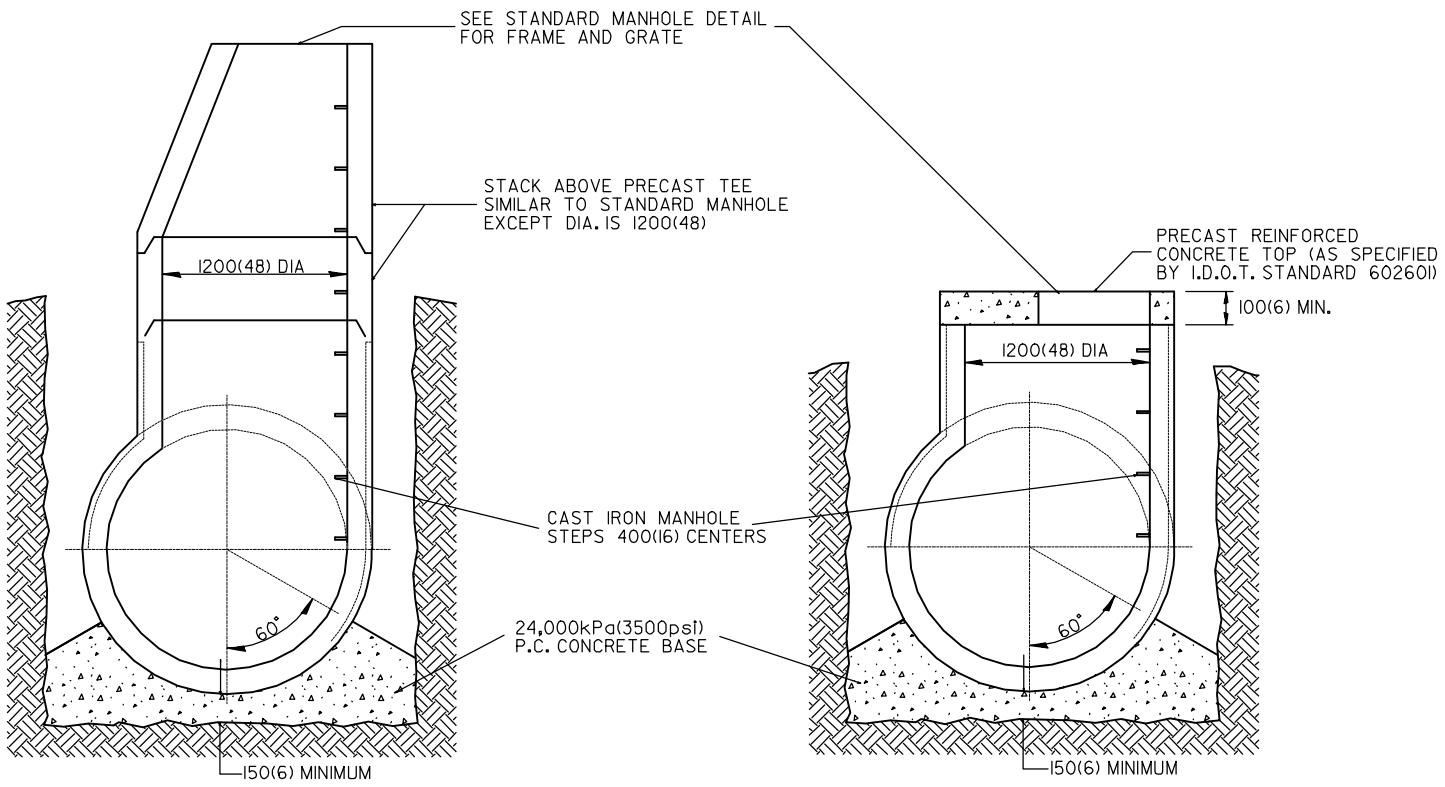
CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN REVISED: 9-19-2003 RCW
APPROVED BY :
DATE :

STANDARD MANHOLE DETAILS - STORM

STANDARD 6.07A

SHEET
1 OF 1



STANDARD

SPECIAL

MANHOLE DETAIL FOR SEWER 1200(48) DIA. & LARGER

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN
REVISED : 3-7-2003
APPROVED BY : DGG
DATE : 3-7-2003

MANHOLE DETAILS SEWERS 1.2m(48") DIA. OR LARGER

STANDARD 6.07B

SHEET 1 OF 1

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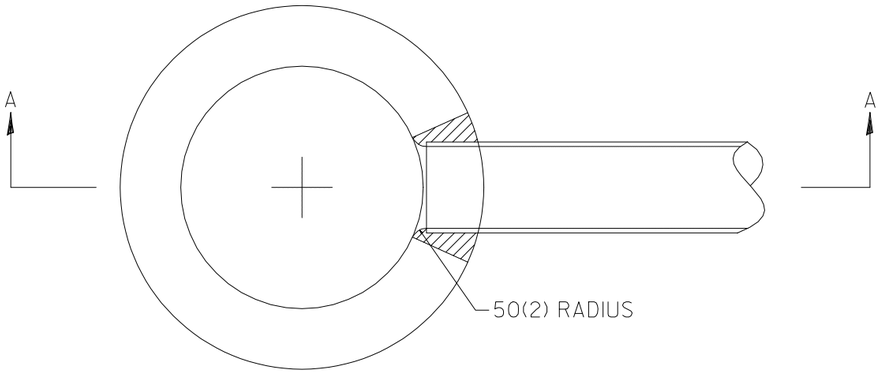
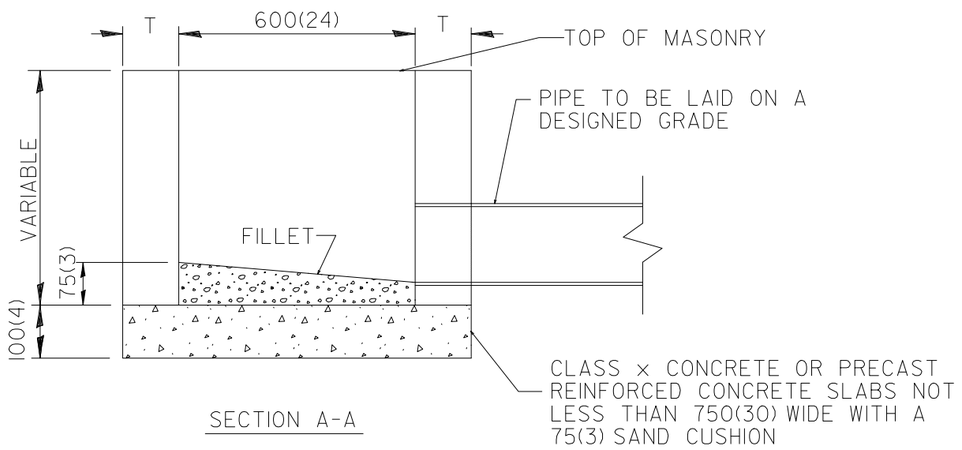


PLAN



SECTION A-A

STANDARD DESIGN FOR INLET - TYPE "A"

MATERIALS PERMITTED FOR INLETS	T
PRECAST REINFORCED CONCRETE SECTIONS	75(3)
CAST-IN-PLACE CONCRETE	150(6)

BRICKS AND MORTAR SHALL BE USED
ONLY FOR ADJUSTMENTS

All dimensions are in millimeters (inches)
unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

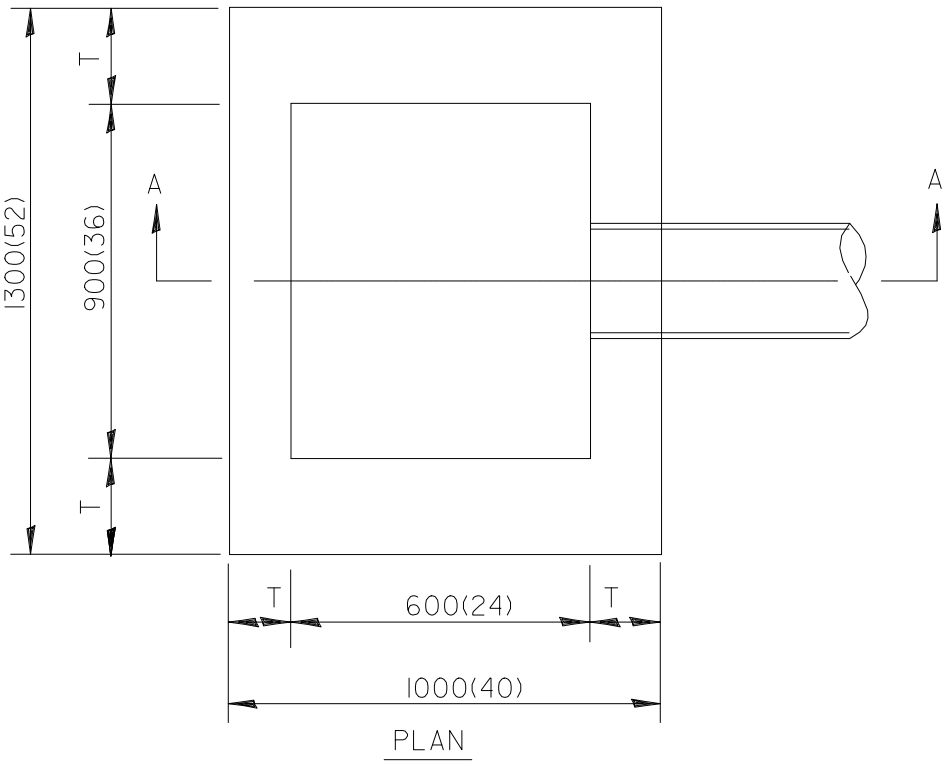
BY :
APPROVED DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

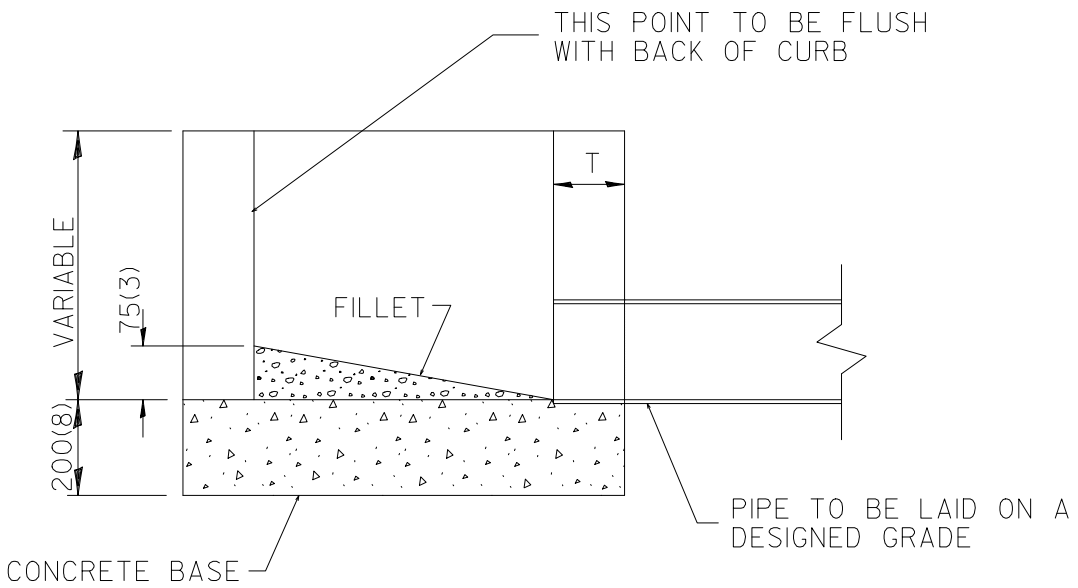
INLET TYPE A DETAILS

STANDARD 6.07C

SHEET
| OF |



PLAN



SECTION A-A

DETAIL OF INLET - TYPE H

MATERIALS PERMITTED FOR INLETS	T
PRECAST REINFORCED CONCRETE SECTIONS	75(3)
CAST-IN-PLACE CONCRETE	150(6)

BRICKS AND MORTAR SHALL BE USED
ONLY FOR ADJUSTMENTS

BICYCLE SAFE
TYPE 50 - FRAME AND GRATE

NEENAH NO. R-3067 WITH TYPE A GRATE

All dimensions are in millimeters (inches)
unless otherwise shown.

SHEET 1 OF 1

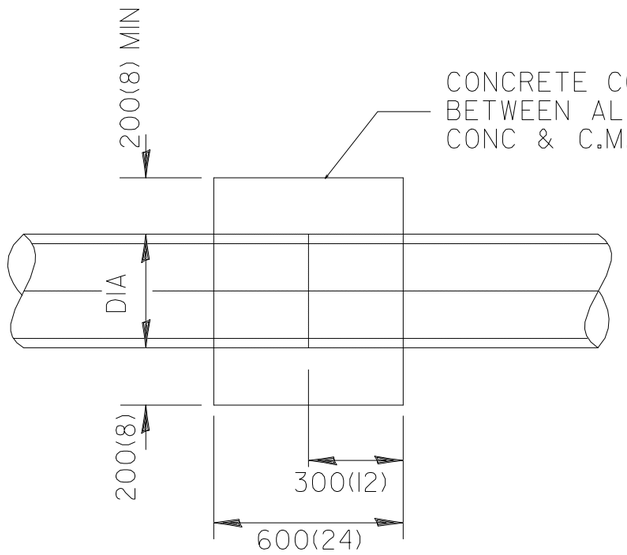
DESIGNED BY: DOUG GROVESTEEN REVISED :

INLET TYPES TYPE H

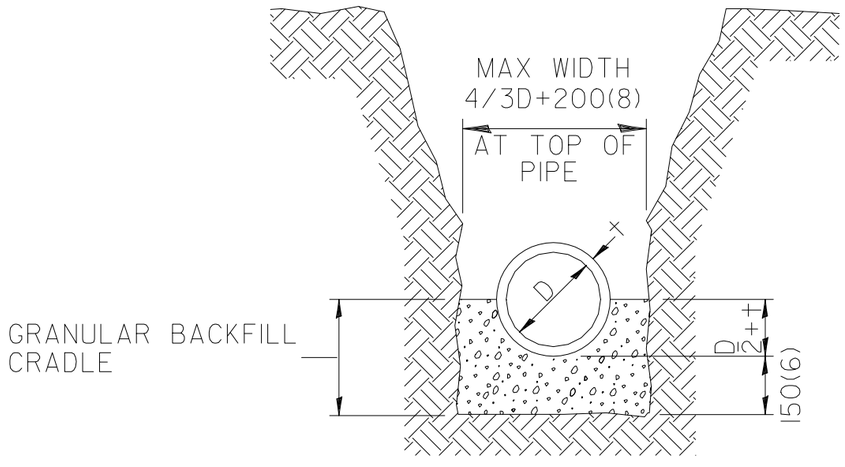
STANDARD 6.07D

APPROVED: BY :
DATE :

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT



STANDARD CONCRETE COLLAR DETAIL



PIPE BEDDING & EXCAVATION DETAIL

BEDDING TYPE "C" PER A.S.T.M. C12

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN REVISED :

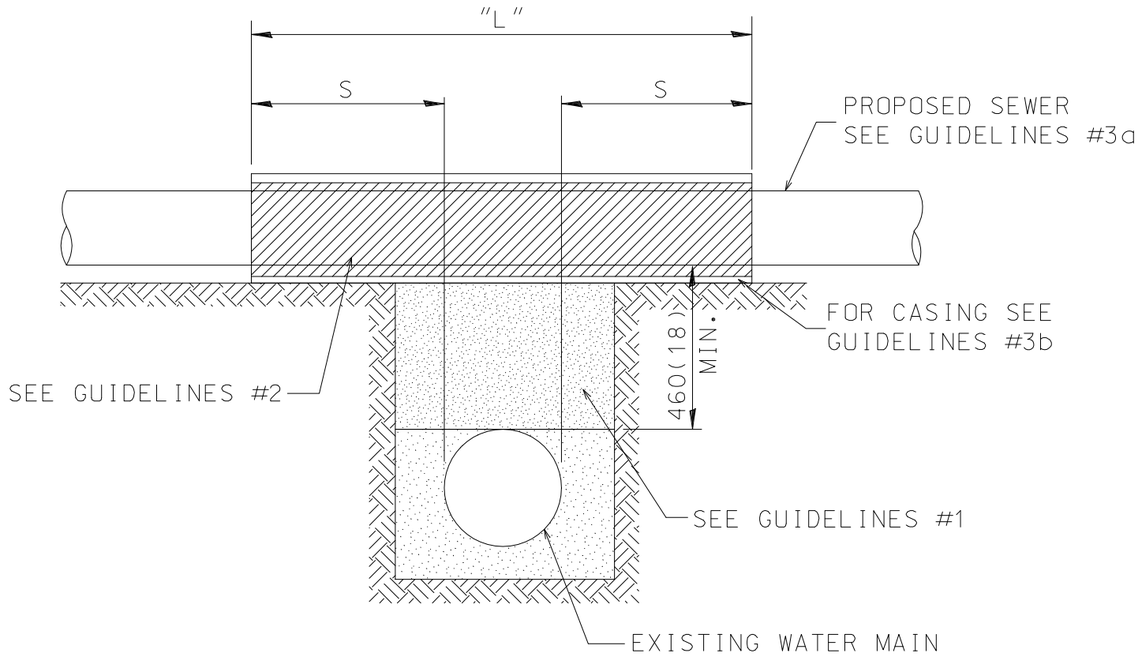
BY :
APPROVED DATE :

STD. CONC. COLLAR & PIPE BEDDING & EXCAV. DETAILS

STANDARD 6.07E

SHEET
1 OF 1

PROPOSED SEWER LINE WITH 460(18) MINIMUM VERTICAL SEPARATION ABOVE EXISTING WATER MAIN



NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1m (10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

GUIDELINES

1. IF SELECT GRANULAR BACKFILL EXISTS: REMOVE WITHIN WIDTH OF PROPOSED SEWER TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.

2. OMIT SELECT GRANULAR EMBEDMENT AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT THE LENGTH OF "L".

3. a. CONSTRUCT "L" OF PROPOSED SEWER OF WATER MAIN MATERIAL AND PRESSURE TEST, OR;
   b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

BY :
APPROVED DATE :

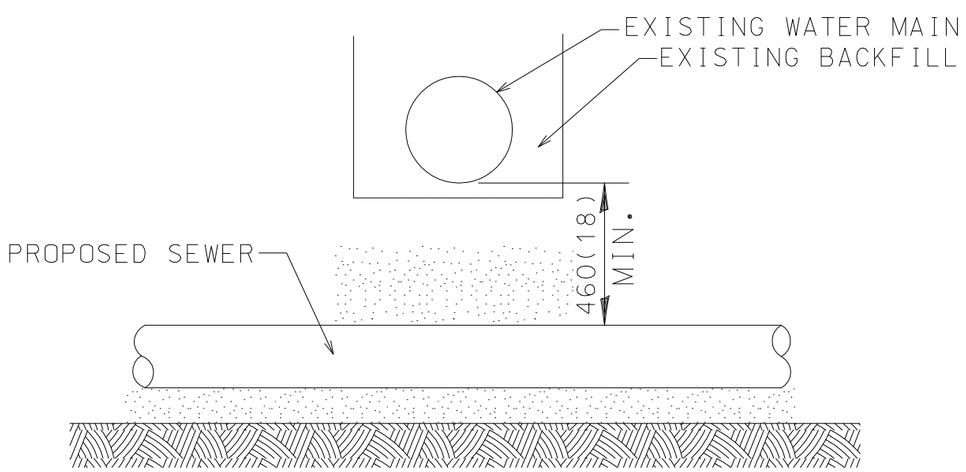
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERTICAL)

STANDARD 6.07F

SHEET
1 OF 1

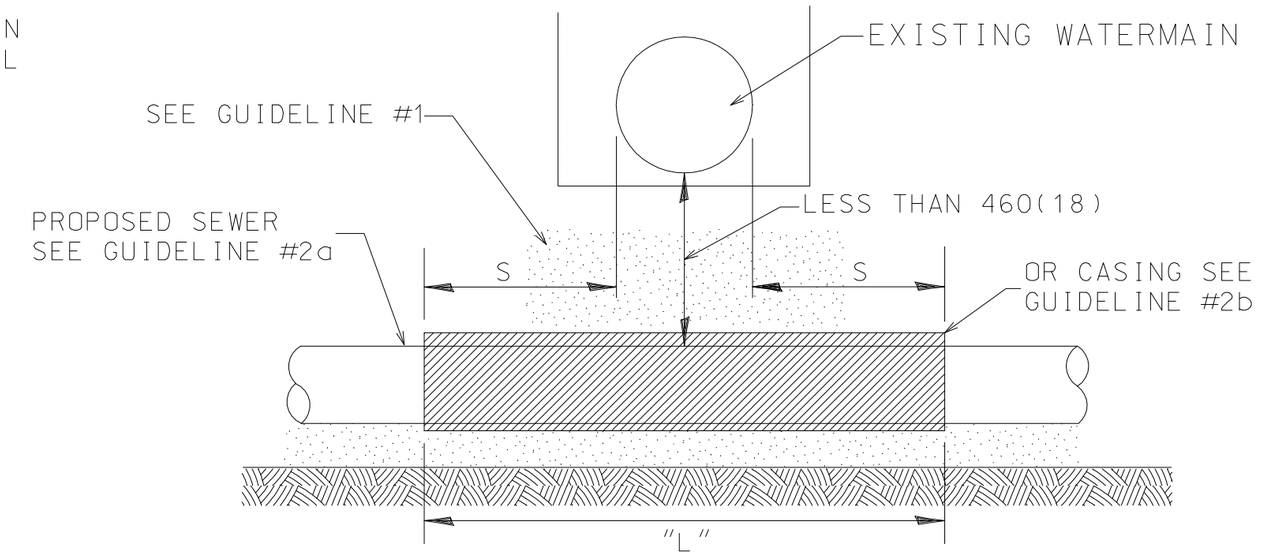
PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH 460(18) MINIMUM VERTICAL SEPARATION



GUIDELINES

1. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH LESS THAN 460(18) VERTICAL SEPARATION



NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1m(10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

GUIDELINES

1. OMIT SELECT GRANULAR EMBEDMENT AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR "S" ON EACH SIDE OF THE WATER MAIN.

2a. CONSTRUCT "L" OF PROPOSED SEWER OS WATER MAIN MATERIAL AND PRESSURE TEST, OR;

b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.

3. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

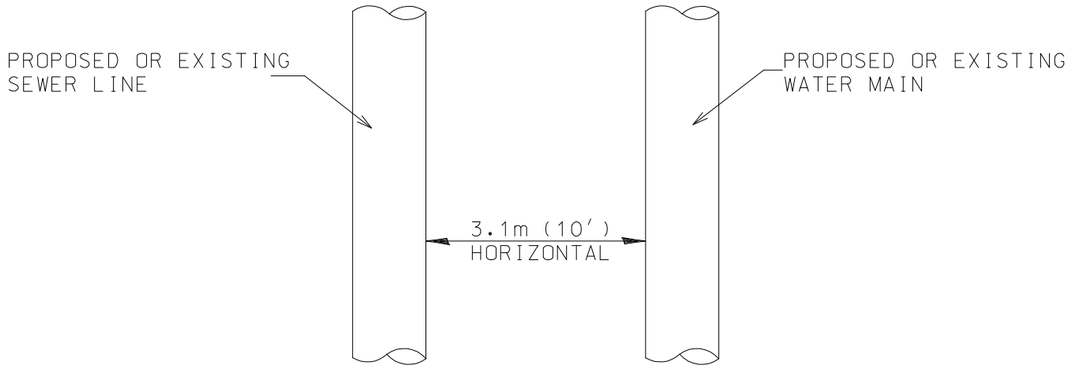
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERTICAL)

STANDARD 6.07G

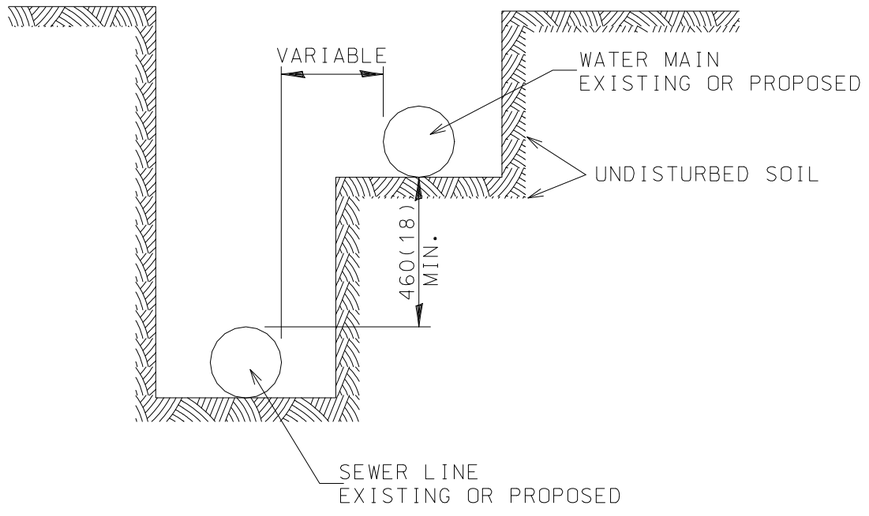
SHEET
1 OF 1

WHEN PROPOSED SEWER (OR WATER) IS LOCATED 3.1m(10′) OR MORE FROM EXISTING WATER (OR SEWER), NO SPECIAL CONSTRUCTION IS REQUIRED



PLAN VIEW

WHEN PROPOSED SEWER (OR WATER) IS LOCATED LESS THAN 3.1m (10′) FROM EXISTING WATER (OR SEWER), DETAILS BELOW SHALL APPLY.



All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

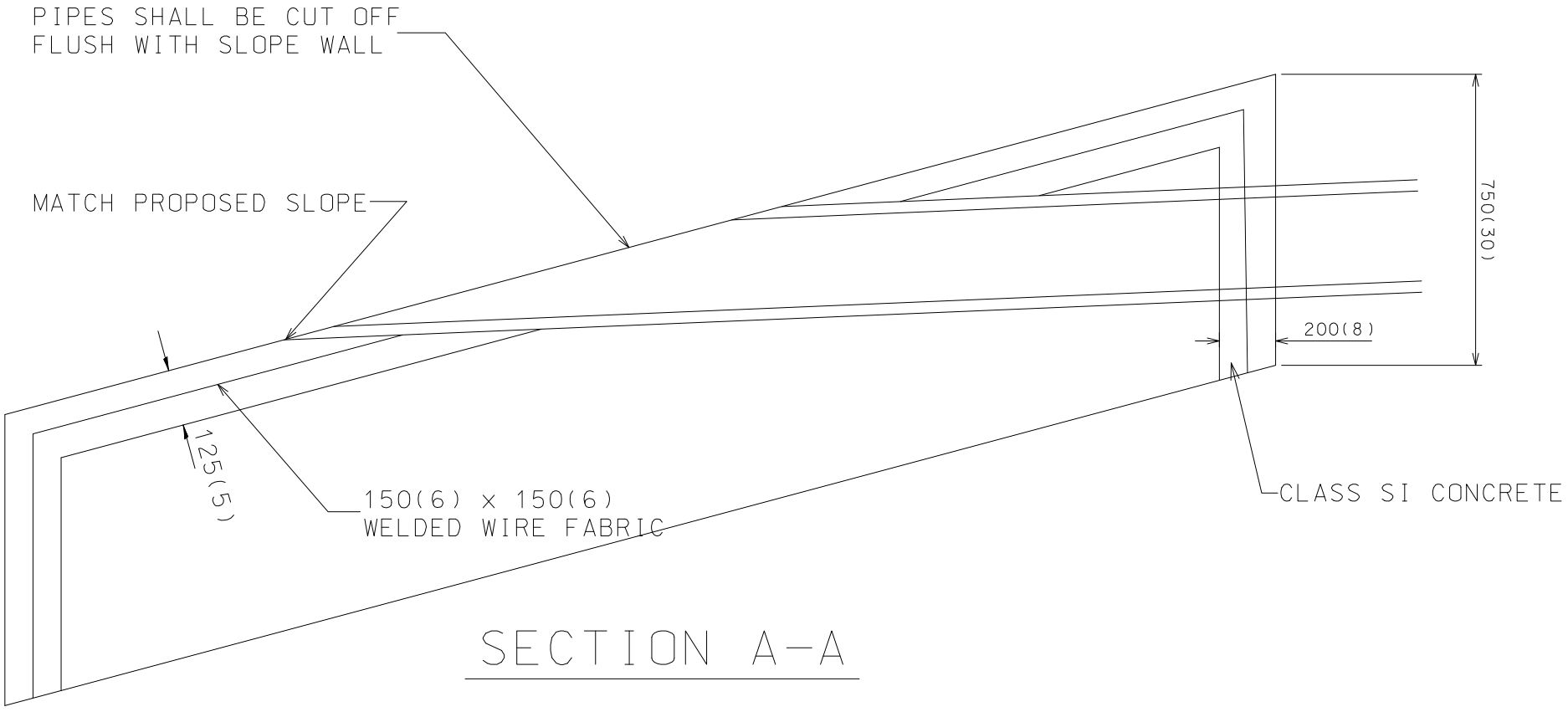
BY :
APPROVED DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

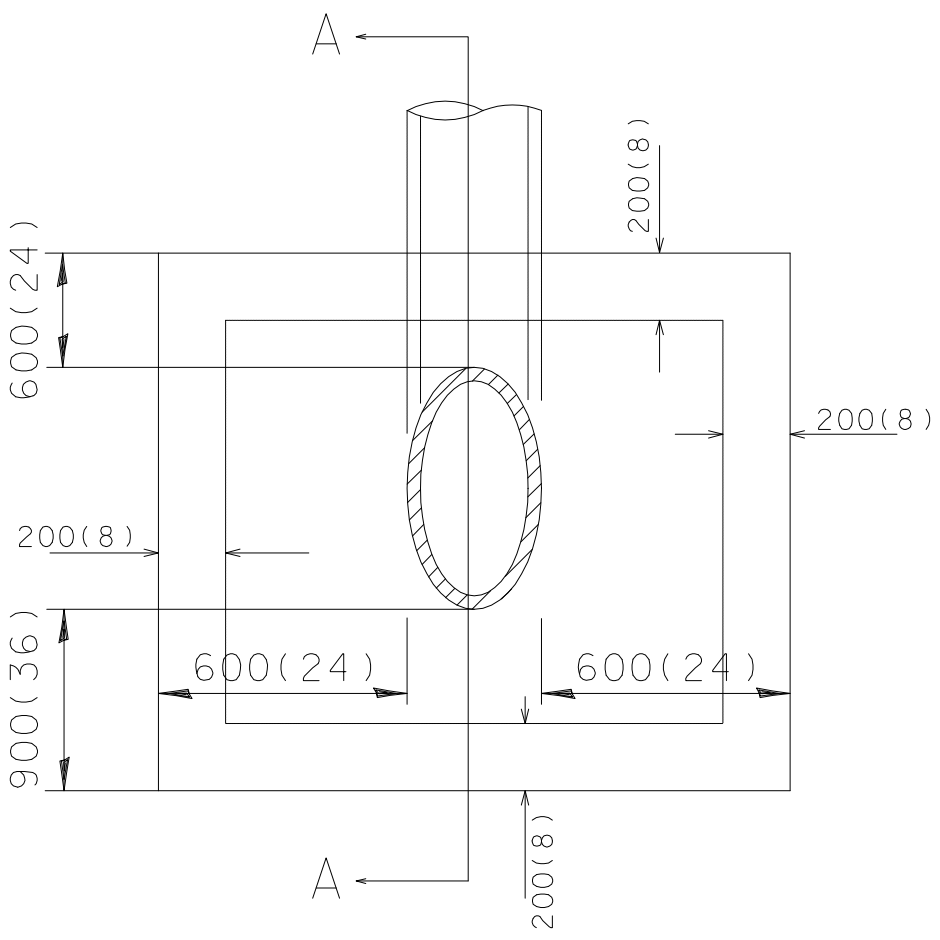
WATER & SEWER SEPARATION REQUIREMENTS (HORIZ.)

STANDARD 6.07H

SHEET
1 OF 1



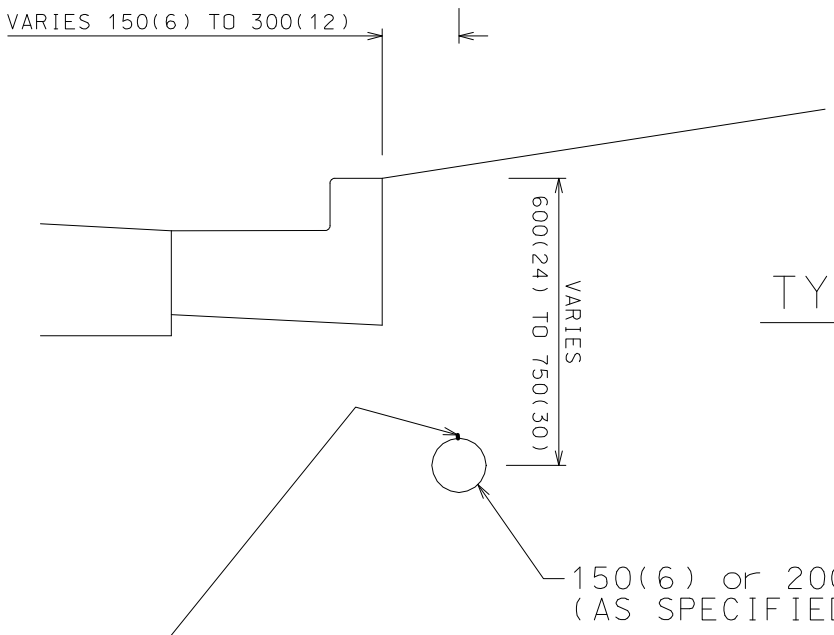
SECTION A-A



SLOPE PAVING DETAILS

All dimensions are in millimeters (inches) unless otherwise shown.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED :	APPROVED BY : DATE :	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	SLOPE WALL DETAIL		
	STANDARD 6.071		

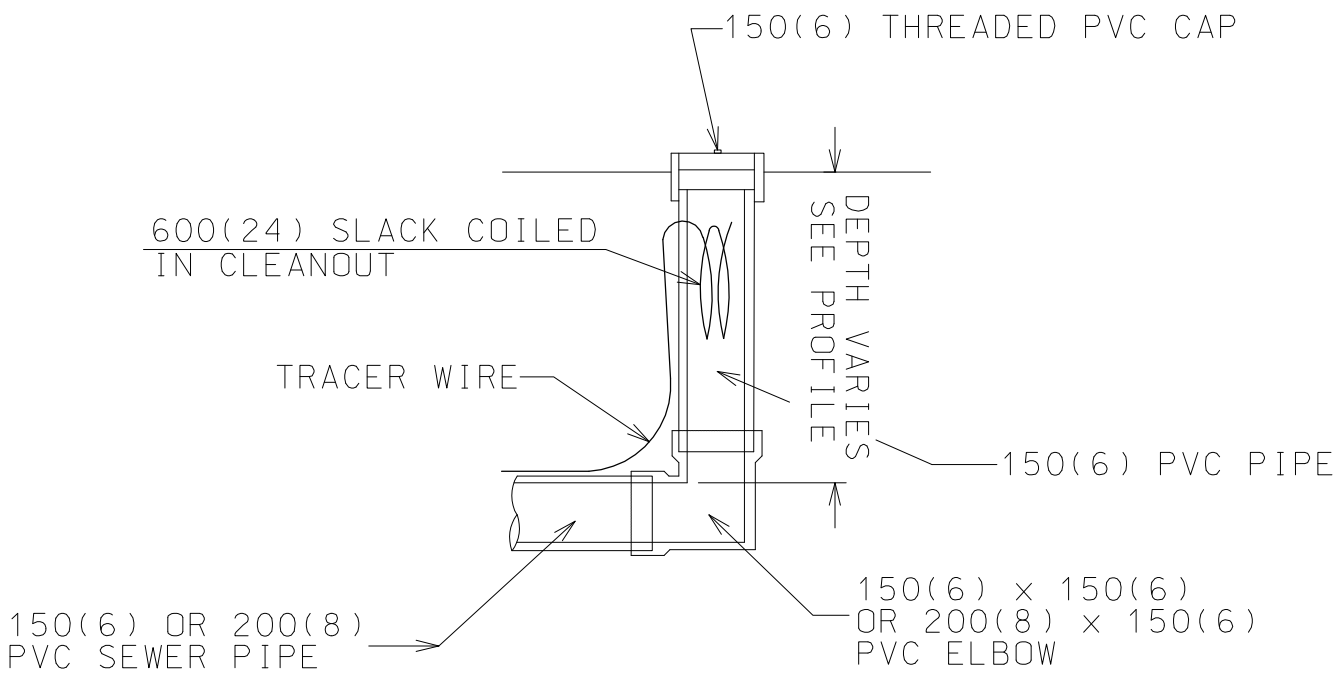


TYPICAL SUMP PUMP LINE DETAIL

NO SCALE

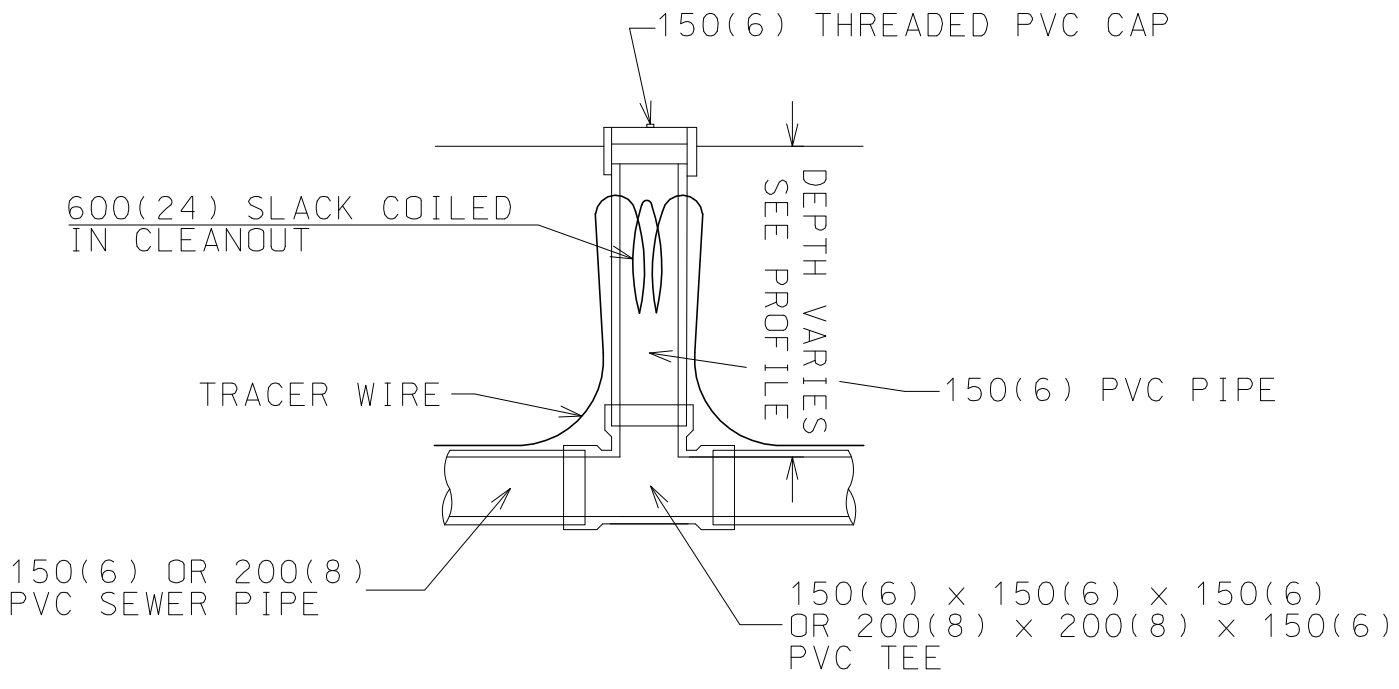
All units are in millimeters (inches) unless otherwise shown.

TRACER WIRE: SINGLE CONDUCTOR #12 THWN TAPED TO TOP OF PIPE. THE WIRE SHALL TERMINATE WITH 2 FEET OF SLACK AT EACH INLET AND CLEANOUT. DRILL A SMALL HOLE JUST BELOW THE GROUND SURFACE AT INLETS AND CLEANOUTS AND LEAVE THE SLACK WIRE COILED INSIDE THE STRUCTURE.



DETAIL: CLEANOUT TYPE I

(NO SCALE)



DETAIL: CLEANOUT TYPE II

(NO SCALE)

SHEET 1 OF 1

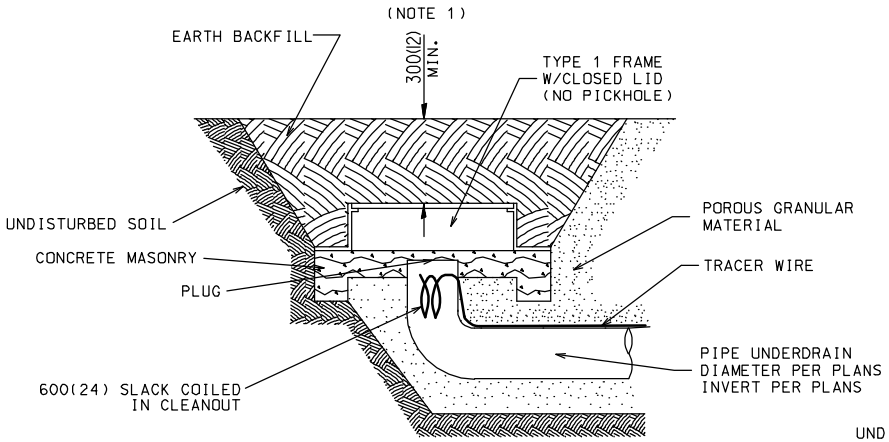
DESIGN BY : DOUG GROVESTEEN REVISED :

SUMP PUMP DISCHARGE CLEANOUT DETAIL

STANDARD 6.07J

APPROVED BY :
DATE :

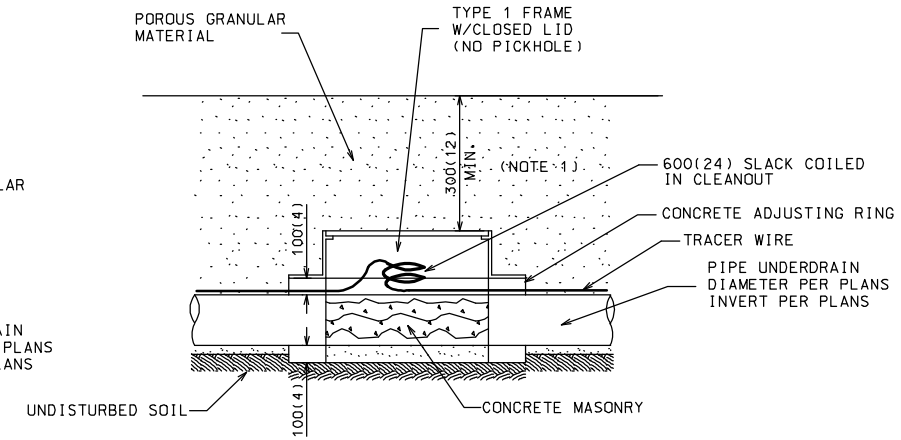
CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT



CLEANOUT – TYPE 1

NOT TO SCALE

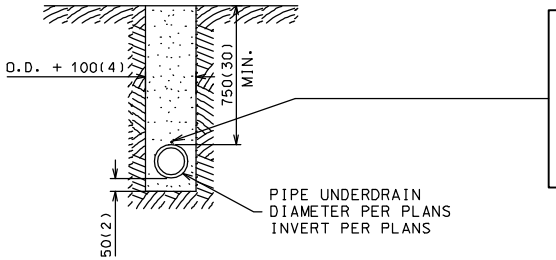
NOTE: MORTAR ALL SURFACES AND CREVICES.



CLEANOUT – TYPE 2

NOT TO SCALE

NOTE: MORTAR ALL SURFACES AND CREVICES.



TRACER WIRE:
SINGLE CONDUCTOR #12 THWN TAPED TO TOP OF PIPE. THE WIRE SHALL TERMINATE WITH 2 FEET OF SLACK AT EACH INLET AND CLEANOUT. DRILL A SMALL HOLE JUST BELOW THE GROUND SURFACE AT INLETS AND CLEANOUTS AND LEAVE THE SLACK WIRE COILED INSIDE THE STRUCTURE.

INSTALLATION OF PIPE UNDERDRAIN (SPECIAL)

NOTE 1: CASTINGS OVER JUNCTIONS SHALL BE EVEN WITH THE SURFACE OF THE GROUND IN DETENTION FACILITIES NOT INTENDED FOR RECREATIONAL USE.

ALL DIMENSION ARE IN MILLIMETERS (INCHES) UNLESS OTHEWISE SHOWN.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY : DGG
DATE : 3-18-2003

DESIGN BY : ELMER SCHAEFER
REVISED: 3-18-2003 RCW

DETENTION UNDERDRAIN CLEANOUTS

STANDARD 6.07K

SHEET 1 OF 1

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CHAPTER 7 - Design and Construction Standards for Sanitary Sewers

7.01 INTRODUCTION

All subdivisions and developments, regardless of size within the corporate limits or under the control of City, shall include provisions for the construction of sanitary sewage facilities designed and constructed in accordance with this chapter.

7.02 GENERAL REQUIREMENTS

All subdivisions shall be designed so the proposed sanitary sewer system does and accomplishes the following:

A. Conforms to the City of Bloomington Comprehensive Plan;

B. Extends interceptor sanitary sewers through the proposed subdivision to serve upstream properties in the natural drainage area;

C. Provides sanitary sewer services with separate service connections terminating not less than two feet inside the property or easement line of each proposed lot of record;

D. Has adequate capacity to drain the portions of the subdivision proposed to be served by the sewer and any property upstream thereof which drains into or may drain into that sewer, based on the effluent discharge reasonably expected from development of the type and to the maximum density permitted by the then-existing zoning ordinances of the City for property within the corporate limits and the land use element of the Bloomington's Comprehensive Plan for property outside the corporate limits;

E. Maintains separation from public water supply system.

F. Discourages the use of sewage pumping facilities.

G. Permits the use of private sewage disposal systems only in the following situations:

1. Where public sanitary sewers are not reasonably available;

2. Where the subdivision contains no lots less than 30 m (100 feet) in width and 2100 square meters (22,500 square feet), not more than two lots of more than 2100 square meters (22,500 square feet) but less than 2,800 square meters (30,000 square feet) and not more than five lots with more than 2,800 square meters (30,000 square feet) but less than 0.4 hectares (one acre), and;

3. All requirements of the City Sewer Code are complied with.

H. Designed to prevent installation of sanitary sewers in rear yard easements and to permit only when necessary installation in side yard easements.

I. Meet requirements for Pump Station (if required).

J. Private sewage disposal systems, including but not limited to septic tanks, holding tanks, distribution boxes, subsurface seepage systems, sand filters, and waste stabilization ponds, which are no longer in active use shall be emptied and abandoned in accordance with all State, County, and City regulations. The Owner of the property shall provide documentation to the Engineering Department that the system has been properly abandoned.

7.03 DESIGN STANDARDS

A. Design Formula. Sanitary sewers shall be designed to provide adequate capacity without surcharge, using Manning's Formula.

Metric	**English**
$V = \frac{1}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$	$V = \frac{1.486}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$

Where:

V = Velocity of flow in meters per second	V = Velocity of flow in Feet per second
n = Roughness Factor	n = Roughness Factor
R = Hydraulic Radius (meters) $\frac{Area}{Perimeter} = \frac{Sq.m}{m}$	R = Hydraulic Radius (feet) $\frac{Area}{Perimeter} = \frac{Sq.ft.}{ft.}$
S = slope of energy grade line for conduit running full (meter per meter)	S = slope of energy grade line for conduit running full (feet per foot)

For new Smooth walled sewer pipe n = 0.013

Sanitary sewers shall flow with a desired minimum velocity of 0.8 meters per second (2.5 feet per second) with an absolute minimum velocity of 0.6 meters per second (2 feet per second). Proposed sanitary sewage flow shall be based on the population after full development of the area. For undeveloped areas where the details of future development are not known, design population will be estimated based on the zoning classification and expected use conforming to the City of Bloomington Comprehensive Plan.

FLOW CRITERIA:

Sanitary sewers shall be sized to accept the following peak design flows:

Domestic:	1500 liters (400 gallons) per day per capita for lateral sewers. Average flow of 375 liters (100 gallons) per capita peaked by a factor per Exhibit Q in the Appendix plus 110 liter/mm Dia/Hectare (300 gal/inch/dia/acre) for infiltration.
Commercial and/or Industrial:	95000 liters/hectare (10000 gallons/acre) per day for lateral sewers. 66000 liters/hectare (7000 gallons/acre) per day for trunk sewers.

or such specific flows known for the type of facilities served.

B. Materials. All sanitary sewer pipe shall be Vitrified Clay Pipe ASTM Designation C-700 (extra strength) or Ductile Iron Pipe Class 150 conforming to ANSI A 21.51. Vitrified Clay pipe joints shall conform to ASTM C-425. Ductile iron pipe joints shall be mechanical or rubber ring (slip seal or push-on) joints. Use of other materials for sanitary sewers must be approved in writing by the Director of Engineering and Water prior to their installation.

C. Minimum Size. All public sanitary sewers shall be a minimum of 200 mm (8 inches) in diameter. All service sewer lines shall be a minimum of 150 mm (6 inches) diameter.

D. Alignment. All sewers shall be laid straight in both horizontal and vertical planes between manholes unless otherwise approved by the Director of Engineering and Water.

E. Sewer Size Changes. When sanitary sewers of different diameters join in a manhole, the invert elevations shall be adjusted to maintain a uniform energy gradient. Alignment of the 0.9 depth points of the sewers shall be implemented to meet this requirement.

F. High Velocity Protection. Where velocities greater than 3.0 m per second (10 feet per second) will occur, in a sanitary sewer when flowing full, special precautions shall be taken to prevent scouring or displacement of the pipe.

G. Manholes.

1. Provide public manholes at the end of each line, at all changes in grade, size or alignment, at all intersections and at distances not greater than 120 m (400 feet). Greater spacing may be permitted by the Director of Engineering and Water in large sewers and in those carrying a settled effluent.

2. Provide an outside drop pipe for sewers entering a manhole at an elevation of 600 mm (2 feet) or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 600 mm (2 feet), the invert should be filleted to prevent the depositing of solids. Drop manhole shall be constructed in accordance with Standard Detail 7.07 B-1.

3. Provide public manholes in improved streets or other hard surfaced public rights-of-way accessible to vehicular access, not more than 240 m (800 feet) measured in a straight line along the sanitary sewer.

4. Manholes install on storm sewer lines shall be cast with the word “STORM” or other wording as approved by the Director of Engineering or their authorized representative.

H. Service Drops in Manholes:

1. New construction: Outside service drops shall be provided as per Standard Detail 7.07 B-1 in new construction when a proposed sanitary service enters a proposed manhole more than 600 mm (2 feet) above the invert of the manhole. With the permission of the Director of Engineering and Water for existing manholes an inside drop connection as per Standard Detail 7.07 B-2 may be used.

I. Sewer Service Laterals:

1. Location: All services shall terminate at a point at least 0.6 m (2 feet) inside the property line or a minimum of 0.6 m (2 feet) beyond any front yard easement containing a City owned utility. Sewer services to individual lots, which are to be privately maintained, shall not be located in easements across other lots, except for short distances to reach the public sewer main located in an easement immediately adjacent to the lot being served, or to reach the public sewer main located in a front yard easement on the opposite side of, and adjacent to, the street right-of-way from the lot being served.

2. Depth: All services shall terminate at a depth of no less than 8 feet or more than 9 feet below the adjacent top of curb unless otherwise approved by the Director of Engineering and Water.

3. Slope: All services shall be laid at a slope of 1.0% or greater. The last length of pipe at the property line shall be laid at 1.0%. Changes in slope on services may be made by "breaking joints" provided the joint seal is air tight and the recommendations of the manufacturer are not exceeded. Fittings not greater than a 45° bend may be used where changes in grade dictate.

4. Service tees or wyes over 3.6 m (12 feet) deep shall be encased in portland cement concrete as per Standard Detail 7.07 C.

7.04 RIGHT-OF-WAY DEDICATION

Generally, all sanitary sewers which are to be publicly maintained shall be installed in public easements or dedicated public rights-of-way. Such easements and rights-of-way are to be of sufficient width and the sewers to be installed at such locations as to permit open cut installation, maintenance and repair within the confines of the easement or right-of-way without relocation or other unreasonable interference with other public utilities located therein and so as to meet the following minimum standards:

A. 4.5 m (15 feet) width plus 1.5 m (5 feet) for each additional utility other than water main and 3 m (10 ft.) for a water main.

B. For sewers exceeding 4.5 m (15 feet) in depth, additional width may be required.

7.05 CITY'S PARTICIPATION IN COST

A. Sanitary Sewers. Where installation of sanitary sewer lines of larger capacity than required to serve land owned by the developer is required by the City Council to serve future growth in the vicinity of the development, the developer shall pay for only his portion, based on the Code requirements for his development, of the total cost of installation; the balance to be borne by the City. Provided funds are available, the City will pay the difference in cost between the size required for the developer's land (minimum size 200 mm (8inches)) and the larger size required. If there is an existing tap-on charge requirement, then the developer shall abide by same.

B. Engineering Costs. The developer will be responsible for all engineering costs for design of sanitary sewer facilities including pump stations within his/her development.

7.06 SPECIFICATIONS & SPECIAL PROVISIONS

All sanitary sewers shall be installed in accordance with all applicable sections of the "Standard Specifications for Water and Sewer Main Construction", then current edition as modified, supplemented and amended by this Manual or the Director of Engineering and Water. These modifications, amendments and amplifications have been provided in this Chapter of the Manual.

Special Provisions for Sanitary Sewer

Granular Cradle: A granular cradle (bedding and haunching) will be required for all sanitary sewers as shown in the Standard Details and in accordance with Section 20-2.20B of the "Standard Specifications for Water and Sewer Main Construction".

Trench Backfill: All trenches under another sewer or water main, or under or within 0.6 meters (2 ft) of existing or proposed streets, existing sidewalks and driveways shall be backfilled with trench backfill material in accordance with Section 208 of the "Standard Specifications For Road And Bridge Construction".

Material for Trench Backfill shall comply with Article 1003.04 of the "Standard Specifications For Road and Bridge Construction", except that the following graduations may be used in addition to FA6: CA6, and CA10, and except that the maximum size shall be 75 mm (3 inches) and that no material over 13 mm (1/2 inch) shall be used below 300 mm (1 foot) over the top of the sewer.

Backfill of Trenches: All sewer trenches under streets, driveways or sidewalks shall be compacted by jetting, mechanical compactor or as directed by the Director of Engineering and Water.

Leakage Test: The leakage test will be by the low pressure air method. The contractor shall notify the Engineer when the sewer is ready for testing. The ground shall be leveled and all manholes shall be accessible to the air testing equipment.

Sewer Service Markings: The contractor shall place 50 mm x 100 mm wood studs (2x4's) extending from the bottom of the sewer service to 0.6 m (2 feet) above the ground at the location where each sewer service terminates. A minimum of the upper one (1) foot of each wood stud (2x4) shall be painted green. These markers shall be installed at the time the services are constructed.

Curb Marking of Sewer Services: At the time the curb and gutter is poured, the contractor shall mark the top of the curb with a permanent "S" for sewer to mark location of said services.

Adjustment of Manhole And Casting within Pavement: Final grade for all manhole castings will be determined after the curb and gutter has been poured and the subgrade and/or base has been constructed. Final adjustment of the frame and grate shall be made in the following manner: After the curb and gutter has been poured and the base constructed the final elevation will be determined by the Director of Engineering and Water. The frame and grate will be adjusted to this elevation in accordance with the Standard Specifications. any material disturbed while adjusting the frame and grate will be disposed of and all fill made with lean concrete. A maximum of 450 mm (18 inches) of adjusting rings shall be allowed.

Utilities

The Owner or his designee shall notify the utility companies shall be notified of the impending project and the plans shall indicate the general location of the utility main lines. The Contractor shall have the responsibility before any construction work has begun, of obtaining from all utilities the exact location of any underground facilities in the area of construction, whether indicated on the plans or not. Any facilities disturbed by the Contractor shall be restored by him at his own expense. The Contractor shall coordinate with the proper utility the relocation of any facility designated on the plans or deemed necessary to be relocated by the Director of Engineering & Water in order to complete construction of the project.

Residents shall be notified a minimum of 48 hours in advance of impending service outages, and no residence shall be without service overnight.

Special Provisions Modifying Standard Specifications for Water and Sewer Main Construction in Illinois

30-3.01 F DUCTILE IRON PIPE

Add:

Inside of all pipes shall have standard cement mortar lining and the inside and outside shall be tar (seal) coated.

31-1.11 A (1) SELECTION OF TEST SECTIONS

Delete paragraphs two, three and four and substitute the following:
All sections of the sewer shall be tested, except for those designated portions of the sewer that are placed into service during the construction process.

32-2.07 CAST IRON FRAMES AND COVERS

Add the following:

Covers shall be Neenah, East Jordan or equal. Neenah numbers are given as examples.

For Sanitary Manholes: Standard Type 1 Frame and Cover - Neenah R-1772 B with Type "B" Lid and NF-9204 pick hole. All lids for sanitary manholes shall be self-sealing.

32-3.05 PRECAST MANHOLES

Add the following to paragraph 3:

No bitumastic material shall be used on the inside of manholes. Inside of all joints shall be finished with non-shrink type grout and rubber gaskets.

32-3.09 PLACING CASTINGS

Change to read:

Castings placed on concrete or masonry surfaces shall be set in a full mortar bed or on approved solid bituminous gaskets.

32-3.09 C MANHOLES NOT WITHIN STREET OR ALLEY AREAS

Change 450 mm (18 inches) to 600 mm (24 inches).

Change second paragraph to read:

Unless otherwise directed, the top of manhole castings shall be at grade of existing surface.

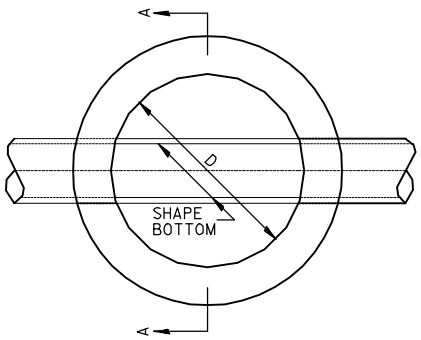
32-3.11 PIPE CONNECTIONS

Add the following sentence:

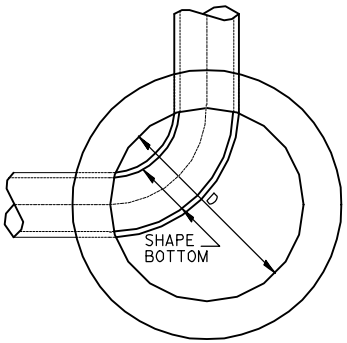
Bituminous material shall be used on the outside of the manhole only.

7.07 STANDARD DETAILS

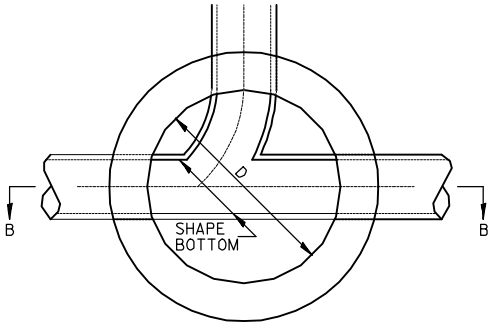
Standard Drawing	Title
A	Standard Manhole Details (Rev. 08/03)
B-1	Standard Drop Manhole Details
B-2	Inside Drop Service Connection
C	Typical House Connections (Rev. 09/03)
D	Standard Concrete Collar & Pipe Bedding and Excavation Details
E	Water & Sewer Separation Requirements (Vertical)
F	Water & Sewer Separation Requirements (Vertical)
G	Water & Sewer Separation Requirements (Horizontal)



STRAIGHT MANHOLE



CORNER MANHOLE



JUNCTION MANHOLE

STANDARD MANHOLE PLANS

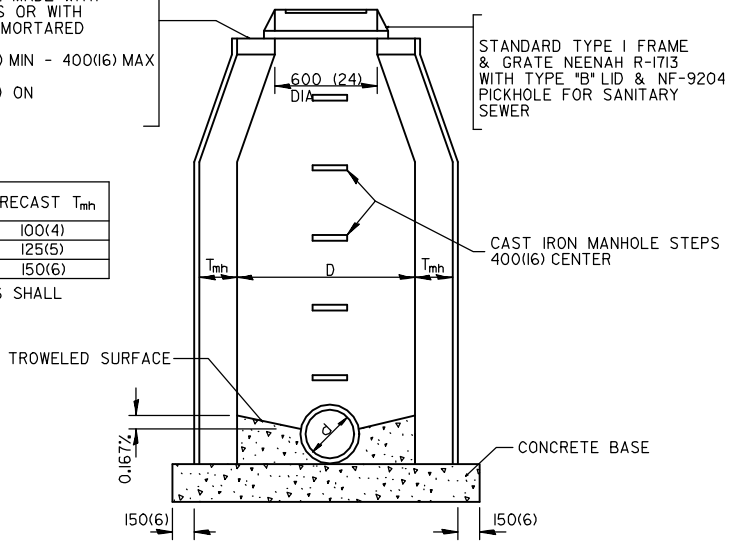
FINAL ADJUSTMENT TO BE MADE WITH PRECAST ADJUSTING RINGS OR WITH BRICKS LAID RADIALLY & MORTARED

ADJUSTMENT RANGE: 100(4) MIN - 400(16) MAX

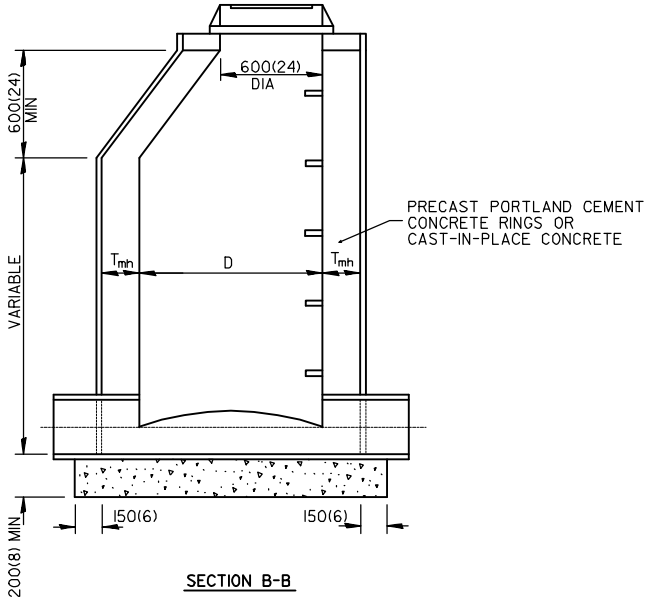
MASTIC IS NOT PERMITTED ON ADJUSTING RINGS

DIA OF SEWER	DIA OF MANHOLE	PRECAST T_{mh}
200(8) THRU 750(30)	1200(48)	100(4)
825(33) THRU 1200(48)	1500(60)	125(5)
1350(54)	1800(72)	150(6)

ALL CAST-IN-PLACE MANHOLES SHALL BE T_{mh} =150(6) THICK



SECTION A-A



SECTION B-B

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

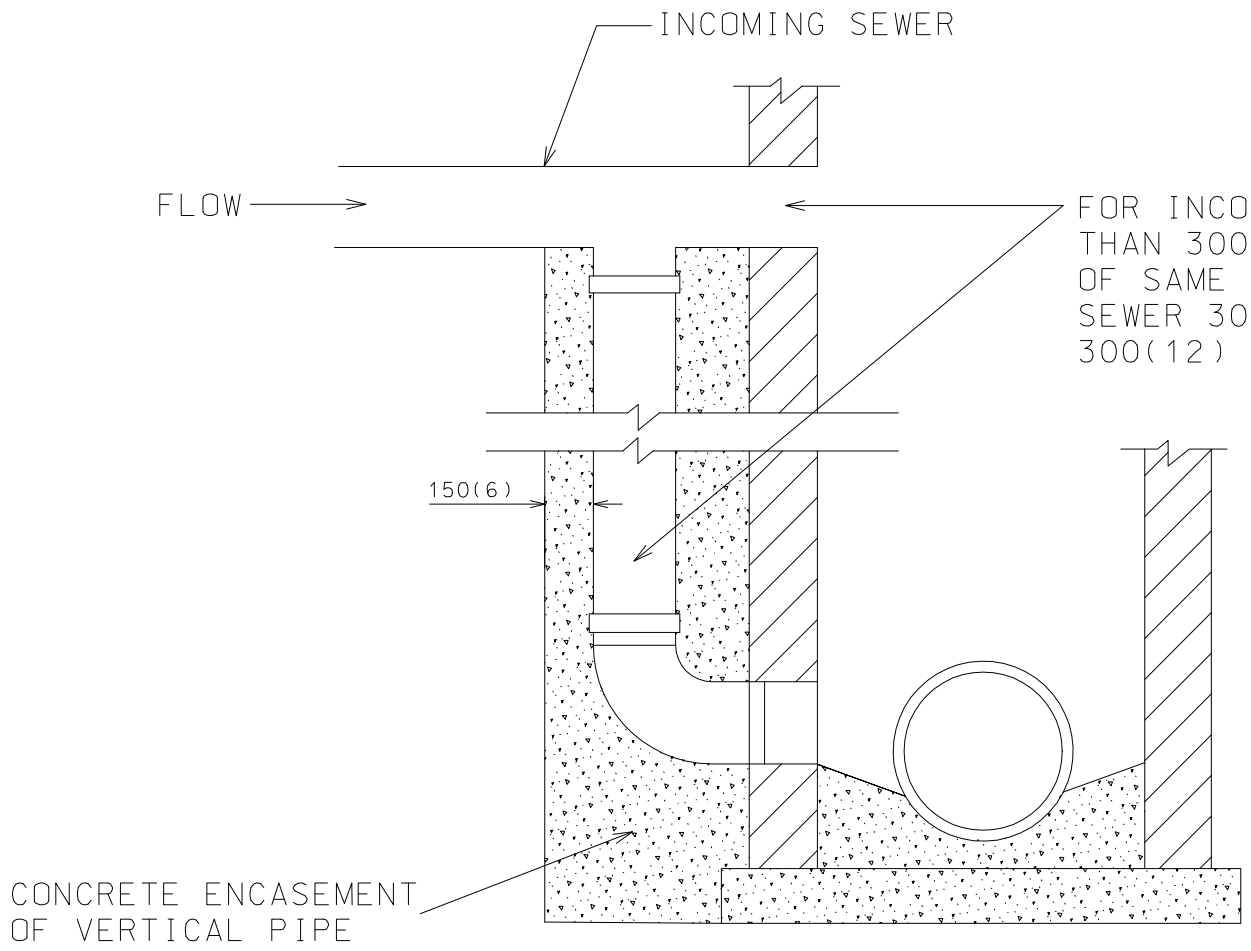
DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW

APPROVED BY :
DATE :

STANDARD MANHOLE DETAILS - SANITARY

STANDARD 7.07A

SHEET
1 OF 1



DROP MANHOLE CONNECTION

NOTES

PAYMENT FOR DROP MANHOLE CONNECTION TO BE MADE AT CONTRACT UNIT PRICE PER EACH "DROP MANHOLE CONNECTION".

TO BE USED IN CONCJUNCTION WITH TYPE "A" MANHOLES WHERE SEWER ENTERS 600(24) OR MORE ABOVE LOWEST INVERT.

THIS DETAIL APPLIES TO INCOMING SEWERS OF 450(18) DIA. OR LESS.

SHEET 1 OF 1

DESIGN BY : DOUG GROVESTEEN REVISED :

STANDARD DROP MANHOLE DETAILS - SANITARY

STANDARD 7.07B-I

APPROVED BY :
DATE :

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

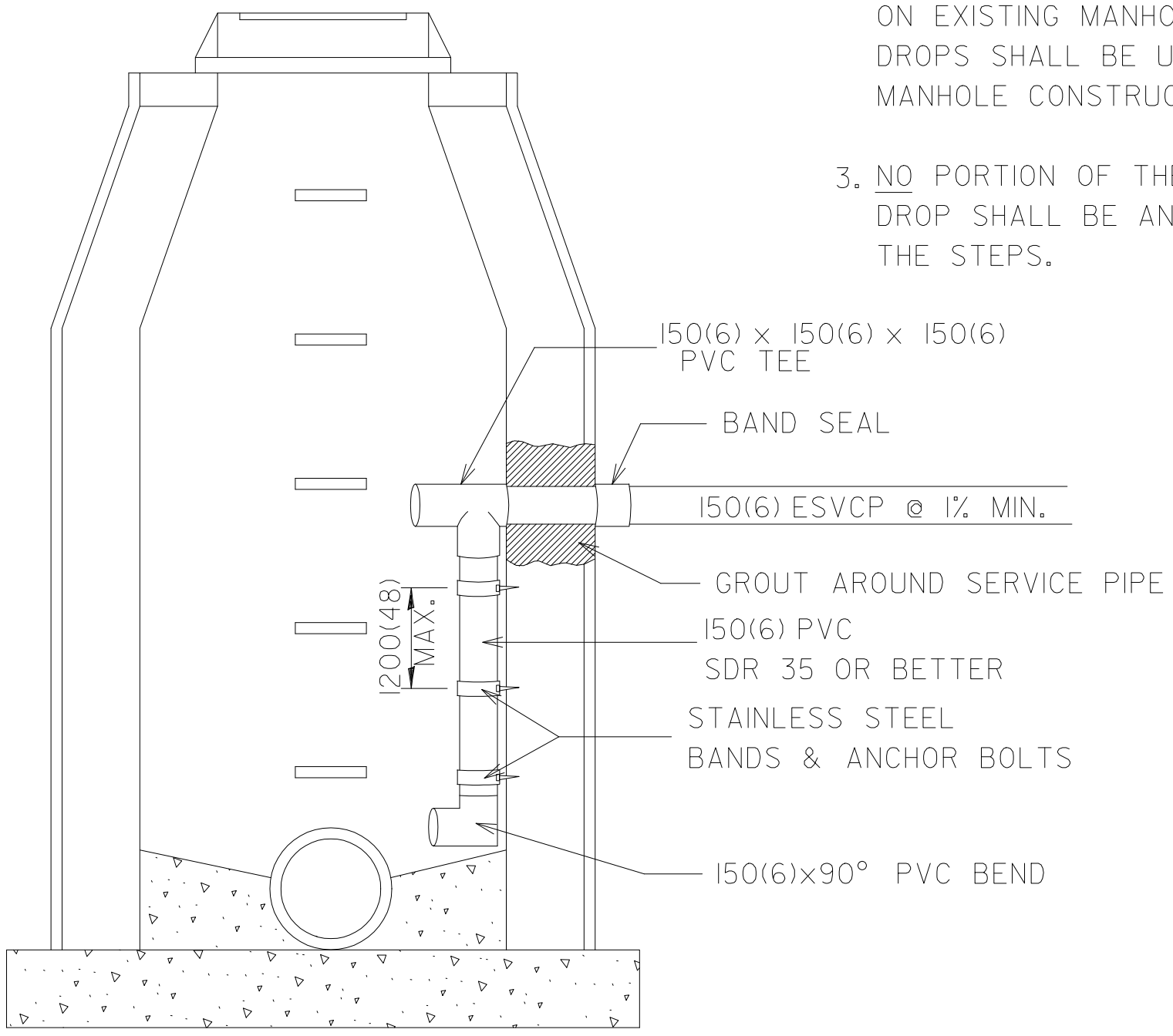
INSIDE SERVICE DROP IN EXISTING SANITARY MANHOLE

NOTES:

1. DROPS ARE REQUIRED WHEN INVERT OF SERVICE IS GREATER THAN 600(24) ABOUT BOTTOM OF MANHOLE.

2. INSIDE DROPS ARE ONLY ALLOWED ON EXISTING MANHOLES. OUTSIDE DROPS SHALL BE USED ON NEW MANHOLE CONSTRUCTION.

3. NO PORTION OF THE INSIDE DROP SHALL BE ANCHORED TO THE STEPS.



ALL DIMENSIONS ARE MILLIMETERS(INCHES) UNLESS OTHERWISE SHOWN.

SHEET 1 OF 1

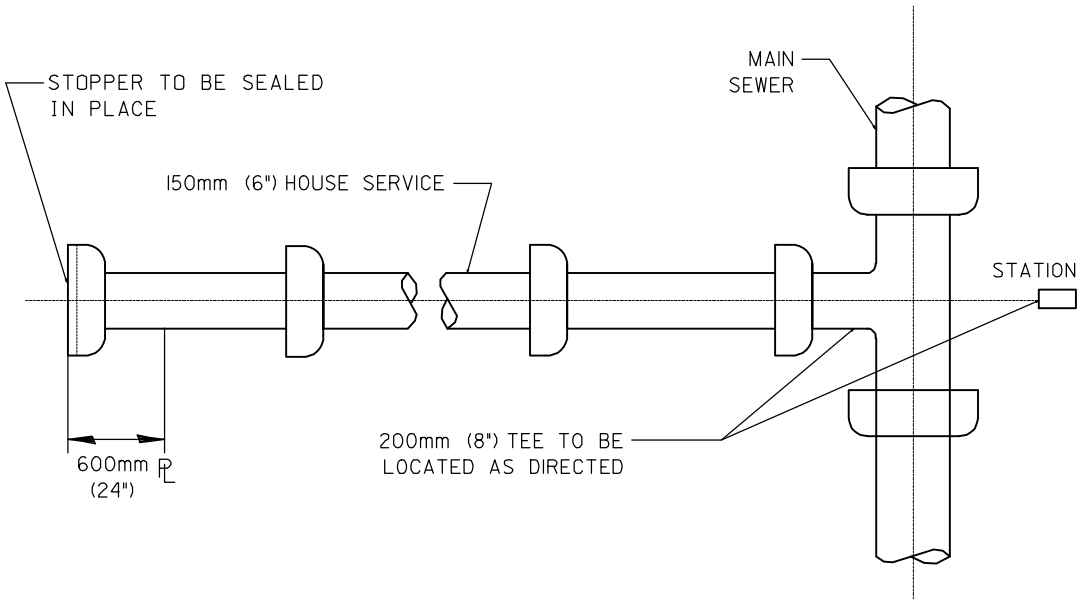
DESIGN BY : DOUG GROVESTEEN REVISED :

INSIDE DROP SERVICE CONNECTION

STANDARD 7.07B-2

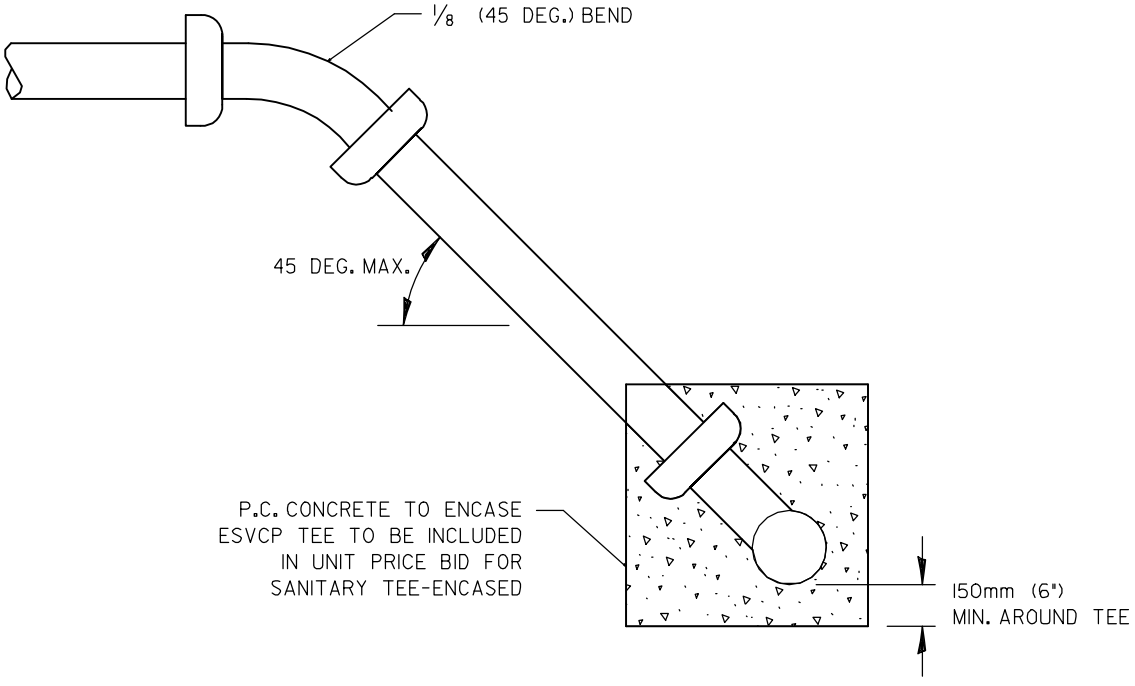
APPROVED BY :
DATE :

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT



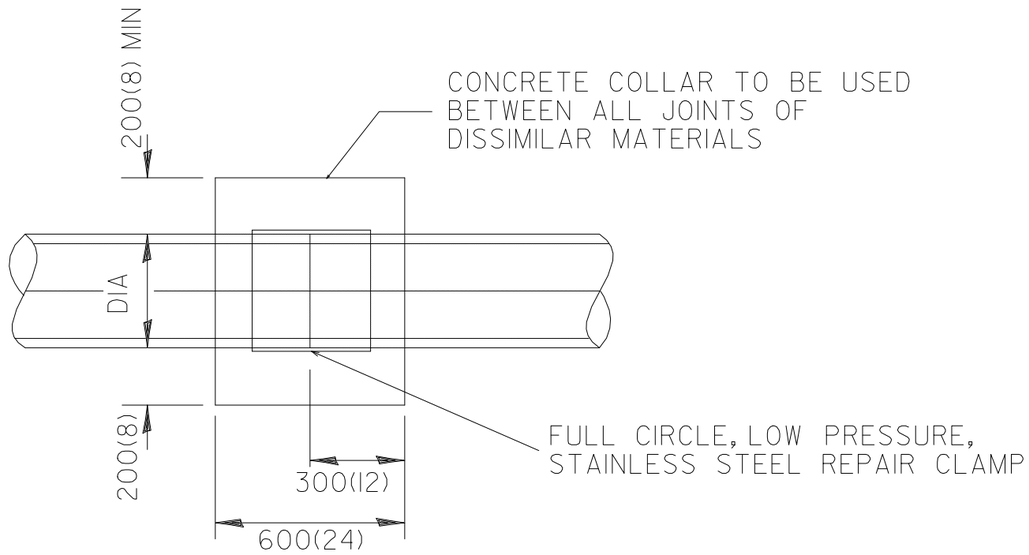
NOTE:
150(6) SERVICE TO BE PAID FOR BY MEASURING FROM CENTERLINE MAIN SEWER TO END OF 150(6) SERVICE. 1/8 BEND TO BE INCLUDED IN UNIT COST OF 150(6) SERVICE.

TYPICAL HOUSE SERVICE

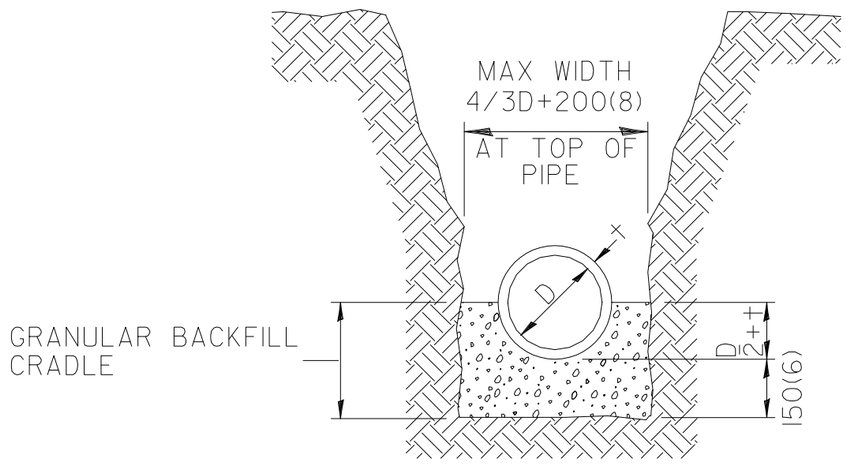


TYPICAL CONNECTION OVER 3.6m(12') DEEP

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 9-19-2003 RCW TYPICAL HOUSE CONNECTIONS **STANDARD 7.07C**	APPROVED BY : DATE :	**CITY OF BLOOMINGTON** **ENGINEERING DEPARTMENT**



STANDARD CONCRETE COLLAR DETAIL



PIPE BEDDING & EXCAVATION DETAIL

BEDDING TYPE "C" PER A.S.T.M. C12

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

DESIGN BY : DOUG GROVESTEEN REVISED :

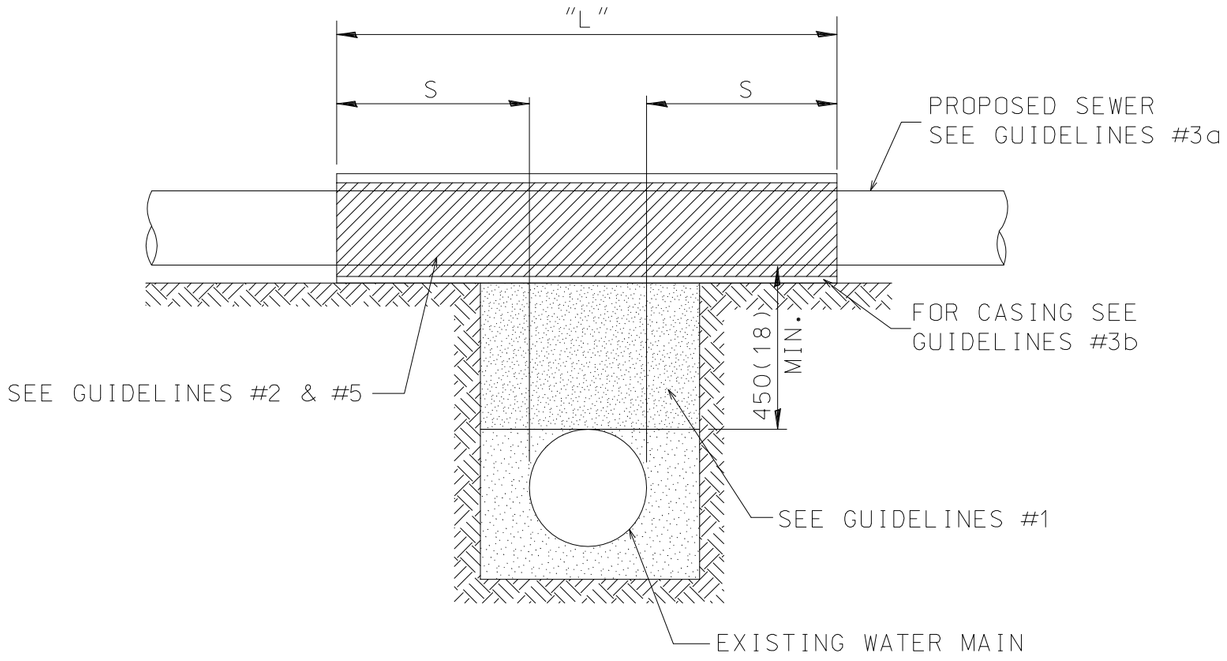
APPROVED BY : DATE :

STD. CONC. COLLAR & PIPE BEDDING & EXCAV. DETAILS

STANDARD 7.07D

SHEET
1 OF 1

PROPOSED SEWER LINE WITH 460(18) MINIMUM VERTICAL SEPARATION ABOVE EXISTING WATER MAIN



GUIDELINES

1. IF SELECT GRANULAR BACKFILL EXISTS: REMOVE WITHIN WIDTH OF PROPOSED SEWER TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.

2. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT THE LENGTH OF "L".

3. a. CONSTRUCT "L" OF PROPOSED SEWER OF WATER MAIN MATERIAL AND PRESSURE TEST, OR;
   b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.
4. POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR SEWER CASING AND WATER MAIN.

5. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1 m (10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

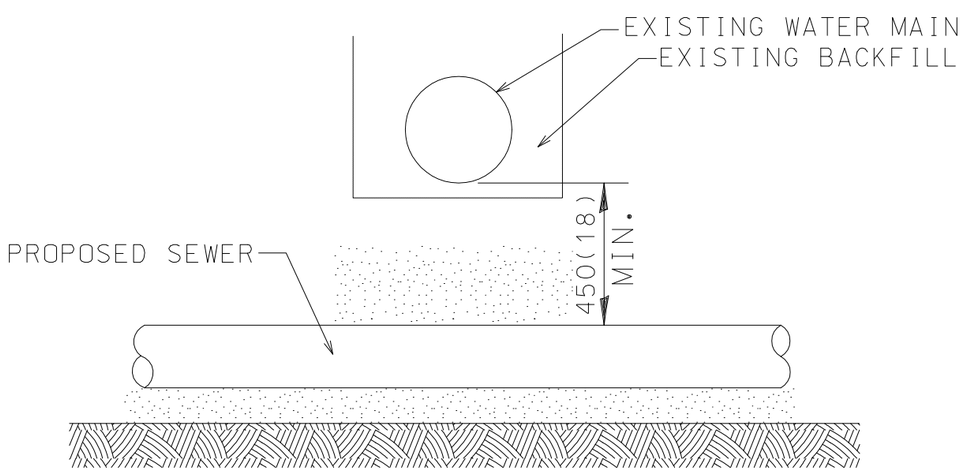
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERTICAL)

STANDARD 7.07E

SHEET
1 OF 1

PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH 460(18) MINIMUM VERTICAL SEPARATION

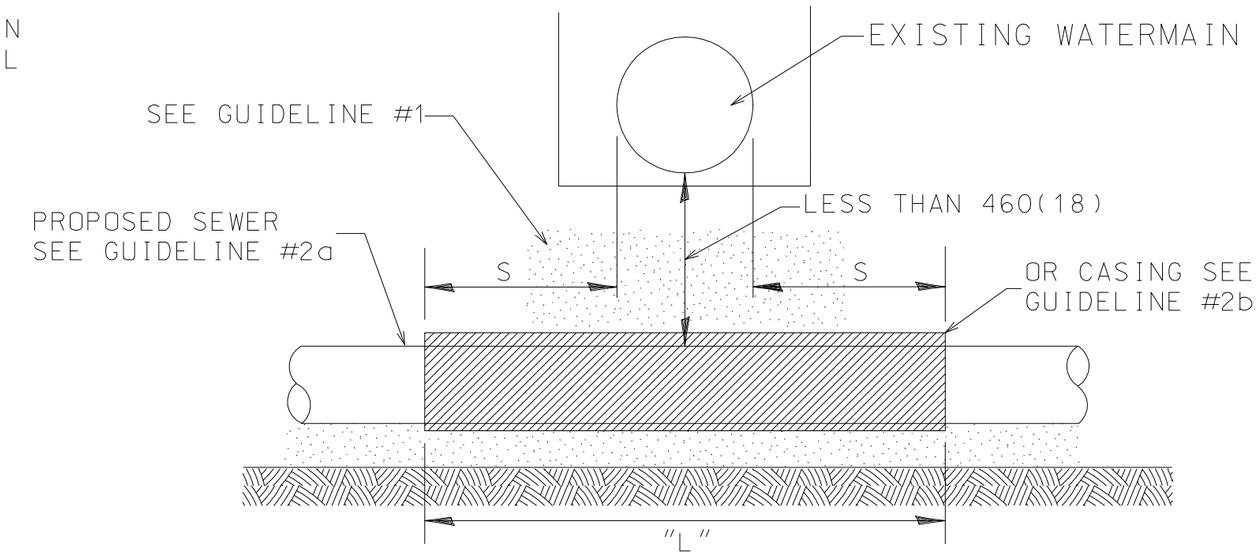


GUIDELINES

1. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

2. MAINTAIN 460(18) MIN. VERTICAL SEPARATION FOR 3.1m (10") HORIZONTALLY.

PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH LESS THAN 460(18) VERTICAL SEPARATION



NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1m(10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

GUIDELINES

1. OMIT SELECT GRANULAR EMBEDMENT AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR "S" ON EACH SIDE OF THE WATER MAIN.

2a. CONSTRUCT "L" OF PROPOSED SEWER OS WATER MAIN MATERIAL AND PRESSURE TEST, OR;

b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.

3. POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR SEWER CASING AND WATER MAIN.

4. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

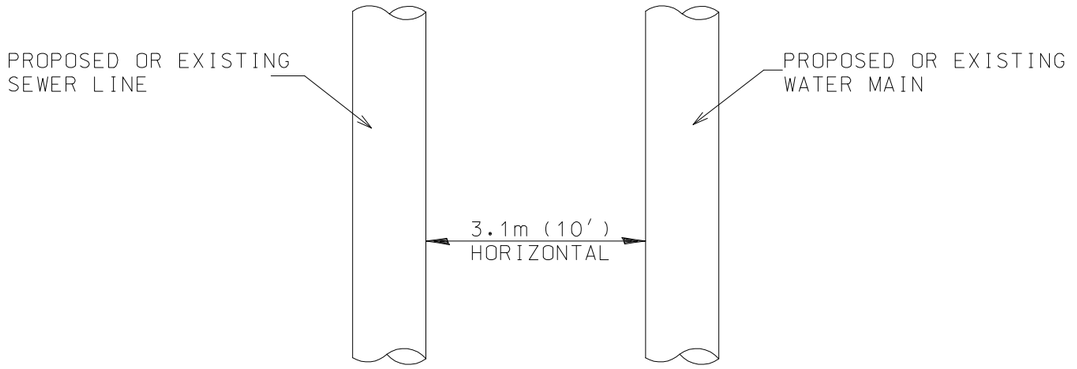
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERTICAL)

STANDARD 7.07F

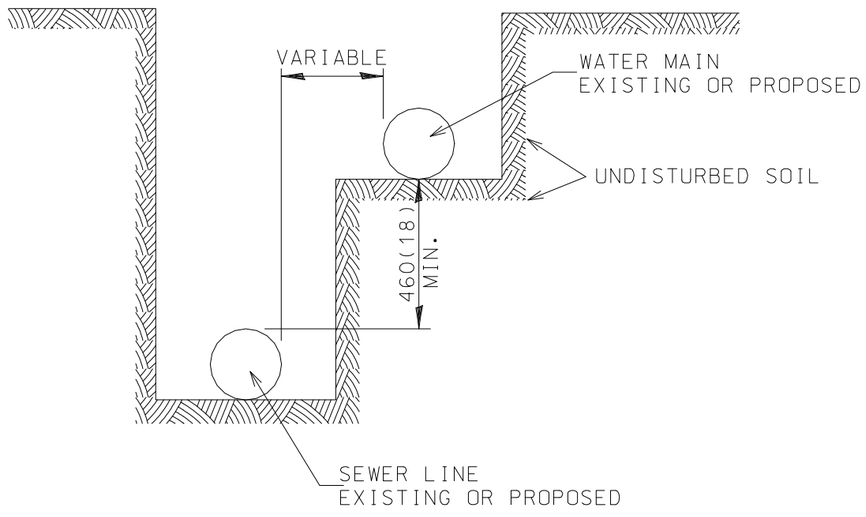
SHEET 1 OF 1

WHEN PROPOSED SEWER (OR WATER) IS LOCATED 3.1m(10′) OR MORE FROM EXISTING WATER (OR SEWER), NO SPECIAL CONSTRUCTION IS REQUIRED



PLAN VIEW

WHEN PROPOSED SEWER (OR WATER) IS LOCATED LESS THAN 3.1m (10′) FROM EXISTING WATER (OR SEWER), DETAILS BELOW SHALL APPLY.



All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

BY :
APPROVED DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (HORIZ.)

STANDARD 7.07G

SHEET
1 OF 1

CHAPTER 8 - Design & Construction Standards for Water Distribution and Supply System

8.02 GENERAL REQUIREMENTS

All developments shall be designed so the proposed water distribution and supply system does and accomplishes the following:

A. Conforms with the City of Bloomington's Water Master Plan.

B. Extends water mains through the proposed development to serve otherwise unserved abutting properties.

C. Provides adequate capacity including maximum fire flows to serve all the lots proposed to be served by the main, plus any additional extensions to the main which might be made to develop property in the same pressure zone with the type of uses and to the maximum density permitted by the then-existing zoning ordinances of the City with respect to the property within the corporate limits and the land use element of the Bloomington Comprehensive Plan for proposals outside the corporate limits.

D. Permits private wells for potable water only in the following instances:

1. Outside the corporate limits; or

2. More than 1,850 square meters (20,000 s.f.) in the lot served; and

3. In complete conformance with Illinois Environmental Protection Agency and McLean County Health Department standards.

4. If a public water supply is not reasonably available.

E. Maintains separation from public or private sewer or septic systems.

F. Loops water mains so as to avoid dead-ends.

G. Private water supply systems, including but not limited to wells, holding tanks, and piping, which are no longer in active use shall be abandoned in accordance with all State, County, and City regulations. The Owner of the property shall provide documentation to the Engineering Department that the system has been properly abandoned.

8.03 DESIGN STANDARDS

A. Provide a water service and an individual shut-off valve and box located in the public right-of-way between the sidewalk and the back of curb for each lot. In developments with private streets shutoff valve and box shall be located not more than 2 meters (6-1/2 ft.) from the back of curb or the water main, whichever greater.

The service line shall be extended inside the lot to a point not less than 0.6 meters (2 ft.) from the property line or easement line. .

A water service connection of type "K" copper must be provided for each lot of record in subdivisions zoned R-1 or R-2. Size and location of service connections in commercial, industrial and multifamily subdivisions is to be determined and installed only if a specific use is known beforehand. Services shall be sized in accordance with Illinois State Plumbing Code.

B. Water mains shall be designed so that looped water mains do not reconnect to the same source main unless there is no alternative whereupon the connections must be a minimum of 150 meters (500 ft.) apart or have a valve located between the two connections.

C. Provide steamer type fire hydrants at each intersection of two or more streets or roadways, and provide additional hydrants so that hydrants are spaced at intervals not exceeding; 150 m (500 feet) in areas zoned R-1, R-2, and R-4, and not exceeding 90 m (300 feet) in areas otherwise zoned. For all zoning districts other than R-1, R-2 or R-4 all hydrants shall be steamer type.

D. Hydrants located at other than street intersections are to be positioned adjacent to the side-yard lot line of two adjoining properties so as to achieve the nearest approximation of hydrant spacing interval required for a specific zoning designation. .

E. Hydrants are not to be located closer than 3 meters (10 feet) from any light standard, tree, sign-post, or other permanent structure that would impede access to the hydrant or reduce its visibility.

F. For water mains 200 mm (8 inch) and smaller, In-line valves shall be installed at intervals not to exceed 180 meters (600 feet). For water mains 300 mm (12 inch) and larger, in-line valves shall be installed at intervals not to exceed 300 meters (1000 ft.)

G. Valves shall be placed at each branch connection and an in-line valve shall be located within 30 m (100 feet) upstream or downstream near each branch.

H. Provide water mains having an inside diameter with a minimum of 200 mm (8 inches) nominal pipe size unless approval for smaller size is granted by the Director of Engineering and Water. All pipe shall be DUCTILE IRON Special Class 52.

I. Water mains shall be located with a minimum clearance of 3.1 m (10 feet) horizontally, or 460 mm (18 inches) vertically above when crossing, any public or private sanitary, storm sewer, drain or manhole. If these minimum clearances cannot be met, then the water main shall be installed in accordance with Standard Drawing 7.07E, 7.07F and 7.07G.

J. If a subdivision is constructed in phases creating temporary dead-end water main, a valve and fire hydrant must be installed at each temporary terminus.

K. Whenever water mains must enter side yard easements, cross water courses, railroads or interstate highways, a valve shall be provided at both ends of the crossing so that the section can be isolated for testing or repair. Whenever water mains, 300 mm (12 inch) diameter or less, are lowered to pass under an obstacle and the depth of cover exceeds 2.4 m (8 feet), a valve shall be provided at each end of the lowered section.

L. There shall be no connection or potentially possible connection between the Public Water Supply system and any pipes, pumps, hydrants or tanks from another system whereby unsafe water or other contaminating materials may be discharged or drawn into the Public Water Supply.

M. No water main shall be constructed in backyard easements.

N. All valves and bolted fittings shall be encased in a polyethylene sleeve for 3 meters (10 feet) each side of the valve or fitting. Sleeves shall be linear low density polyethylene, 8 mil thickness, Class C (black) conforming to the requirements of AWWA C105 / ANSI A21.5

O. All water main materials shall be manufactured in countries signatory to the North American Free Trade Agreement and shall meet or exceed AWWA specifications.

8.04 RIGHT-OF-WAY AND EASEMENT DEDICATIONS

All water mains which are to be publicly maintained shall be installed in public easements or dedicated public right-of-way. Water services to individual lots, which are to be privately maintained, shall not be located in easements across other lots, except for short distances to reach the public water main located

in an easement immediately adjacent to the lot being served, or to reach the public water main located in a front yard easement on the opposite side of, and adjacent to, the street right-of-way from the lot being served. Easements and rights-of-way shall be of sufficient width, and the water mains to be installed at such locations as to permit open cut installation, maintenance and repair within the confines of the easement or right-of-way without relocation or unreasonable interference with other public utilities located therein, and so as to meet the following minimum standards:

A. Have a minimum width of 5 meters (15 feet), plus 1.5 meters (5 feet) for each additional utility.

B. An additional 3 meters (10 feet) of width if a water main is to be installed parallel to a sanitary sewer, so that the two utilities will at least 3.1 meters (10 feet) of clearance.

8.05 CITY'S PARTICIPATION IN COST

A. Water Mains. Where installation of water mains of larger capacity than required to serve land owned by the developer is required by the City Council to serve future growth in the vicinity of the development, the developer shall pay for only his/her portion, based on the Code requirements for his/her development, of the total cost of the installation; the balance to be borne by the City. Provided funds are available, the City will pay the difference in the cost between the size required for the developer's land (minimum 200 mm (8 inch)) and the larger size required. If there is an existing water main, adjacent to a proposed development, the developer shall pay a tap on charge to reimburse the City for his/her appropriate share of the cost of installing said water main..

B. Engineering Costs. The developer will be responsible for all engineering costs for design of water main facilities within his/her development.

8.06 WATER MAIN SIDE TAP

Whenever a side tap is required, the developer shall provide all side tapping material (side tap sleeves & valve with box) and the City will physically make the tap. The labor cost for side tap shall be as per the current fee schedule as provided by the Director of Water for the City of Bloomington.

For side taps smaller than four inch and larger than the size permitted by Chapter 27 of City Code for a direct tap, a four inch side tap shall be made and then the service reduced to desired size.

8.07 SPECIFICATIONS & SPECIAL PROVISIONS

All water mains shall use materials and be installed in such manner meeting or exceeding the required standards and specifications contained in the "Standard Specifications for Water and Sewer Main Construction", the then current edition as modified, supplemented and amended by this Manual or the Director of Engineering and Water. These modifications, amendments and amplifications have been provided in this Chapter of the Manual.

Tapping valves shall be Clow F6114 resilient wedge gate valves or approved equal. Retainer Glands shall be: McWane (Clow) F-1058 or approved equal, and shall be installed at the joint between the valve and the proposed water main.

Tapping Sleeves shall be stainless steel with stainless steel bolts as follows:
Taps onto existing 4", 6" and 8" mains:
Cascade CST-SL, Ford FAST or approved equal

Taps onto existing 10" or larger mains:
Cascade CST-EX or approved equal

Valve boxes shall be provided and installed. All valve boxes shall have not less than a 5-1/4 inch shaft. The extensions of the valve box and shaft necessary to reach the ground elevation shall be included. Valve boxes shall by Tyler Pipe two piece, screw type, #6850 series with the word "water" cast on lid or an approved equal.

The contractor shall make all excavation required for side-tapping existing mains. The contractor shall provide an 8 ft. x 4 ft. hole, oriented with the 4 ft. dimension along the water main to be side-tapped, from one foot behind the tap location to 7 ft. perpendicular to the existing main along the alignment of the future main. The depth of the excavation shall be one foot below the existing water main. The contractor shall insure that excavation is in compliance with Occupational Safety and Health Act (O.S.H.A.) regulations for safety.

Water Service Markings: The contractor shall place 50 mm x 100 mm wood studs (2x4's) extending from the bottom of the water service to 0.6 m (2 feet) above the ground at the location of the end of each service. A minimum of the upper one (1) foot of each wood stud (2x4) shall be painted blue. These markers shall be installed at the time the services are constructed.

Curb Marking of Water Services: At the time the curb and gutter is poured, the contractor shall mark the top of the curb with a permanent "W" for water to mark location of the curb box.

Special Provisions Modifying
Standard Specifications for
Water and Sewer Main
Construction in Illinois

DIVISION IV - WATER DISTRIBUTION

Applicable sections of this Division also apply to Force Main Construction.

40-2 PIPE MATERIALS

Force mains and water mains shall be ductile iron pipe Special Class 52 with single gasket joints.

40-2.02 DUCTILE CAST IRON PIPE

Add the following:

Cement lining and tar (seal) coating shall be provided for all pipe. All pipe shall have push-on type joint unless otherwise called for.

40-2.04 JOINTING

Add the following:

Where restrained joints are specified, they shall meet one of the following:

a. U.S. Pipe: TR Flex Joint
b. American Ductile Iron Pipe: Lok-Ring Joint
c. McWane Inc. (Clow): Titon or Fastite Joint
d. Griffin Pipe: Snap-Lok or Bolt-Lok
e. 14" or larger pipe: Ebba Iron Sales Meg-a-lug Retainer Glands
f. 12" or smaller pipe standard retainer glands from approved manufacturers.
g. or approved equal.

40-2.05 PIPE FITTINGS

Water main fittings incorporated into this work shall conform to A.N.S.I./A.W.W.A. C110/A21.10 and A.N.S.I./A.W.W.A. C111/A21.11, 1725 Kpa (250 psi) rated pressure. All fittings shall have the same linings and coatings as the pipe supplied. All fittings (including but not limited to bends, tees, reducers and plugs) shall be restrained with retainer glands or a manufactured joint restraining system approved by the Director of Engineering and Water.

40-2.06C STOPS AND FITTINGS

Add the following to this section:

Corporation Stops, Curb Stops and Curb Boxes shall be as follows or approved equals:

Service Size	**Corp. Stop**	**Curb Stop**	**Curb Box**
19mm-25mm (3/4"-1")	Mueller H-15000	Mueller H-15200 or A.Y. McDonald 4713	Mueller H-10314 or A.Y. McDonald 5601
30mm (1-1/4"	Mueller H-15000	Mueller H-15200 or A.Y. McDonald 6100	A.Y. McDonald 5603
35mm-50mm (1-1/2"-2")	Ford, Mueller, or A.Y. McDonald Ball Valve	Ford, Mueller or A.Y. McDonald Ball Valve	A.Y. McDonald 5603

41-2.02A DEPTH OF PIPE COVER

Minimum depth of cover shall be 1.2 m (4 feet) unless approved by Director of Engineering & Water.

41-2.04 LAYING OF PIPE ON CURVES (DEFLECTION)

Delete the third paragraph of Section 21-2.04 and read: "The maximum deflection at any joint, shall not exceed 3 degrees per joint or 80%, of the pipe manufacturers recommended maximum, whichever is less." The contractor shall, at the time of contract execution, supply documentation from the pipe manufacture's to verify the recommended deflection for any type pipe proposed for use.

41-2.13A PRESSURE TESTING OF WATER MAINS

Testing per Section 41-2.13 shall be done by the contractor. The City shall have a representative present during testing to record any faults found by the testing.

Revise Section 41-2.13A to read:

After all pipe has been laid and back filled as specified herein, all newly laid pipe or any sections of it shall, unless otherwise expressly specified, be subjected to a hydrostatic pressure equal to fifty (50) percent more than the operating pressure at the lowest elevation of the pipe section of 1050 Kpa (150 psi) whichever is greater, but not to exceed the pressure rating of the type of pipe specified. The duration of each pressure test shall be for a period of not less than two (2) hours and not more than six (6) hours. The basic provisions of A.W.W.A. C-600 and C-603 shall be applicable.

41-2.14 DISINFECTION OF WATER MAINS

Sterilization per Section 41-2.14 shall be performed by the contractor. The contractor shall notify the engineer 24 hours prior to disinfection operations.

SECTIONS 42, 43 AND 44: VALVES AND BOXES

Revise the Sections 42, 43 and 44 to reflect that all valves and boxes must be approved by the Director of Engineering and Water before installation. Valves 300 mm (12 inch) diameter or less shall be Resilient Wedge Gate Valves meeting A.W.W.A. C509, such as Clow F-6100, Mueller, or approved equal. Valves 350 mm (16 inch) or larger shall be butterfly valves meeting A.W.W.A. C504, Class 150-B, as manufactured by Mueller, Clow, Pratt or American. All valves shall be restrained with retainer glands or a manufactured pipe restraint system approved by the Director of Engineering and Water. All valve boxes shall have not less than a 130 mm shaft. The extensions of the valve box and shaft necessary to reach the ground elevation shall be provided. Valve boxes shall by Tyler Pipe two piece, screw type, #6850 series with the work “water” cast on lid or an approved equal.

Where valve boxes to be adjusted require more than one additional section of box, the top section of the box shall be removed and a section of 150 mm (6 inch) diameter A.W.W.A. C900 P.V.C. pipe, cut to length, shall be inserted into the bottom section of buffalo box and the upper section installed on top of the P.V.C. extension. All extensions of the valve box shall be installed plum and straight.

45 FIRE HYDRANT DETAILS

Revise all conflicting portions of Section 45 to reflect the following:

The specific type of hydrants used must be approved by the Director of Engineering and Water prior to installation. Hydrants shall be set as shown on the plans, conforming to the City of Bloomington’s Standard “1.5 meter (5 ft.) bury”, except that extensions required to meet existing grade shall be installed in such a manner that future adjustments shall conform to the plan elevations by removal of the extension. All bolts below ground level shall be stainless steel.

In Section 45-2.02, in the fourth paragraph, hydrants shall only be supplied with a 101.3 mm (four inch) pumper nozzle only if steamer hydrants are called for on the plans.

In Section 45-3 (13), hydrant blocking shall consist of masonry blocks and no poured-in-place concrete shall be used.

In Section 45-3 (16), change “0.25 cubic meter” (1/3 cubic yard) to read “0.50 cubic meter (2/3 cubic yard).”

Fire hydrants shall have a 150 mm (6 inch) restrained joint opening. Fire hydrants shall open counterclockwise and close with pressure.

Fire hydrants approved for use:

- Clow #2500
- Mueller Modern Centurion
- Waterous Pacer
- Kennedy Guardian

RECURRING SPECIAL PROVISIONS FOR WATER MAIN IMPROVEMENTS

Coordination of Work

The Contractor shall coordinate his operations with the Engineering and Water Department. The chlorination, pressure testing and sampling of the new mains shall be done with Engineering and Water Department supervision.

Water & Sewer Crossing

In cases where a water main crosses a storm sewer or sanitary sewer and proper separation cannot be provided, the Contractor shall construct the sewer as outlined in Division IV, Section 41-2.01C of the "Standard Specifications for Water and Sewer Main Construction", Latest Edition. Should the Contractor elect to encase the water main in lieu of constructing the sewer of water main quality pipe, the water main may be encased with any approved water main quality pipe. Water main 300 mm (12 inch) or greater in diameter that is encased shall be installed with approved casing spacers and the ends of the casing sealed. Before starting either of the above operations, the Contractor shall notify the Director of Engineering & Water and have the method approved.

Setting Hydrants

Each hydrant shall stand plumb and shall rest on a precast solid concrete block base. Under and around the drip of each hydrant shall be placed not less than 0.50 cubic meter (2/3 cubic yard) of broken stone not less than 25 mm (1 inch) in size. All fittings and valves in connection with the fire hydrant shall be the anchoring type. No hydrant shall be placed closer than 0.75 m (2-1/2 feet) from back of curb or edge of pavement to the centerline of hydrant.

Connections to Existing Mains

If the connection to an existing water main requires a shutdown of the existing main, the Contractor shall notify all users of the affected main a minimum of 48 hours ahead of the shutdown. The Contractor shall re-chlorinate that portion of the existing water main which is shutdown before it is put back into service. The Contractor shall provide the necessary blocking or restraining of the existing main when he/she makes the new connection.

Leakage Test

When performing a hydrostatic pressure test, all water used must be potable and contain a chlorine residual of not less than 0.2 parts per million of free chlorine or 0.5 parts per million of combined chlorine. The hydrostatic pressure test will be made in accordance with ANSI/AWWA C-600 latest edition. The hydrostatic pressure shall be 1050 Kpa (150 psi) or 150% of normal operating pressure whichever is greater for at least one two-hour duration and not vary more than 35 KPa (5 psi). Before applying the specified test pressure, the air shall be expelled from the pipe. The allowable leakage shall be determined by the following formula:

English Formula:

$$L = \left(\frac{SD\sqrt{P}}{133,200} \right)$$

L = allowable leakage in gallons/hour
S = length of pipe in feet
D = nominal diameter of pipe in inches
P = avg. test pressure during leakage test, in pounds per square inch (gauge)

Metric Formula:

$$L_m = \left(\frac{SD\sqrt{P}}{715,317} \right)$$

L= allowable leakage in liters/hour
S= length of pipe in meters
D= nominal diameter of pipe in mm
P= avg. test pressure during leakage, test in KPa

All visible leaks are to be repaired regardless of the amount of leakage.

Flushing of New Mains

All water mains shall be flushed in accordance with Article 41-2.14 of the "Standard Specifications for Water and Sewer Main Construction". There will be no charge by the City of Bloomington to the Contractor for the water used to flush the mains, provided it is not necessary to flush the mains more than one time. If it is necessary to flush the mains more than one time, then the Contractor will be charged by the City of Bloomington for water used to flush the mains. The Contractor shall provide and install any hose necessary to direct the water being flushed away from any area it might damage. The contractor shall take whatever precautions necessary during flushing to prevent ecological damage to any receiving stream, lake, or other body of water.

Sampling and Chlorinating Taps

At the extreme ends of the proposed new water main or at locations as directed by the Director of Engineering and Water, sampling and chlorinating taps shall be installed by the Contractor in accordance with the details as shown on the plans. After the chlorinating, sampling and testing is approved by the City of Bloomington Engineering and Water Department, the corporation stop shall be shut off and the piping removed from the corporation stop.

Disinfection of Mains

Disinfection must be accomplished by either the continuous feed method or slug method. The tablet method is not acceptable and is not to be used except with the expressed written permission of the Director of Engineering and Water. A chlorine residual of at least 50 parts per million must be attained initially and 25 parts per million residual present after 24 hours when the preferred continuous feed method is used. If the slug method is used, 300 parts per million must be retained for a minimum of 3 hours, or 500 parts per million retained for 30 minutes. Attainment of initial and final chlorine residuals must be verified by the Engineering and Water Department. Disinfecting chlorine doses shall not remain in the pipe for more than 24 hours.

In order to provide proper conditions for disinfection following construction, installation option 'A' or 'B' must be followed.

A. A minimum of three low density foam swabs shall be introduced into the first unit of pipe being installed and shall remain until the job is completed whereupon the swabs shall be propelled a minimum of three times, or until water is clear, in the direction of the extreme ends of the construction project during the initial filling and flushing process. When a dead-end main is involved the contractor may return the swabs to the point of origin by using another water source with sufficient volume and pressure to propel the swabs, or he may retrieve the swabs at the exit point and reintroduce the swabs at the origin repeating the process until exit water is clear. The process must be performed on every run of pipe from each branch of newly constructed water main. In cases where foam swabs are too large to be retrieved from a fire hydrant, an exit tee or wye and a means of directing the water away from the trench must be provided. All swabs that are used must be accounted for when cleaning is completed.

B. Each unit of pipe, fitting and valve shall be hand swabbed or otherwise mechanically cleaned with a prior approved method before installation, and a cap or plug inserted in the pipe and retained until just prior to joining with the next unit of pipe. Two caps or plugs must be utilized, one inserted in the last unit of pipe laid and one to be used in the unit of pipe being prepared for installation. The plug or cap in the last unit of pipe installed shall not be removed until the next pipe unit is lowered into the trench and is ready to be inserted. At the end of each working day a watertight plug or cap shall reside in the last unit of pipe or fitting installed, until construction resumes. During installation workman's hands, gloves, rags, tools, or any other foreign object must not be introduced into the open ends of any previously cleaned pipe. If dirt or mud is kicked into or falls into the open ends of the pipe during handling or joining, re-cleaning of the pipe or fitting effected must be performed. Cleaning water must be clear water containing a minimum of 10 ppm chlorine, and shall be changed whenever appropriate. Muddy or overly discolored cleaning solutions shall not be used at any time.

   In the event a project is constructed where a flushing velocity of 0.75 meters per second (2-1/2 feet per second) cannot be attained the hand cleaning method must be employed. Where the hand cleaning method is employed, chlorine in the form of high test hypochlorite (HTH) may be introduced into each unit of pipe during construction to satisfy the disinfection requirements, providing a minimum of fifty parts per million (50 ppm) of chlorine is present in both ends of the new main following initial filling.

Bacteriological Testing

After disinfection, bacteriological testing must be done to insure the public health of the main. All samples must be collected by a designated sample collector of the Engineering and Water Department and tested at an EPA approved laboratory.

Water mains that fail the initial bacterial test shall be flushed again before additional sampling is commenced. If the second sample also fails the bacterial test, then disinfection shall be repeated and flushing prior to additional sampling shall be required. If the third sample fails the bacterial test, then the next step shall be determined by the Director of Engineering & Water.

Trench Backfill

Approved compacted granular material shall be required in all trenches extending 0.6 m (2 feet) either side of all sidewalks, driveways and street pavements.

Curb and Gutter Crossing

Contractor may remove and replace the curb and gutter at the street crossings or he may tunnel the curb and gutter at his option. All excavated material shall be disposed of off site and the trench backfilled with approved compacted granular material.

Pavement Removal and Replacement

All Street Pavement Removal and Replacement shall be done in accordance with Chapter 2 of this Manual.

Damage to Existing Structures

If damage is done to existing or new structures during construction of the proposed improvement, they shall be replaced or repaired in a satisfactory manner by the Contractor at his own expense.

Utilities

The Owner or his designee shall notify the utility companies shall be notified of the impending project and the plans shall indicate the general location of the utility main lines. The Contractor shall have the responsibility before any construction work has begun, of obtaining from all utilities the exact location of any underground facilities in the area of construction, whether indicated on the plans or not. Any facilities disturbed by the Contractor shall be restored by him at his own expense. The Contractor shall coordinate with the proper utility the relocation of any facility designated on the plans or deemed necessary to be relocated by the Director of Engineering & Water in order to complete construction of the project.

Residents shall be notified a minimum of 48 hours in advance of impending service outages, and no residence shall be without service overnight.

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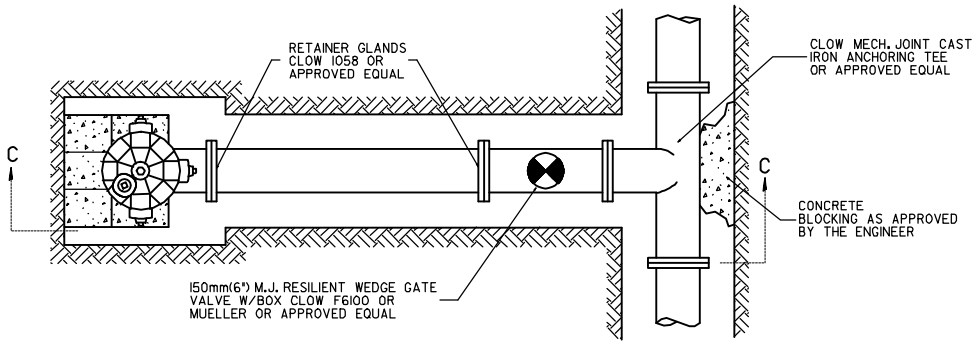
8.08 STANDARD DETAILS

Standard Drawing No.	Title
A	Hydrant Installation (rev. 08/03)
B	Parallel Mount Hydrant Installation
C	(reserved)
D	Typical Water Service (rev. 08/03)
E	Sampling & Chlorination Service Piping Tap (rev. 08/03)
F	Creek Crossing Detail
G	(reserved)
H	Water & Sewer Separation Requirements/Horizontal
I	Water & Sewer Separation Requirements/Vertical
J	Water & Sewer Separation Requirements/Vertical (continued)
K	Pipe Cover Details (08/03)
L	Concrete Encasement Plan (08/03)
M	Hardwood Pipe Support Chair (08/03)
N	Typical Hydrant Location Plan (08/03)

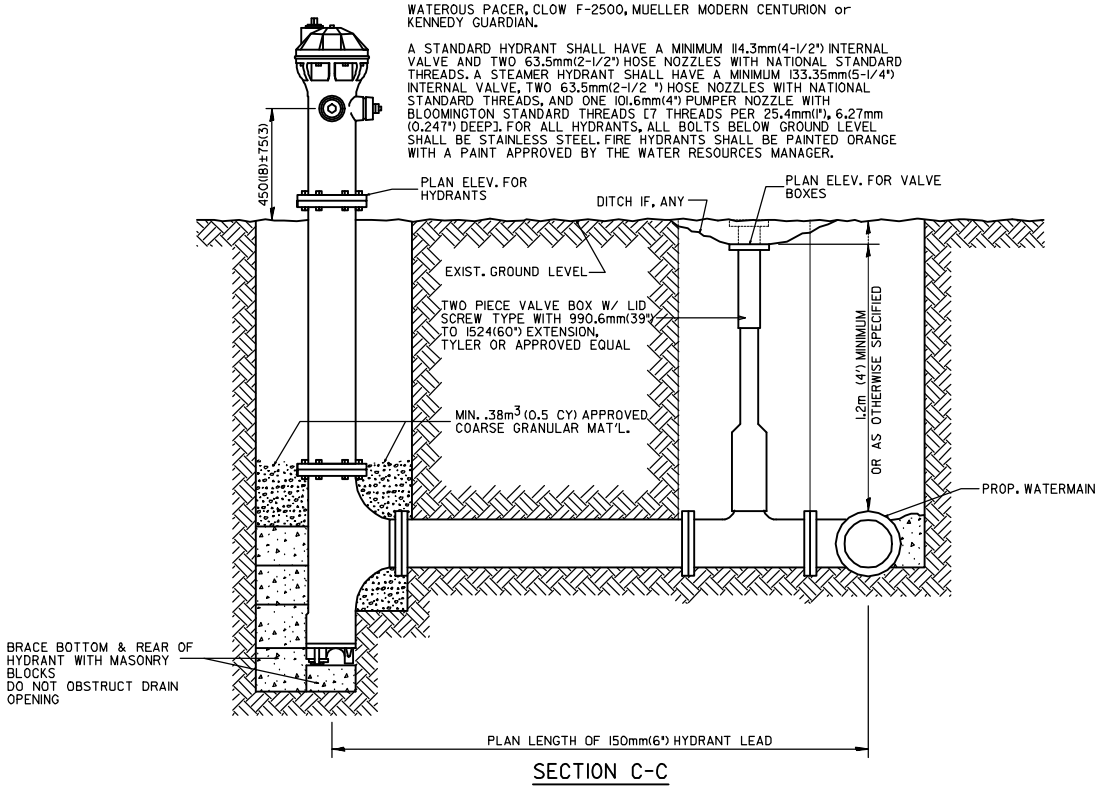
TYPICAL HYDRANT INSTALLATION



PLAN VIEW

FIRE HYDRANTS SHALL BE:
WATEROUS PACER, CLOW F-2500, MUELLER MODERN CENTURION or KENNEDY GUARDIAN.

A STANDARD HYDRANT SHALL HAVE A MINIMUM 114.3mm(4-1/2") INTERNAL VALVE AND TWO 63.5mm(2-1/2") HOSE NOZZLES WITH NATIONAL STANDARD THREADS. A STEAMER HYDRANT SHALL HAVE A MINIMUM 133.35mm(5-1/4") INTERNAL VALVE, TWO 63.5mm(2-1/2 ") HOSE NOZZLES WITH NATIONAL STANDARD THREADS, AND ONE 101.6mm(4") PUMPER NOZZLE WITH BLOOMINGTON STANDARD THREADS [7 THREADS PER 25.4mm(1"), 6.27mm (0.247") DEEP]. FOR ALL HYDRANTS, ALL BOLTS BELOW GROUND LEVEL SHALL BE STAINLESS STEEL. FIRE HYDRANTS SHALL BE PAINTED ORANGE WITH A PAINT APPROVED BY THE WATER RESOURCES MANAGER.



SECTION C-C

NOTES:

1. THE "STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS", FIFTH EDITION, DATED MAY 1996 SHALL APPLY TO THIS WORK.

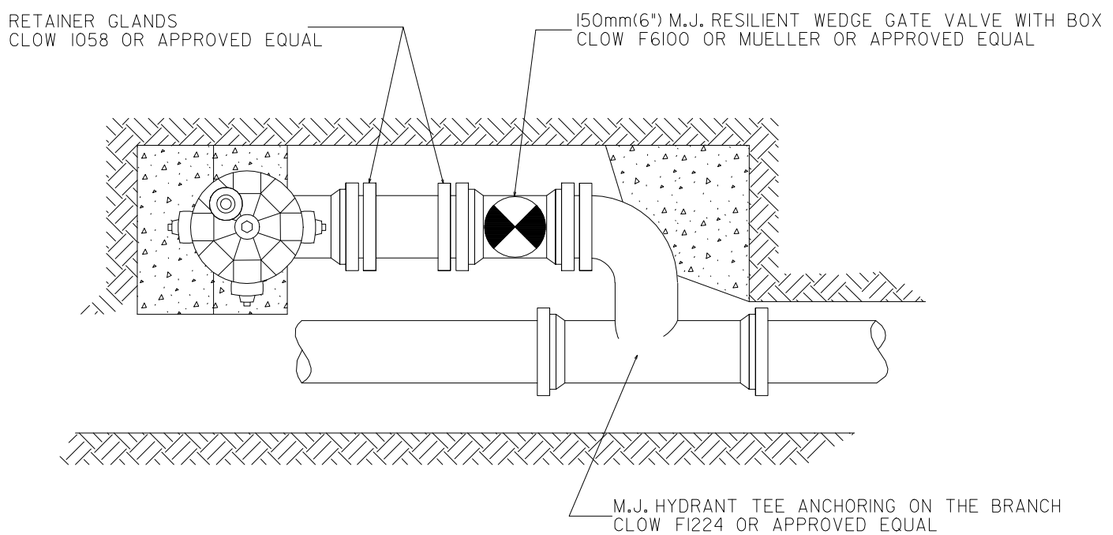
2. ALL WATERMAIN MATERIALS SHALL BE MANUFACTURED IN COUNTRIES SIGNATORY TO THE NORTH AMERICAN FREE TRADE AGREEMENT AND SHALL MEET OR EXCEED AWWA SPECIFICATIONS.

3. FOR APPROVED MANUFACTURERS NOT LISTED ON THIS SHEET, INQUIRE OF THE CITY OF BLOOMINGTON WATER RESOURCES MANAGER AT (309) 434-2225.

4. ALL FIRE HYDRANTS, VALVES, AND FITTINGS SHALL BE RESTRAINED.

All dimensions are in millimeters (inches) unless otherwise shown.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW HYDRANT INSTALLATION **STANDARD 8.08A**	APPROVED BY : DATE :	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT



PARALLEL MOUNT HYDRANT INSTALLATION

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

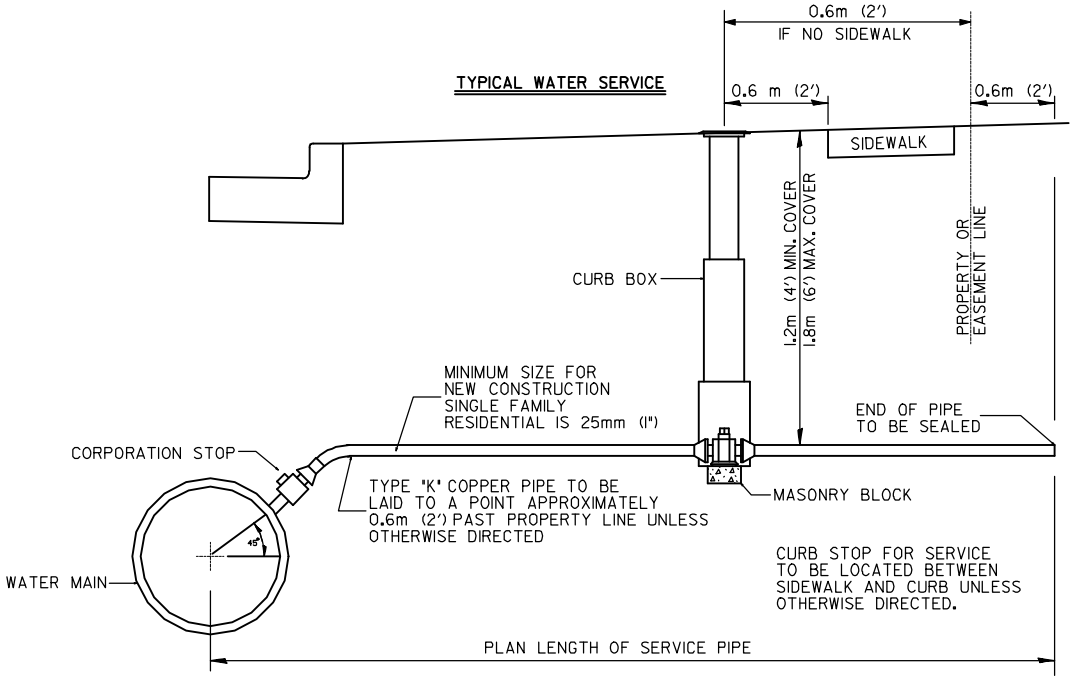
DESIGN BY : DOUG GROVESTEEN REVISED :

PARALLEL MOUNT HYDRANT INSTALLATION

STANDARD 8.08B

BY :
APPROVED DATE :

SHEET
1 OF 1



PERMITTED TAP SIZES

TAP SIZE	MINIMUM SIZE OF WATERMAIN TO BE TAPPED
19mm (3/4 ")	100mm (4" DIA.)
25mm (1")	200mm (8")
* 30mm (1 1/4") & OVER	A SPECIAL PERMIT IS NEEDED FROM THE WATER RESOURCES MANAGER

* 50mm (2") AND OVER MUST BE MADE BY SIDE TAP SLEEVES AND VALVES OR BY A REGULAR TEE. ALL SIDE TAPS 50mm (2") DIA. AND OVER SHALL BE MADE BY CITY FORCES @ THE SCHEDULED PRICES ESTABLISHED BY THE WATER DEPARTMENT.

SERVICE SIZE	* CORP. STOP	* CURB STOP	* CURB BOX
19mm - 25mm (3/4" - 1")	MUELLER H-15000	MUELLER H-15200 OR A.Y. MCDONALD 4713	MUELLER H-10314 OR A.Y. MCDONALD 5601
30mm (1 1/4")	MUELLER H-15000	MUELLER H-15200 OR A.Y. MCDONALD 6100	A.Y. MCDONALD 5603
35mm - 50mm (1 1/2" - 2")	FORD, MUELLER. OR A.Y. MCDONALD BALL VALVE	FORD, MUELLER. OR A.Y. MCDONALD BALL VALVE	A.Y. MCDONALD 5603

SHEET 1 OF 1

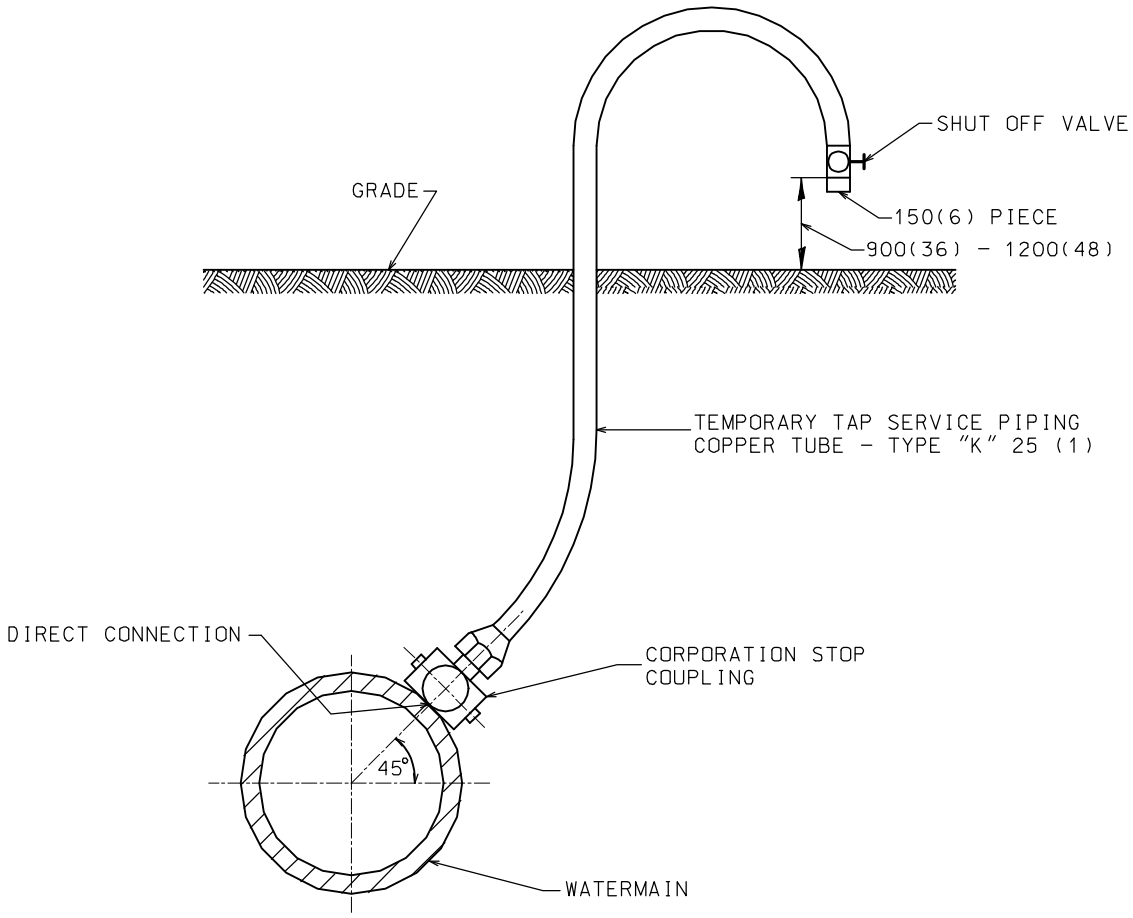
DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW

APPROVED BY : DATE :

TYPICAL WATER SERVICE

STANDARD 8.08D

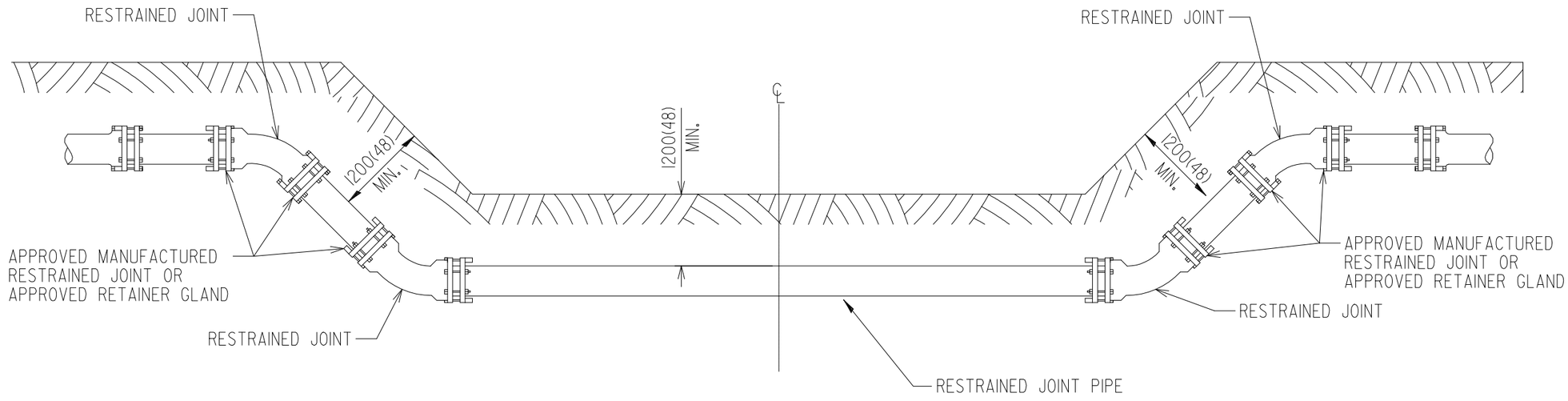
CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT



SAMPLING & CHLORINATION SERVICE PIPING TAP

ALL DIMENSIONS ARE IN MILLIMETERS(INCHES)
UNLESS OTHERWISHE SHOWN.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW SAMPLING & CHLORINATION SERVICE PIPING TAP **STANDARD 8.08E**	APPROVED BY : DATE :	**CITY OF BLOOMINGTON** **ENGINEERING DEPARTMENT**



CREEK CROSSING DETAIL

ALL DIMENSIONS ARE IN MILLIMETERS (INCHES)
UNLESS OTHERWISE SHOWN

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

BY :
APPROVED DATE :

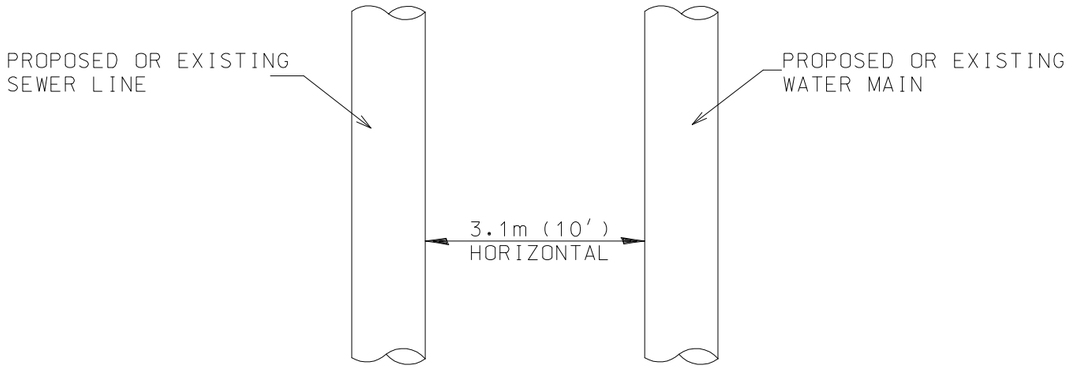
DESIGN BY : DOUG GROVESTEEN REVISED :

CREEK CROSSING DETAIL

STANDARD 8.08F

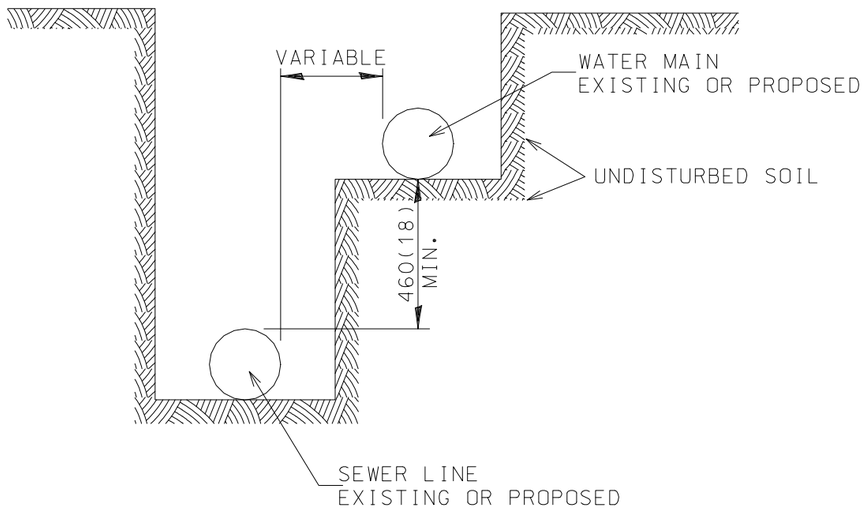
SHEET
1 OF 1

WHEN PROPOSED SEWER (OR WATER) IS LOCATED 3.1m(10′) OR MORE FROM EXISTING WATER (OR SEWER), NO SPECIAL CONSTRUCTION IS REQUIRED



PLAN VIEW

WHEN PROPOSED SEWER (OR WATER) IS LOCATED LESS THAN 3.1m (10′) FROM EXISTING WATER (OR SEWER), DETAILS BELOW SHALL APPLY.



All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

BY :
APPROVED DATE :

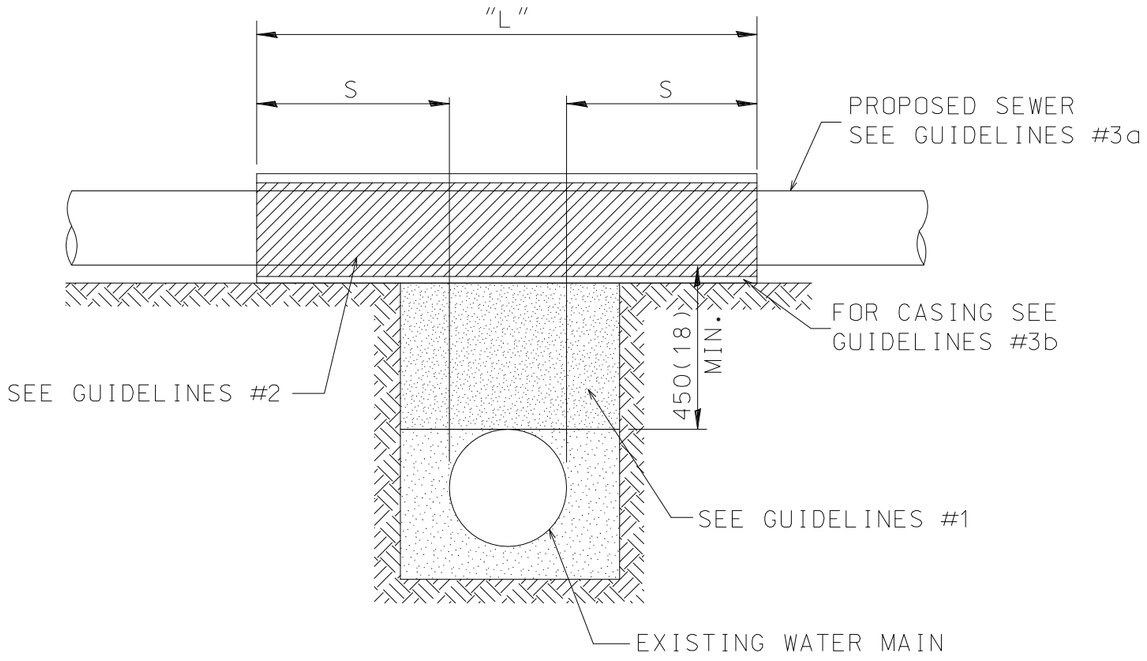
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (HORIZ.)

STANDARD 8.08H

SHEET
1 OF 1

PROPOSED SEWER LINE WITH 460(18) MINIMUM VERTICAL SEPARATION ABOVE EXISTING WATER MAIN



GUIDELINES

1. IF SELECT GRANULAR BACKFILL EXISTS: REMOVE WITHIN WIDTH OF PROPOSED SEWER TRENCH AND REPLACE WITH SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT.

2. OMIT SELECT GRANULAR CRADLE AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT THE LENGTH OF "L".

3. a. CONSTRUCT "L" OF PROPOSED SEWER OF WATER MAIN MATERIAL AND PRESSURE TEST, OR;
   b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.
4. POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR SEWER CASING AND WATER MAIN.

NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1m (10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

APPROVED BY :
DATE :

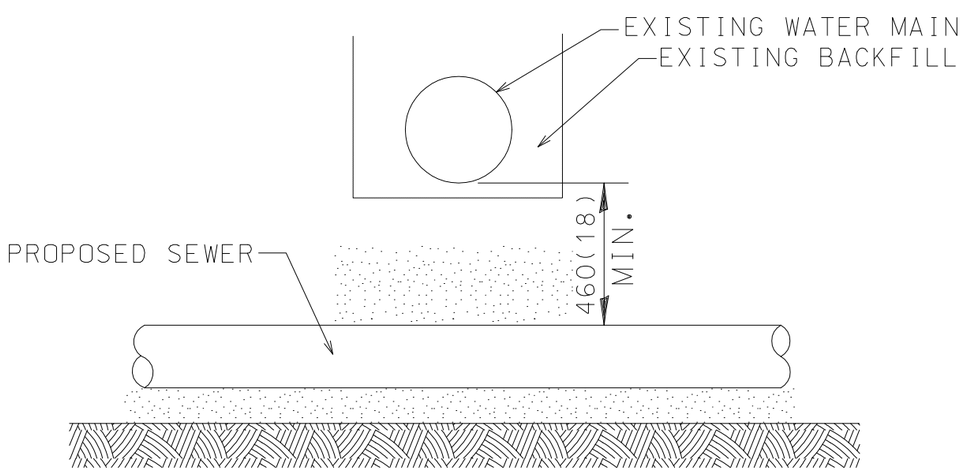
DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERT.)

STANDARD 8.081

SHEET
1 OF 1

PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH 460(18) MINIMUM VERTICAL SEPARATION

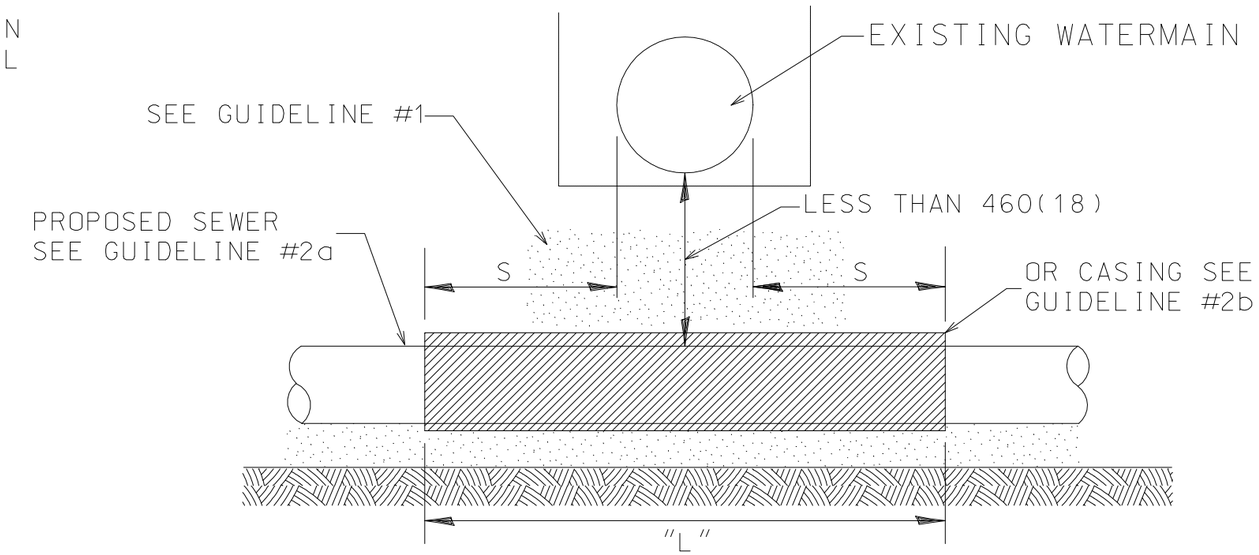


GUIDELINES

1. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

2. MAINTAIN 460(18) MIN. VERTICAL SEPARATION FOR 3.1m (10") HORIZONTALLY.

PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH LESS THAN 460(18) VERTICAL SEPARATION



NOTE: "S" THE LENGTH NECESSARY TO PROVIDE 3.1m(10') OF SEPARATION AS MEASURED PERPENDICULAR TO THE EXISTING WATER MAIN.

GUIDELINES

1. OMIT SELECT GRANULAR EMBEDMENT AND GRANULAR BACKFILL TO 300(12) OVER TOP OF SEWER AND USE SELECT EXCAVATED MATERIAL (CLASS IV) AND COMPACT FOR "S" ON EACH SIDE OF THE WATER MAIN.

2a. CONSTRUCT "L" OF PROPOSED SEWER OS WATER MAIN MATERIAL AND PRESSURE TEST, OR;

b. USE "L" OF WATER MAIN MATERIAL FOR CASING OF PROPOSED SEWER AND SEAL ENDS OF CASING.

3. POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR SEWER CASING AND WATER MAIN.

4. PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH.

All dimensions are in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

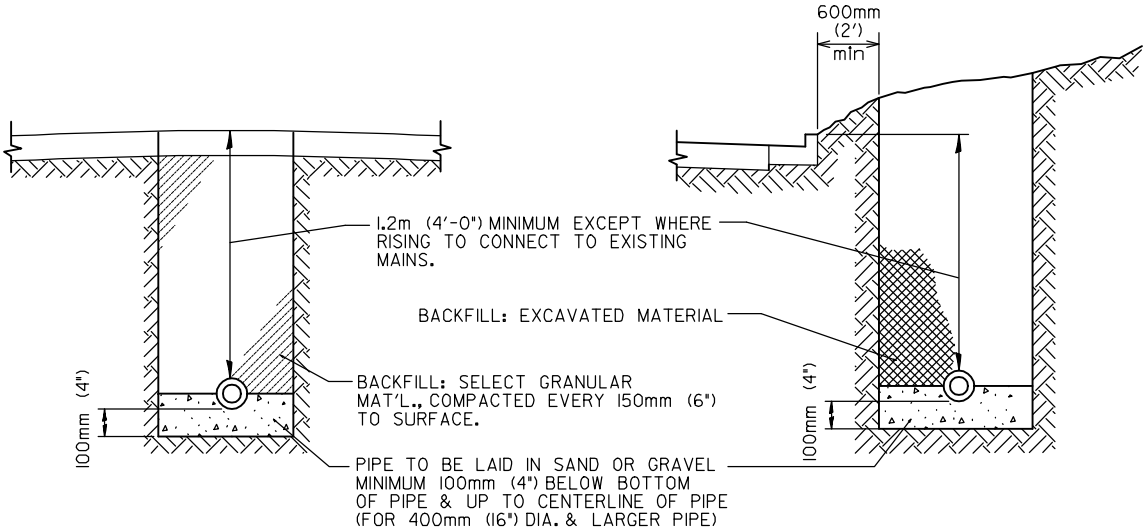
APPROVED BY :
DATE :

DESIGN BY : DOUG GROVESTEEN REVISED :

WATER & SEWER SEPARATION REQUIREMENTS (VERT.)

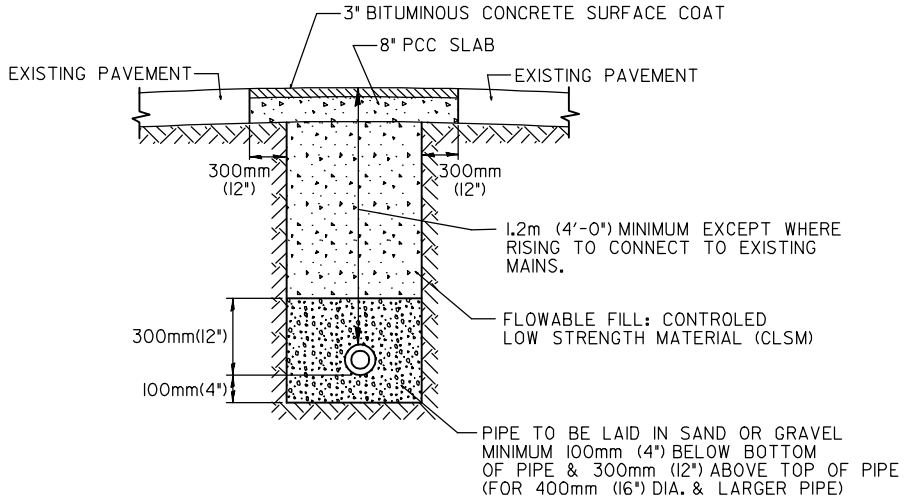
STANDARD 8.08J

SHEET
1 OF 1



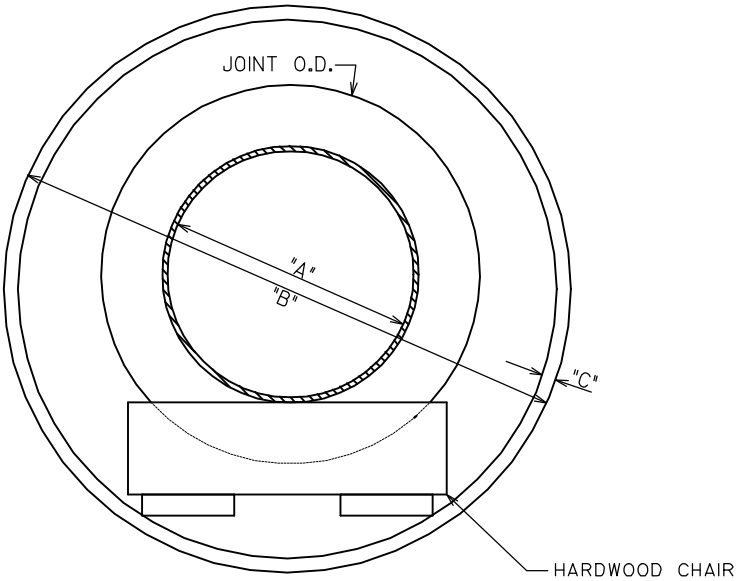
IN PAVEMENT, DRIVEWAYS AND SIDEWALKS

IN PARKWAY

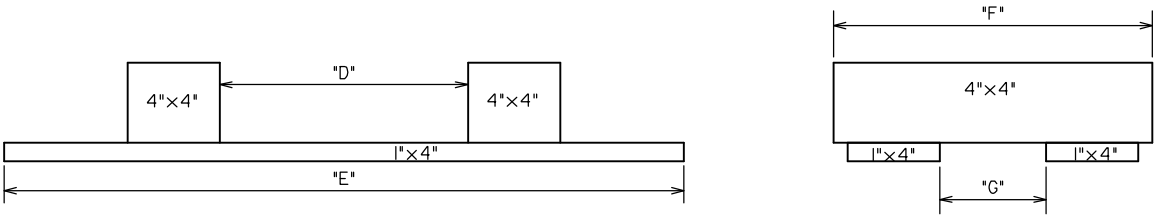


IN STATE AND US HIGHWAYS

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW PIPE COVER DETAILS **STANDARD 8.08K**	APPROVED BY : DATE :	**CITY OF BLOOMINGTON ENGINEERING DEPARTMENT**



CASING DETAIL
(NO SCALE)

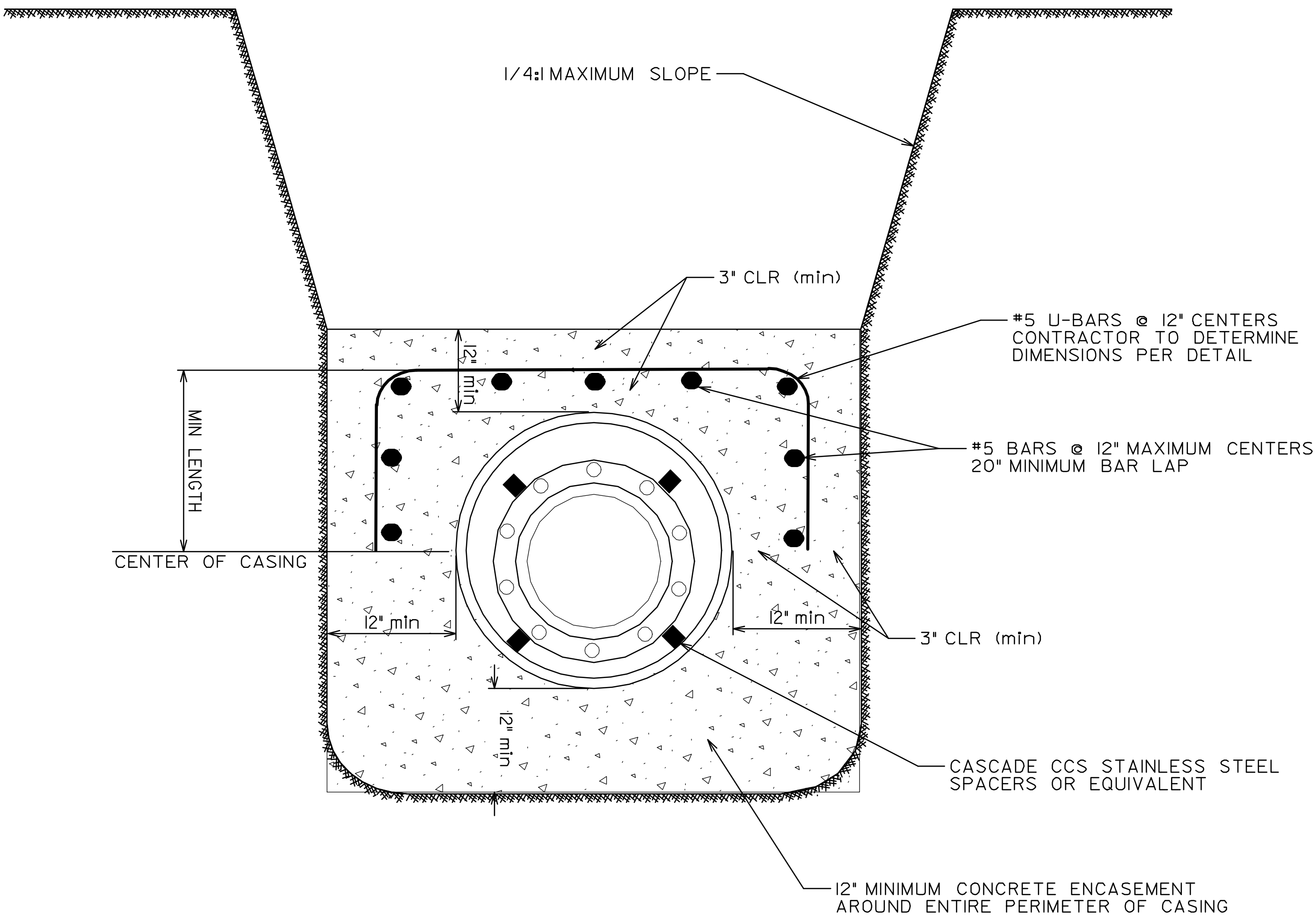


HARDWOOD CHAIR DETAIL
(NO SCALE)

"A" WATERMAIN I.D.
"B" CASING PIPE O.D. PER SPECIFICATIONS
"C" CASING PIPE THICKNESS PER SPECIFICATIONS
"D" = 12 INCHES (MINIMUM)
"E" = 24 INCHES (MINIMUM)
"F" = $\frac{1}{2}$(B)
"G" = F-8"

ALL LUMBER SHALL BE APPROVED HARDWOOD IN NOMINAL SIZES.

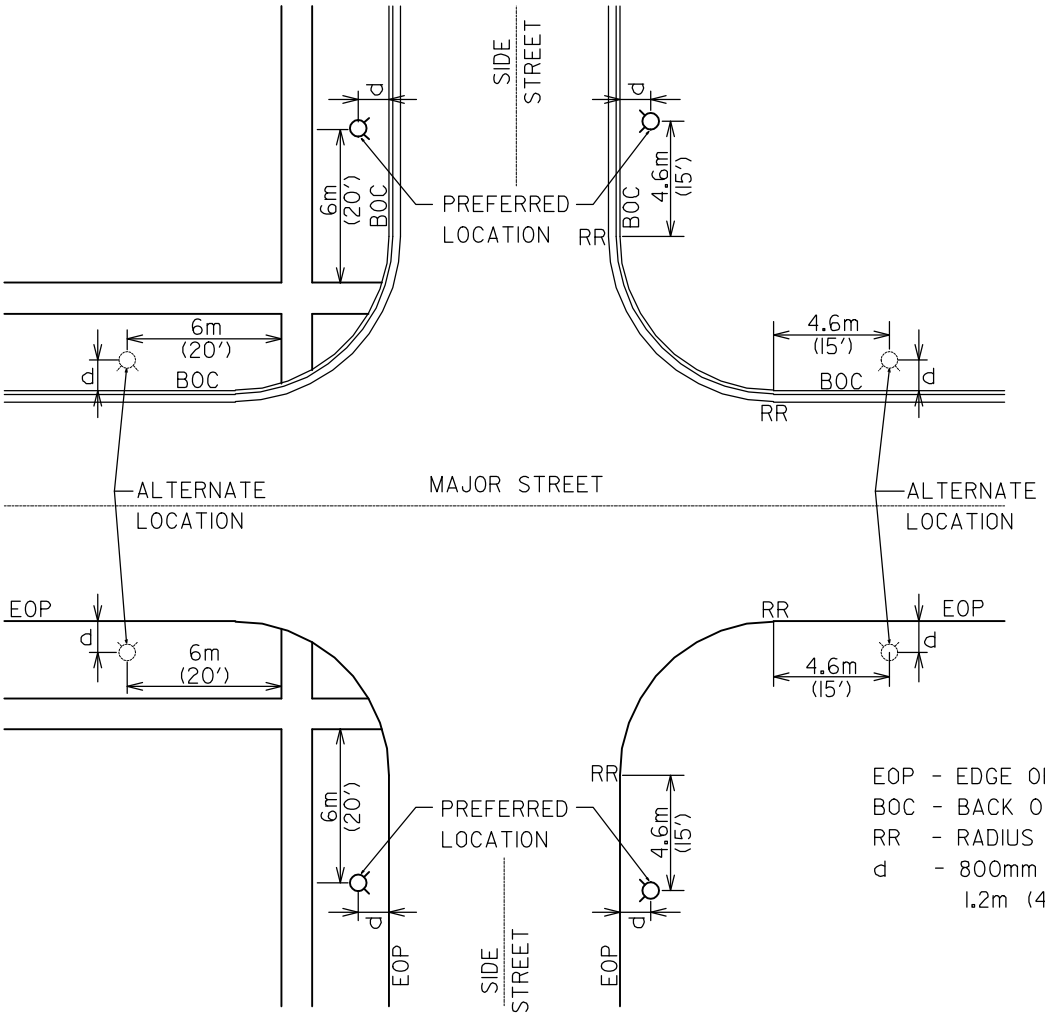
SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW HARDWOOD PIPE SUPPORT CHAIR **STANDARD 8.08L**	APPROVED BY: DGG DATE: 2-20-2003	**CITY OF BLOOMINGTON ENGINEERING DEPARTMENT**



CONCRETE ENCASEMENT DETAIL

(NO SCALE)

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW	APPROVED BY: DGG DATE: 2-20-2003	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	CONCRETE ENCASEMENT DETAIL		
	STANDARD 8.08M		



SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED: 2-20-2003 RCW TYPICAL HYDRANT LOCATION PLAN **STANDARD 8.08N**	APPROVED BY: DGG DATE: 2-20-2003	**CITY OF BLOOMINGTON ENGINEERING DEPARTMENT**

CHAPTER 9 - Design & Construction Standards for Street Lights

9.02 DESIGN STANDARDS

All developments shall be designed so that street lights are provided in such locations and in such manner as to do and accomplish the following:

A. Provides a street light at every cross or tee intersection and at the end of every cul-de-sac or eyebrow.

B. Provide such additional street lights as may be necessary to meet the following:

1. Minor Streets and Frontage Roads: so that street lights are not more than 75 m (250 feet) apart.

2. Arterial and Collector Streets: so as to provide a minimum average of one (1) candle -foot on the street surface.

C. Provide the type of luminaire as selected by the Director of Engineering and Water meeting the following height and lumination standards:

1. Minor Streets and Frontage Roads: A minimum 8,700 lumen High Pressure Sodium Vapor luminaire mounted at a minimum 7.5 m (25 foot) mounting height

2. Arterial and Collector Streets: A minimum 23,000 lumen High Pressure Sodium Vapor luminaire mounted at a minimum 9 m (30 foot) mounting height shall be utilized , including at all intersections of minor streets with arterial and collector streets.

D. In areas zoned R-1, R-2, R-3 and R-4, street lights may be affixed to wood or concrete poles. In all other zonings, street lights shall be attached to concrete poles.

E. In areas zoned R-1, R-3 and R-4, all wiring shall be underground; in areas zoned for business, commercial or manufacturing uses, underground wiring shall be provided where all other electrical wiring is underground.

F. Street Light Electric Service Fee - In areas where the local power company installs street lights in accordance with the Franchise agreement, upon filing for the final construction plan approval, the developer shall be required to pay the City a Street Light Electric Service Fee which will be computed based upon the actual estimated costs using historical data for similar installations.

G. Private Street Lights - All private street lights in a residential planned unit development shall meet City standards of illuminance.

H. Where street lights are privately owned or where the City has no agreement with the electric utility for street light installation, the developer shall be responsible for installing the street lights.

I. Street light cable shall be routed so as not to lie parallel and within five (5) feet of existing or proposed utilities such as gas mains, water mains, sanitary sewers, storm sewers, etc. or within two (2) feet of existing or proposed utilities such as power lines, telephone lines, cable television lines, etc.

9.03 RIGHT-OF-WAY & EASEMENT DEDICATIONS

All street lights shall be installed in public easements or dedicated public right-of-way. Such easements and rights-of-way shall be of sufficient width and the street lights and their required wiring shall be installed in such locations therein that will not reasonably interfere with other public utilities. Easements or rights- of-way shall have a minimum width of 3 m (10 feet).

9.04 SPECIFICATIONS & SPECIAL PROVISIONS

When street lights are to be owned and maintained by the City, the design and installation shall meet or exceed all applicable City of Bloomington, Illinois Commerce Commission and accepted industry standards, whichever imposes the more demanding requirement for the protection and preservation of the public health, safety and welfare.

A. All electrical cable shall conform to the applicable portions of Section 820, Article 1085.25 through Article 1085.27 of the Standard Specifications for Road and Bridge Construction in Illinois. Service cable from the power source to the pole(s) shall be a minimum of #8 AWG. Conductor sizes larger than #8 may be warranted to meet electrical codes. The designer shall verify conductor size requirements based on circuit load and service length. Conductors may be Aluminum or Copper, but all conductors on a given circuit shall be of like material. Cable may be installed by either direct bury or within conduit. Cable insulation shall meet electrical code requirements for the type of application.

B. Wood poles shall be class 5 or better and shall be in accordance with articles 1085.30(a) and 1085.30(f) of the Standard Specifications for Road and Bridge Construction in Illinois.

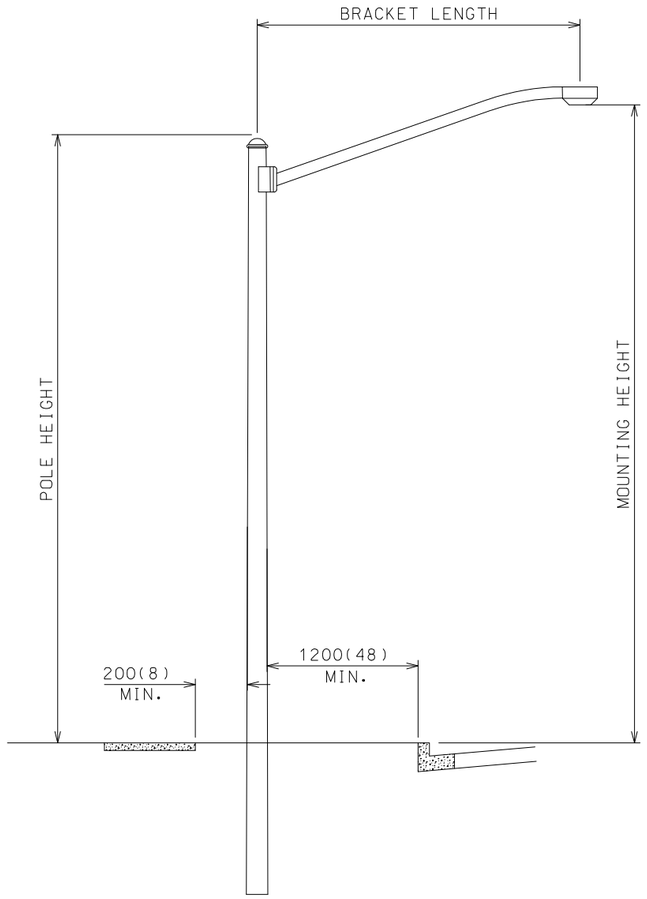
C. Concrete Poles shall be constructed of reinforced spun concrete and shall be of a hollow octagonal cross section. Concrete poles shall be designed in accordance with article 1085.30(a) of the Standard Specifications for Road and Bridge Construction in Illinois. Poles shall be capable of supporting a 34 kg (75lb) luminaire having an effective projected area of 0.15 m2 (1.6 sq. ft.) on a single bracket arm. Poles shall include a top cap, a handhole, and two cable exit holes in the base (with grommets). Handholes shall be located 450 mm (18 inches) above grade and oriented to be on the side of the pole away from the street. Handhole covers shall be fitted with tamper resistant screws.

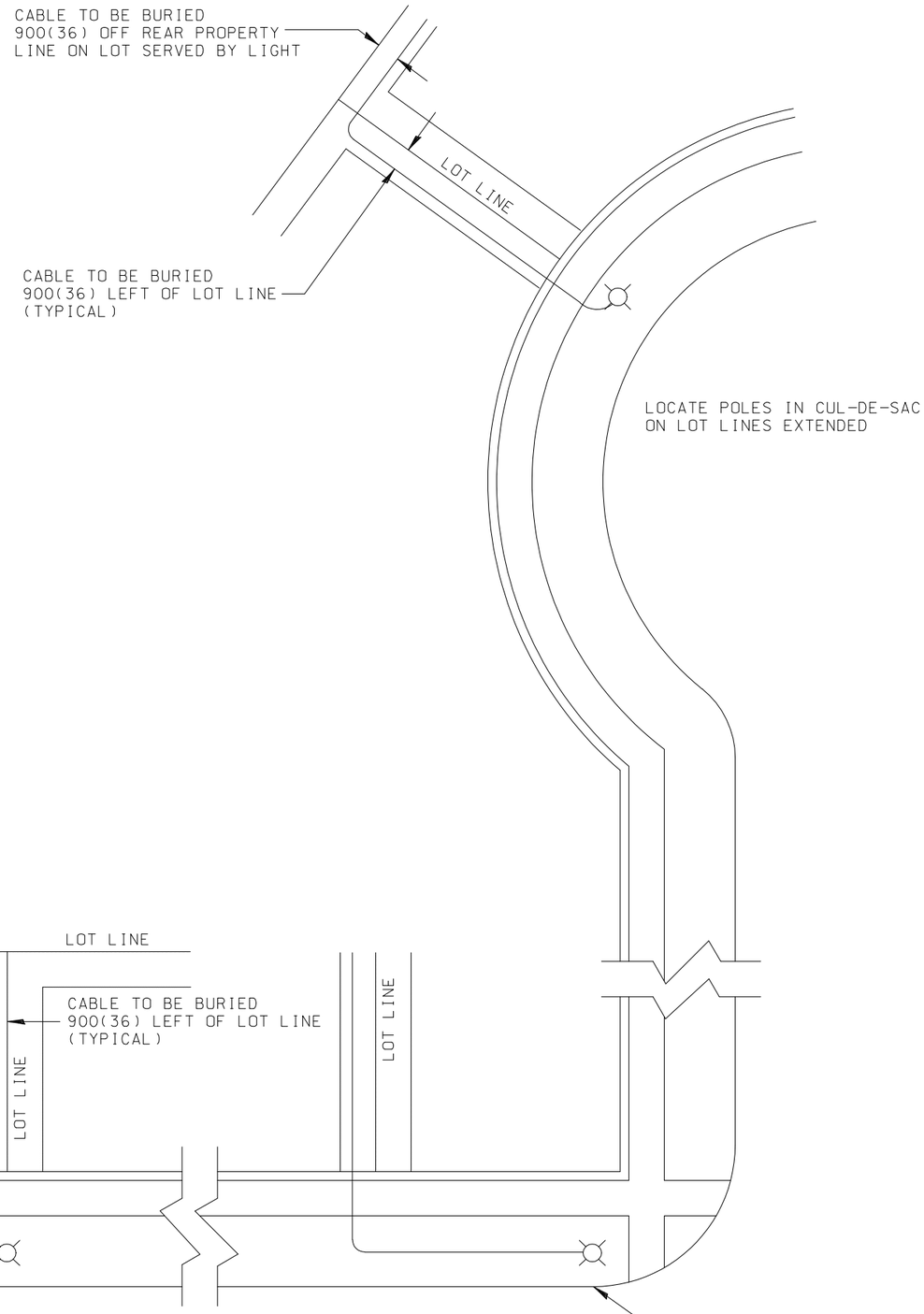
D. Luminaire bracket arm length shall be a minimum of 2.4 m (8 feet). Bracket arms shall be capable of supporting a 34 kg (75lb) luminaire having an effective projected area of 0.15 m^2 (1.6 sq. ft.).

E. Pole installation shall be in accordance with standard detail 9.05A. Poles of 9 m (30 foot) mounting height or less shall be buried in the ground according to the manufacturers recommendations, or a minimum of 1.5 m (5 feet), whichever is greater.

9.05 STANDARD DETAILS

STANDARD DRAWING NO.	TITLE
A	Typical Luminare Installation
B	Cable Trenching Details





All dimensions shown in millimeters (inches) unless otherwise shown.

CITY OF BLOOMINGTON
ENGINEERING DEPARTMENT

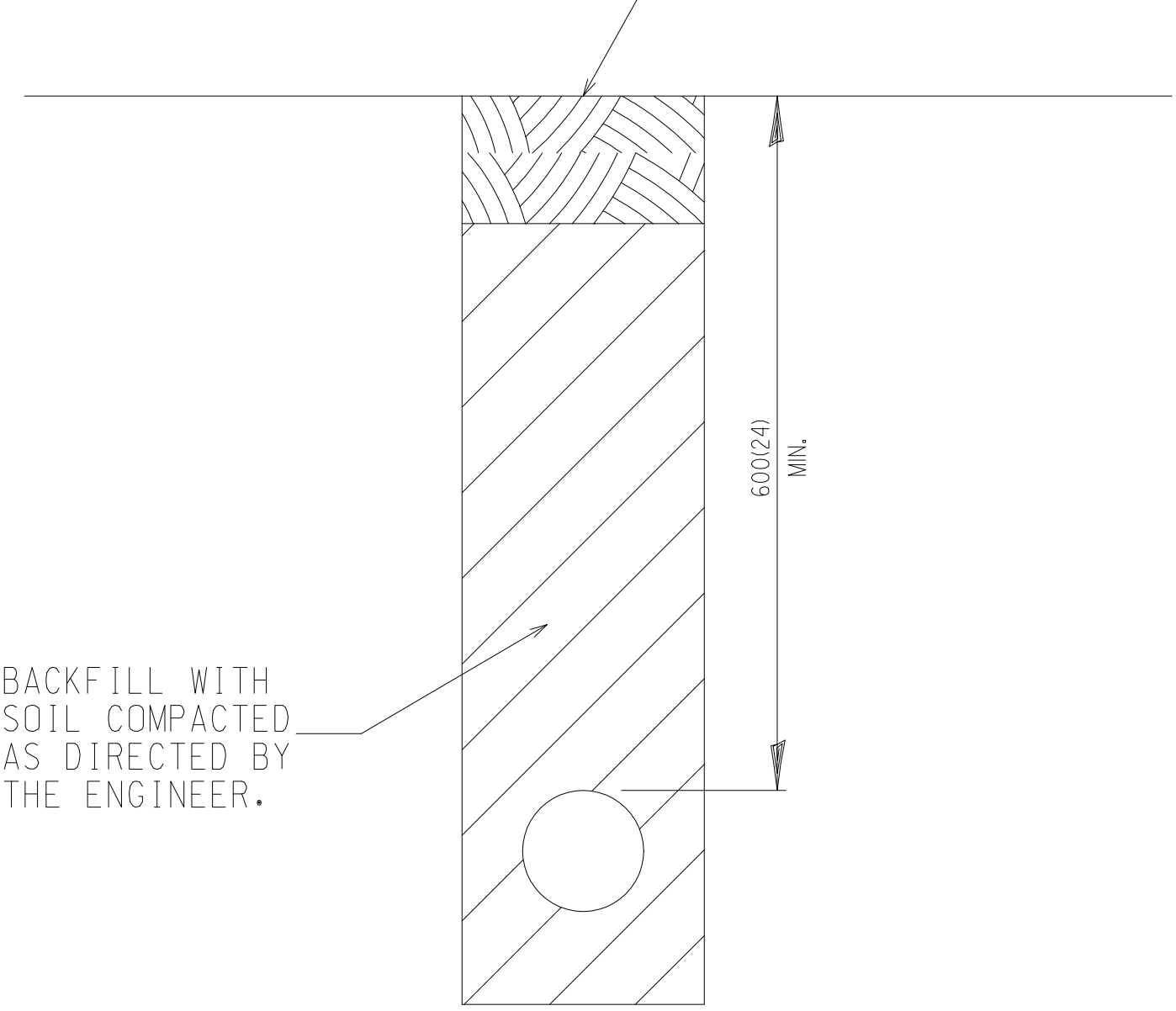
DESIGN BY : DOUG GROVESTEEN
REVISED :
APPROVED
DATE :

TYPICAL LUMINAIRE INSTALLATION

STANDARD 9.05A

SHEET
1 OF 1

SURFACE TO BE RESTORED TO ORIGINAL CONDITION
TO THE SATISFACTION OF THE ENGINEER.



CABLE TRENCHING DETAIL

NOT TO SCALE

All dimensions are in millimeters (inches)
unless otherwise shown.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED :	APPROVED BY : DATE :	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	CABLE TRENCHING DETAILS		
	STANDARD 9.05B		

CHAPTER 10 - Design & Construction Standards for Bridges & Culverts

10.01 INTRODUCTION

Where streets or roadways in or adjacent to property in a subdivision cross drainage ways, streams or creeks, or where bridges or culverts are otherwise proposed within the confines of a subdivision, or on the roadway adjacent thereto, they shall be designed and constructed in accordance with this chapter.

10.02 RIGHT-OF-WAY DEDICATION

Bridges and culverts shall be located in dedicated public right-of-way of sufficient width to permit the construction, operations, maintenance and replacement of the improvement within the confines of dedicated right-of-way without relocation or other unreasonable interference with other public utilities located therein.

10.03 DESIGN STANDARDS

A. Bridges and culverts shall be of width comparable to the abutting street or roadway, including sidewalks.

B. In the case of culverts or bridges over waterways, such crossing shall be of sufficient size to permit the volume of water reasonably expected from a 30-year storm frequency event on the area in the natural drainage area flowing into the stream for the natural drainage area as it currently exists or for that same area if it were developed to the types of uses and to the maximum density permitted by the then-existing City zoning ordinance with respect to property within the corporate limits of the City and the land use element of the Bloomington Comprehensive Plan for the areas outside the corporate limits whichever produces the greater flow. The designer shall submit hydraulic calculations documenting the expected backwater created by the structure for both the 30 year design storm and the 100 year storm event.

C. Bridges and culverts shall meet or exceed all applicable City, Illinois Department Natural Resources, Illinois Department of Transportation, other local, state and federal regulatory authorities and accepted industry standards with respect to the preservation and protection of the public health, safety and welfare. Should the City desire any of these improvements expanded or enlarged to meet anticipated growth, then the City shall pay for the increment due to the expansion, provided funds are available.

D. Bridges and Culverts over waterways shall be designed in accordance with the Illinois Department of Transportation, Bureau of Local Roads Administrative Policies.

10.04 CITY'S PARTICIPATION IN COST

A. Bridges And Culverts. Where installation of a bridge or culvert of a larger capacity or width than required to serve land owned by the developer is required by the City Council to serve future growth in the vicinity of the development, the developer shall pay for only his/her portion of the total cost of construction with the balance to be paid by the City, provided funds are available.

B. Engineering Costs. The developer will be responsible for all engineering costs for design of bridges and culverts within his/her development.

10.05 SPECIFICATIONS & SPECIAL PROVISIONS

All bridges and culverts shall be constructed in accordance with all applicable sections of the "Standard Specifications for Road and Bridge Construction", then current edition as modified, supplemented and amended by this Manual or by the Director of Engineering and Water.

CHAPTER 11 - Design & Construction Standards for Railroad Crossings

11.01 INTRODUCTION

Where streets or roadways in or adjacent to property in a subdivision cross a railroad line, or where a railroad line is otherwise proposed within the confines of a subdivision, or on the roadway adjacent thereto, it shall be designed and constructed in accordance with this chapter.

11.02 RIGHT-OF-WAY DEDICATION

Railroad crossings shall be located in dedicated public right-of-way of sufficient width to permit the construction, operations, maintenance and replacement of the improvement within the confines of dedicated right-of-way without relocation or other unreasonable interference with other public utilities located therein.

11.03 DESIGN STANDARDS

A. Railroad crossings shall be of width comparable to the abutting street or roadway including sidewalks.

B. Railroad crossings shall meet or exceed all applicable City, Illinois Department of Transportation, Illinois Commerce Commission, other local, state and federal regulatory authorities and accepted industry standards with respect to the preservation and protection of the public health, safety and welfare. Should the City desire any of these improvements expanded or enlarged to meet anticipated growth, then the City shall pay for the increment due to the expansion, provided funds are available.

CHAPTER 12 - Design & Construction Standards for Other Public Utilities

12.01 INTRODUCTION

All public and quasi- public utilities, including without limitation gas lines, electrical lines, telephone lines and cable TV transmission lines shall be located underground unless above ground installation is permitted by franchise agreement. All interior utilities within proposed residential subdivisions shall be underground.

12.02 EASEMENT & RIGHT-OF-WAY DEDICATION

Except for individual building or property services, utility lines shall be located in public easements or dedicated public right-of-way. Such easements or rights-of-way shall be of sufficient width and the utilities shall be installed at such locations therein as to permit open cut installation, maintenance and repair within the confines of the easement or right-of-way without relocation or other unreasonable interference with other public or quasi-public utilities located therein, provided that no permanent structures shall be placed over the easements or rights-of-way dedicated to the City. Fences and vegetative material may be placed on easements, but if it becomes necessary to repair or inspect the underlying utility, the fence or vegetative material may be removed, damaged or destroyed at the expense of the property owner. Under no circumstances will the City be responsible for the repair or replacement of anything placed upon an easement. The Staff will make every possible effort to notify property owners that items placed upon an easement need to be relocated or removed, with one notable exception, that is for emergency repairs.

12.03 DESIGN STANDARDS

A. Front yard electrical transformers shall not be located above ground in front yard easements or dedicated rights-of-way.

B. Side yard electrical transformers may be located above ground when the transformer is located behind the building setback line.

C. Easements or rights-of-way shall have a minimum width of 3 m (10 feet) plus 1.5 m (5 feet) for each additional utility to be provided.

12.04 SPECIFICATIONS & SPECIAL PROVISIONS

All utility installation shall conform with the applicable City, Illinois Commerce Commission regulatory authority or accepted industrial standards, whichever imposes the highest and most demanding requirements for the preservation and protection of the public health, safety and welfare. All Gas, Electric, Phone, and Cable TV lines shall be located 1.5 m (5 feet) away from water mains and sewers lines and 1.5 m (5 feet) away from water and sewer services.

CHAPTER 13 - Sedimentation and Erosion Control

13.01 INTRODUCTION

The intent of this section is to require erosion control and storm water practices that will reduce the amount of sediment and other pollutants leaving development sites, both during and after construction and reduce the impact of development on erosion in receiving streams. It is also the intent of the section to promote design and construction practices that 1) minimize ground disturbances during development; 2) that maintain natural drainage and; 3) provide storm water storage. Erosion, sediment, and storm water control measures are needed for the following reasons;

A. High rates of soil loss may occur from areas undergoing development for nonagricultural use including, but not limited to, the construction of dwelling units, commercial buildings, industrial plants, and public works.

B. The washing, blowing and falling of eroded soil across and upon roadways endangers the health and safety of users thereof be decreasing vision and reducing traction of road vehicles.

C. Soil erosion necessitates the costly repair of gullies, wash-outs, embankments, drainage structures, and stream banks.

D. Sediment from soil erosion can clog or reduce the flow and storage capacity of sewers, ponds, ditches, and streams.

E. Sediment and associated pollutants can pollute the waters of streams, ponds, lakes, and rivers, creating far reaching biological impacts to aquatic life and species dependent upon aquatic life.

F. Sediment limits the use of water and waterways for beneficial uses, including water supply, navigation, recreation, fishery resources, drainage, and flood control.

G. Development, if not controlled, causes increases in peak storm water runoff rates which can lead to increased stream bed and stream bank erosion and flooding in receiving streams.

H. Erosion and stream bank instability caused by altered stream flow rates due to development can create unsafe conditions, adverse environmental impacts, and other conditions that require costly repairs or preventative measures to protect private and public structures and facilities.

I. To meet the requirements of the Federal Water Pollution Control Act Amendments of 1972,1977, and subsequent amendments, commonly known as the Clean Water Act.

J. To comply with the City of Bloomington Storm Water Management Plan.

13.02 APPLICABILITY

A. No person shall commence or perform any clearing, grading, stripping, excavating, or filling of land which meets the following provisions unless an Erosion and Sediment Control Permit has first been obtained for that activity from the Engineering Department:

1. Any land disturbing activity (i.e., clearing, grading, stripping, excavating, fill, or any combination thereof) that will affect an area in excess of 5,000 square feet; or

2. Any land disturbing activity that will affect an area in excess of 1,000 square feet if the activity is within 25 feet of a lake, pond, stream, or wetland; or

3. Excavation, fill or any combination thereof that will exceed 100 cubic yards.

B. A permit shall not be required for any of the following provided that the person responsible for any such development shall implement necessary soil erosion and sediment control measures to satisfy the principles set forth in section 6.2 of Chapter 24 of City Code and in this Manual:

1. Excavation below final grade for the basement and footings of one (1) single family residence and appurtenant structures on a site in excess of five (5) acres, which disturbs less than one (1) acre of land, for which a building permit has been issued by the City. All properties which disturb greater than one (1) acre of land shall provide the City with a copy of all National Pollutant Discharge Elimination permits, a copy of the site Storm Water Pollution Prevention Plan and a site erosion control plan; or

2. Agricultural use of land including the implementation of conservation measures included in a farm conservation plan approved by the Soil and Water Conservation District, and including the construction of agricultural structures; or

3. Installation, renovation, or replacement of a septic system to serve an existing dwelling or structure.

C. The Director of Engineering reserves the right to require any nonagricultural, construction activity, regardless of land disturbance area or type of activity, to comply with these requirements if it is determined to be the cause of or a contributor to an existing or potential adverse erosion, sediment, or storm water impact.

D. Erosion Control Plan

1. An Erosion Control Plan is required for any activity which disturbs more than one acre in area. The Erosion Control plan shall be submitted and approved prior to the issuance of a permit.

2. For activities which disturb more than 5000 square feet but less than one acre (43,560 square feet) the party requesting the permit shall have the choice of either:
   A. Submitting a formal Erosion Control Plan or
   B. Providing perimeter erosion control around the entire perimeter of the disturbed area, excepting the entrance, in accordance with the details herein.

3. For any site one acre or larger in area, the Erosion Control Plan shall be prepared by a Licensed Professional Engineer or a Certified Professional in Erosion and Sediment Control.

4. The stabilized construction entrance must be installed prior to any grading or excavation work being performed and in accordance with standard details 1307-K1 and 1307-K2 or by an equivalent method approved by the Director of Engineering. Developers or builders performing any work at construction activities where the sewer and/or water services must be installed under the permanent drive may request permission to install the stabilized construction entrance after the sewer and/or water services are installed. Permission may be granted by the Director of Engineering or their appointee on a case by case basis.

13.03 STANDARDS FOR DESIGN AND MAINTENANCE OF CONTROL MEASURES FOR SOIL EROSION, SEDIMENT AND STORM WATER

A. Unless otherwise stated in section 13.04 of this Manual, all temporary sediment control measures shall be designed to control sediment from a development for a five (5) year frequency storm event.

B. Design standards for erosion and sediment control measure shall comply with provisions of this Manual of Practice and the "Illinois Urban Manual, A Technical Manual Designed for Urban Ecosystem Protection and Enhancement," Prepared by the United States Department of Agriculture - Natural Resources Conservation Service, as accepted by the Illinois Environmental Protection Agency, latest edition, and the Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control (the Green Book, issued by the Association of Illinois Soil and Water Conservation Districts) unless otherwise stated by this Manual. In the event of conflict between provisions of said manuals and of this ordinance, the following order of precedence procedure shall apply:

1. City of Bloomington Ordinances and A Manual of Practice For The Design of Public Improvements

2. Illinois Urban Manual (Blue Book).

3. Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control (Green Book)

13.04 EROSION, SEDIMENT, AND TEMPORARY STORM WATER CONTROL MEASURES

All inlets within the site and any effected inlets off-site shall be protected by one of the methods shown in the Inlet Protection Details included in this chapter (13.07-D, 13.07-E, 13.07-F, or 13.07-G) and in accordance with the approved Erosion Control Plan. On-site sediment control measures shall be constructed and functional prior to initiating clearing, grading, stripping, excavation or fill activities on the site as specified by the following criteria:

A. For disturbed areas draining one (1) acre or less, filter barriers (including filter fences, straw bales, or equivalent control measures) shall be constructed to control all runoff leaving the site as specified in this Manual and in the handbooks referenced in section 13.03-B. Vegetated filter strips, with a minimum width of 25 feet, may be used as an alternative only with the permission of the Director of Engineering where runoff in sheet flow is expected. Perimeter Barrier consisting of Silt Fence or Straw Bales shall be in accordance with the Perimeter Barrier Details included in this chapter (13.07-A1 & 13.07-A2, 13.07-B1 & 13.07-B2, or 13.07-C). Construction Entrances shall be stabilized in accordance with the Stabilized Construction Entrance Details included in this chapter (13.07-K1 & 13.07-K2).

B. For disturbed areas draining more than one (1) acre but less than or equal to five (5) acres, in addition to the requirements in "A" above, a sediment trap(s) or equivalent control measure(s), in accordance with the approved Erosion Control Plan, shall be constructed at all downslope point(s) of the disturbed area.

C. For disturbed areas draining more than 5 acres, in addition to the requirements of "A" and "B" above, sediment basin(s) or equivalent control measure(s) shall be constructed at the downslope point(s) of the disturbed area.

D. Sediment basins and sediment traps designs may provide for both detention storage and sediment storage. Sediment basins and sediment traps shall be sized for the 2-year, 24-hour runoff from the site under maximum runoff conditions during construction. The release rate of the sediment basin shall be that rate required to achieve minimum detention times of at least 8 hours.

E. The sediment storage shall be sized to store the estimated sediment load generated from the site over the duration of the construction period with a minimum storage equivalent to the volume of sediment generated in one year. For construction periods exceeding 1 year, the 1-year sediment load and a sediment removal schedule may be substituted.

F. Storm water conveyance channels, including ditches, swales, and diversions, and the outlets of all channels and pipes shall be designed and constructed to withstand the expected flow velocity from the 10-year frequency storm without erosion. All constructed or modified channels shall be stabilized within 48 hours, consistent with the following standards:

1. For grades up to 4 percent, seeding in combination with mulch, erosion blanket, or an equivalent control measure shall be applied. Sod or erosion blanket or mat shall be applied to the bottom of the channel (unless a continuous flow of water is present).

2. For grades of 4 to 8 percent, sod or an equivalent control measure shall be applied in the channel.

3. For grades greater than 8 percent, rock, riprap, or an equivalent control measure shall be applied, or the grade shall be effectively reduced using drop structures. Ditch checks, shall be constructed in accordance with the Ditch Check Details included in this chapter (13.07-H, 13.07-I, or 13.07-J) and in accordance with the approved Erosion Control Plan. Straw bale ditch checks shall not be allowed.

G. Disturbed areas shall be stabilized with temporary or permanent measures within 7 calendar days following the end of active disturbance, or re-disturbance, consistent with the following criteria, weather conditions permitting.

1. Appropriate temporary or permanent stabilization measures shall include seeding, mulching, sodding, and/or non-vegetative measures.

2. Areas having slopes 25 percent or greater shall be stabilized with sod, mat or blanket in combination with seeding, or equivalent.

H. Land disturbance activities in stream channels with permanent or semi-permanent flow shall be avoided, where possible. If disturbance activities are unavoidable, the following requirements shall be met:

1. Construction vehicles shall be kept out of the stream channel to the maximum extent practicable. Where construction crossings are necessary, temporary crossings shall be constructed of non-erosive material, such as riprap or gravel.

2. The time and area of disturbance of stream channels shall be kept to a minimum. The stream channel, including bed and banks, shall be restabilized within 48 hours after channel disturbance is completed, interrupted, or stopped.

3. Whenever channel relocation is necessary, the new channel shall, where possible, be constructed in the dry and fully stabilized before flow is diverted.

I. Storm sewer inlets and culverts shall be protected by sediment traps or filter barriers in accordance with the Pipe Outlet Details included in this chapter (13.07-L or 13.07-M) and the Inlet Protection Details included in this chapter (13.07-D, 13.07-E, 13.07-F, or 13.07-G) and in accordance with the approved Erosion Control Plan.

J. Soil storage piles containing more than 10 cubic yards of material shall not be located with a downslope drainage length of less than 15 feet to a roadway or drainage channel. Filter barriers, including straw bales, filter fence, or equivalent, shall be installed immediately on the downslope side of the piles.

K. If dewatering devices are used, discharge locations shall be protected from erosion. All pumped discharges shall be routed through appropriately designed sediment traps or basins, or equivalent.

L. Each site shall have graveled (or equivalent) entrance roads, access drives, and parking areas of sufficient length and width to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by shoveling or street cleaning (not flushing) before the end of each workday. Any tracked material causing a hazard on a public or private road shall be removed (as defined above) immediately.

M. All temporary and permanent erosion and sediment control practices must be maintained and repaired as needed to assure effective performance of their intended function until permanent ground surface protection and permanent storm water control measures are established.

N. All temporary erosion and sediment control measures shall be disposed of within 30 days after final site stabilization is achieved with permanent soil stabilization measures. Trapped sediment and other disturbed soils resulting from the disposition of temporary measures should be permanently stabilized to prevent further erosion and sedimentation.

O. The Director of Engineering may require additional control measures as necessary after site inspection if sedimentation controls are not functioning properly.

P. A performance guarantee will be required for erosion, sediment, and storm water control measures.

13.05 TEMPORARY SEEDING

All disturbed areas including lots not anticipating further construction within fourteen (14) days shall have ground surface seeded within seven (7) days, weather and soil conditions permitting in accordance with Illinois Urban Manual Practice Standard 965. Where the initiation of stabilization measures by the 14th day after construction activity temporarily cease is precluded by snow cover, stabilization measures shall be initiated as soon as possible.

13.06 PERMANENT SEEDING

Within seven (7) days after completion of construction and soil conditions are suitable, and before final inspection, the development must have permanent seeding or other ground cover planted or installed. Where the initiation of stabilization measures by the 7th day after construction activity temporarily cease is precluded by snow cover, stabilization measures shall be initiated as soon as possible. Public improvements will not be accepted until all public right-of-ways and all other areas (not under construction) have permanent seeding established.

Final plat public improvement payment, performance and workmanship bonds will not be released except in accordance with Section 24-3.9 of the City Code until all public right-of-ways and all other areas (not under construction) have permanent seeding established.

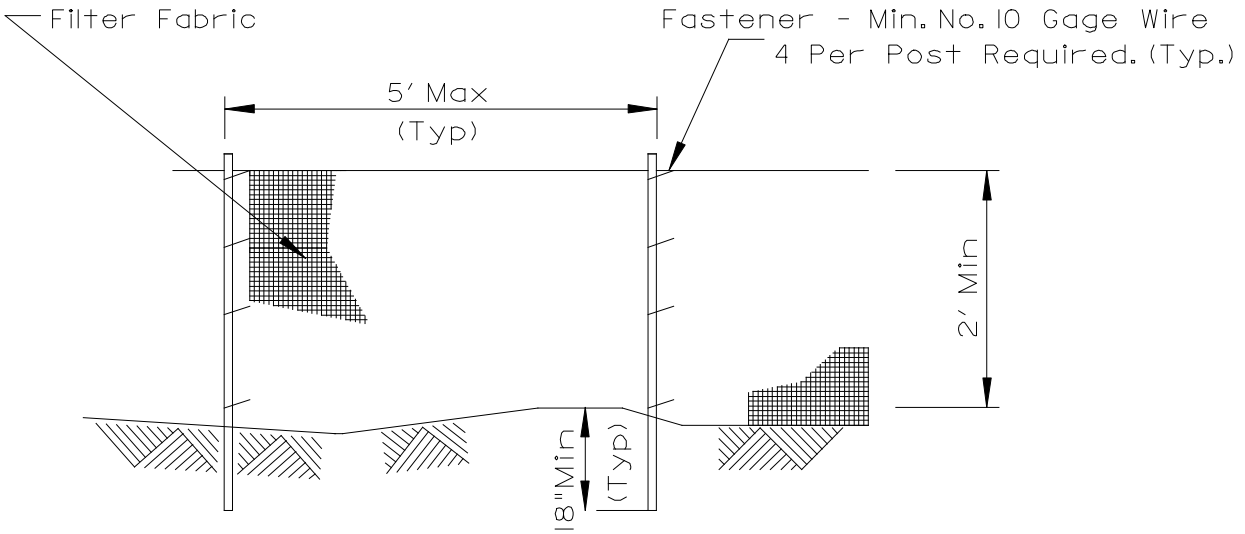
Permanent seeding shall be in accordance with Illinois Urban Manual Practice Standard 880. Seed mixtures shall be as follows:

	Seeding Rate		
Seed Mixture	lbs/ac	lbs/1000 sq. ft.	Use
Kentucky blue grass (use at least 3 varieties)	110-130	2.5 - 3.0	adjacent to residential properties
Kentucky blue grass	110	2.5	ditches and nonresi-
Red fescue	44	1.0	dential areas

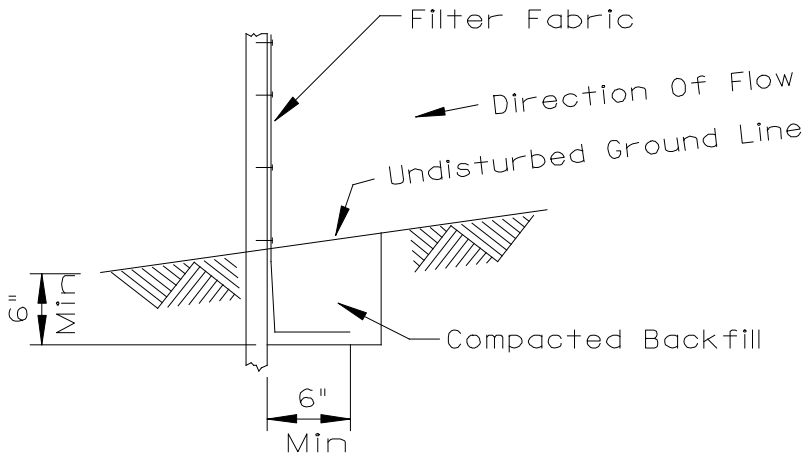
13.07 STANDARD DETAILS

Standard Drawing No.	Title
13.07-A1 & 13.07-A2	Perimeter Barrier - Silt Fence
13.07-B1 & 13.07-B2	Perimeter Barrier - Silt Fence with Wire Support
13.07-C	Perimeter Barrier - Straw Bale
13.07-D	Inlet Protection - Block and Gravel
13.07-E	Inlet Protection - Fabric Drop
13.07-F	Inlet Protection - Gravel and Wire Mesh
13.07-G	Inlet Protection - Straw Bale Barrier
13.07-H	Rock Ditch Check - Coarse Aggregate
13.07-I	Rock Ditch Check - Rip rap
13.07-J	Silt Fence Ditch Check
13.07-K1 and 13.07-K2	Stabilized Construction Entrance
13.07-L	Pipe Outlet to Flat Area
13.07-M	Pipe Outlet to Channel

PERIMETER BARRIER - SILT FENCE DETAIL



ELEVATION



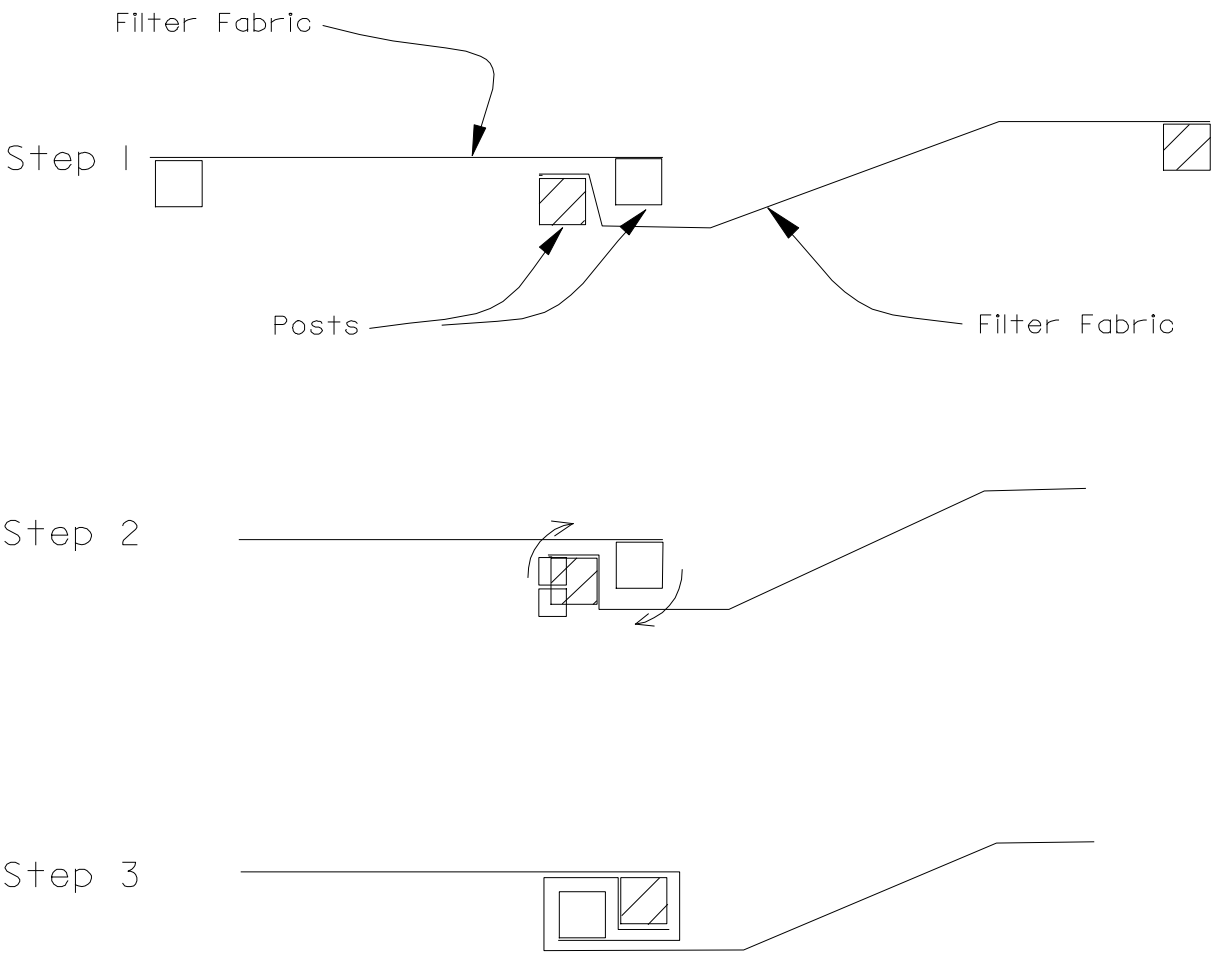
FABRIC ANCHOR DETAIL

NOTES:

1. Temporary sediment fence shall be installed prior to any grading work in the area to be protected. They shall be maintained throughout the construction period and removed in conjunction with the final grading and site stabilization.
2. Filter fabric shall meet the requirements of material specification 592 Geotextile Table 1 or 2, Class I with equivalent opening size of at least 30 for nonwoven and 50 for woven.
3. Fence posts shall be either standard steel post or wood post with a minimum cross-sectional area of 3.0 sq. in.

SHEET 1 OF 2	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	PERIMETER BARRIER - SILT FENCE			
	STANDARD DETAIL: 13.07-A1			

PERIMETER BARRIER - SILT FENCE DETAIL

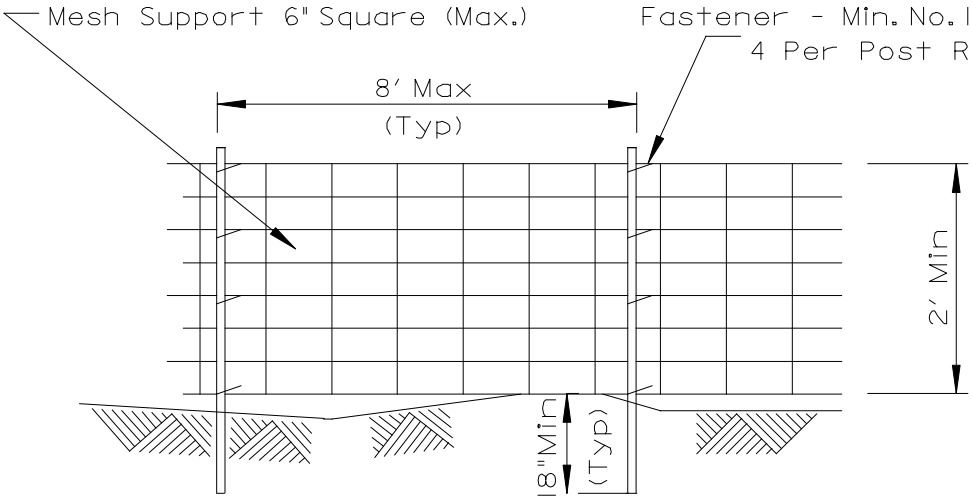


ATTACHING TWO SILT FENCES

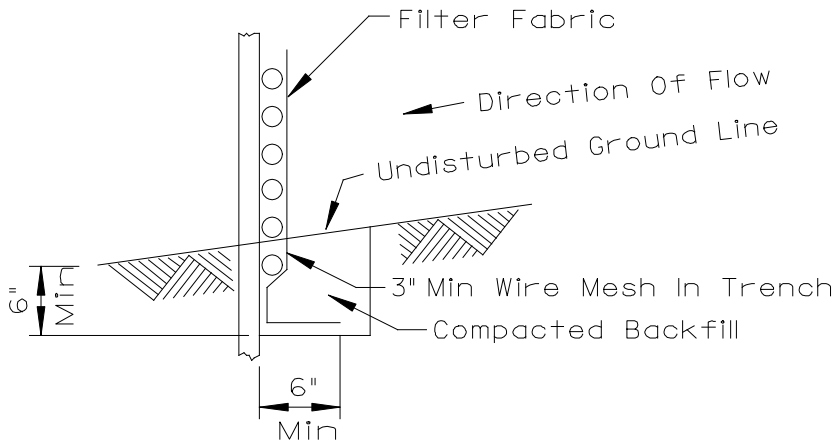
NOTES:
1. Place the end post of the second fence inside the end post of the first fence.
2. Rotate both posts at least 180 degrees in a clockwise direction to create a tight seal with the fabric material.
3. Drive both posts a minimum of 18 inches into the ground and bury the flap.

DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
PERIMETER BARRIER - SILT FENCE			
STANDARD DETAIL: 13.07-A2			

PERIMETER BARRIER - SILT FENCE WITH WIRE SUPPORT DETAIL



ELEVATION



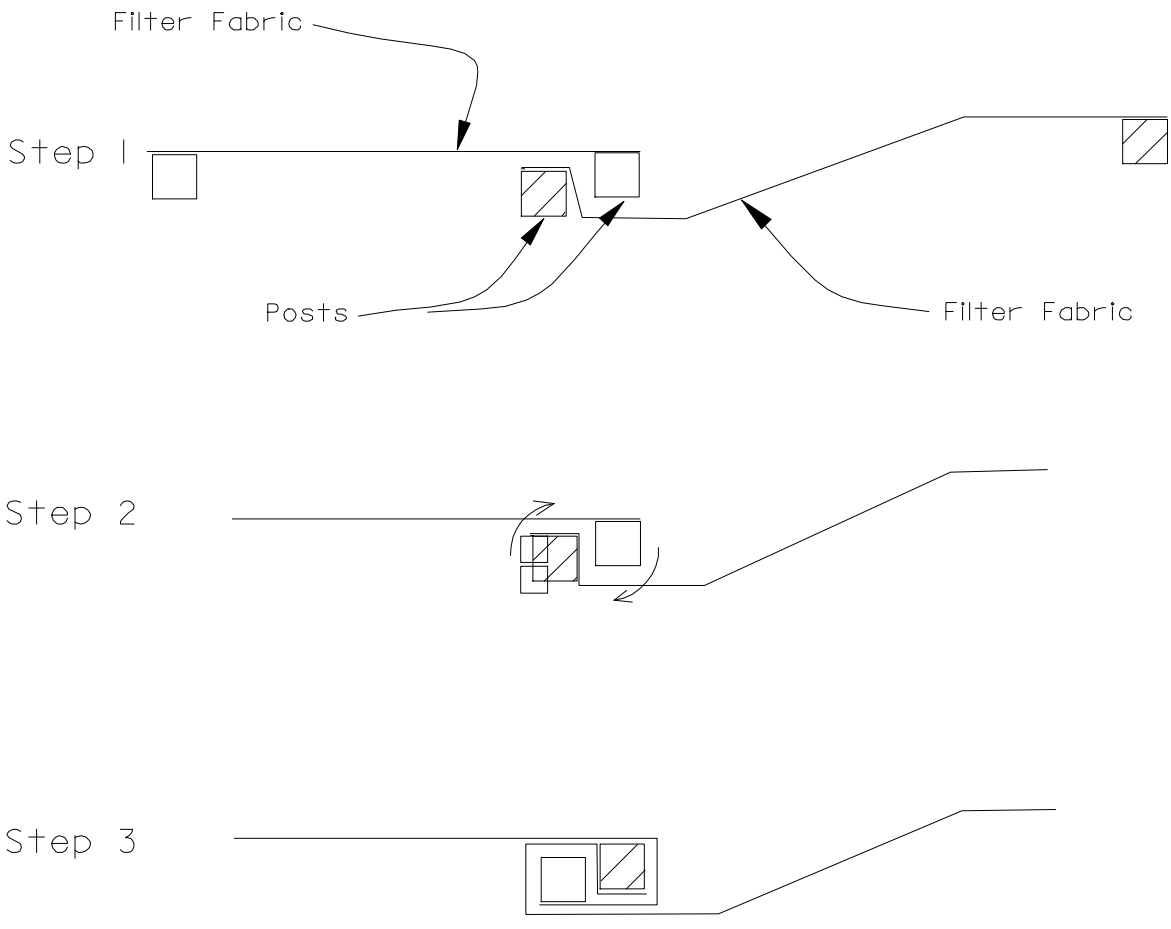
FABRIC ANCHOR DETAIL

NOTES:

1. Wires of mesh support shall be min. gage no. 12.
2. Temporary sediment fence shall be installed prior to any grading work in the area to be protected. They shall be maintained throughout the construction period and removed in conjunction with the final grading and site stabilization.
3. Filter fabric shall meet the requirements of material specification 592 Geotextile Table 1 or 2, Class I with equivalent opening size of at least 30 for nonwoven and 50 for woven.
4. Fence posts shall be either standard steel post or wood post with a minimum cross-sectional area of 3.0 sq. in.

DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
PERIMETER BARRIER SILT FENCE WITH WIRE			
STANDARD DETAIL: 13.07-B1			

PERIMETER BARRIER - SILT FENCE WITH WIRE SUPPORT DETAIL

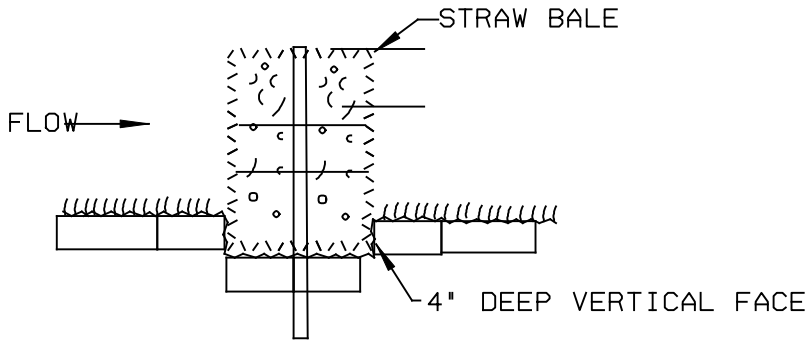


ATTACHING TWO SILT FENCES

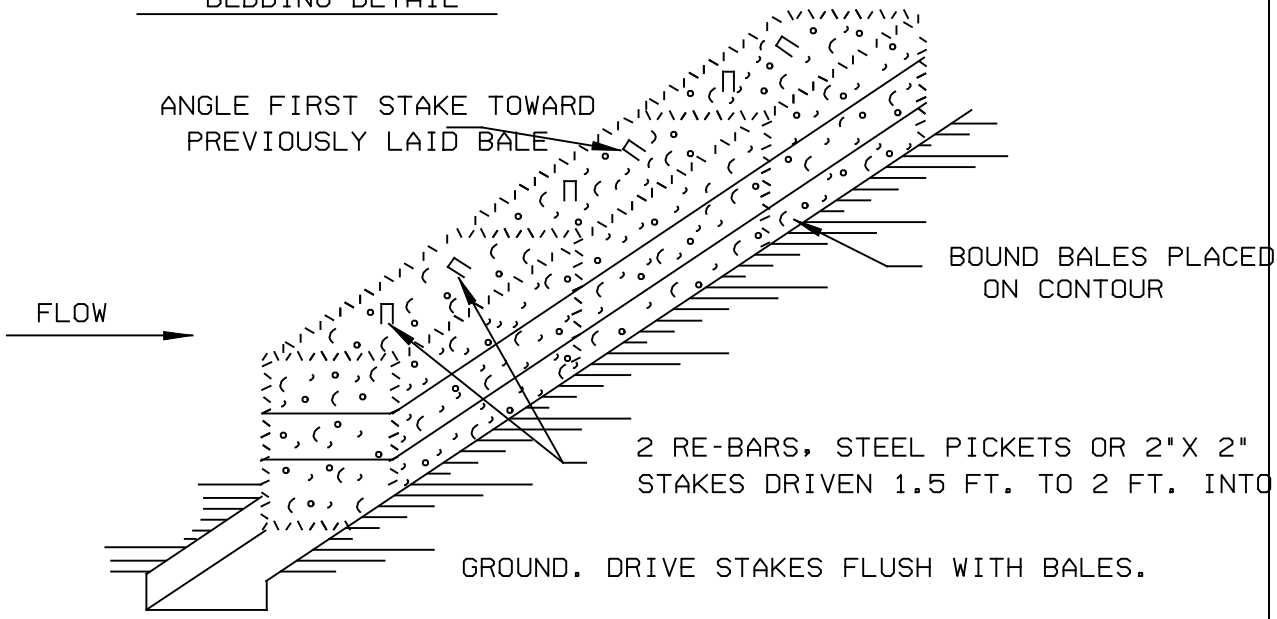
NOTES:
1. Place the end post of the second fence inside the end post of the first fence.
2. Rotate both posts at least 180 degrees in a clockwise direction to create a tight seal with the fabric material.
3. Drive both posts a minimum of 18 inches into the ground and bury the flap.

DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
PERIMETER BARRIER SILT FENCE WITH WIRE			
STANDARD DETAIL: 13.07-B2			

PERIMETER BARRIER - STRAW BALE DETAIL



BEDDING DETAIL



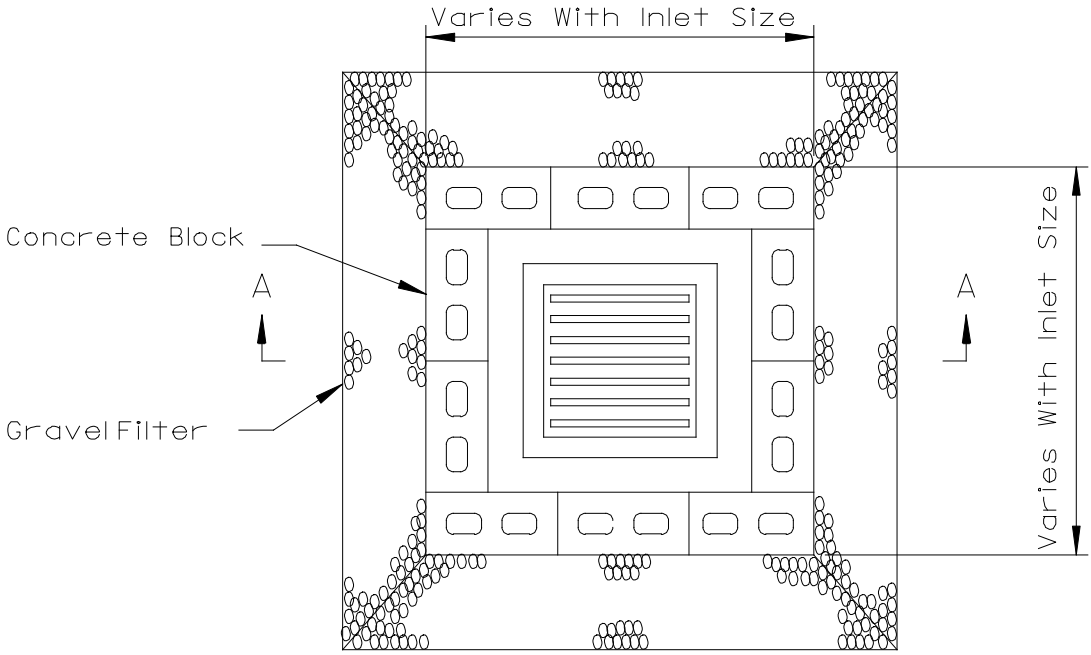
ANCHORING DETAIL

NOTES

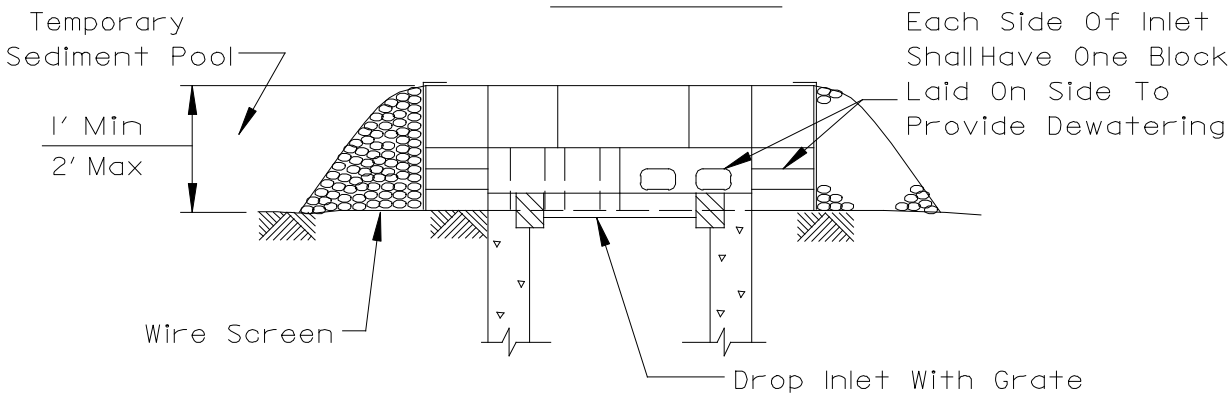
1. BALES SHALL BE PLACED AT THE TOP OF SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4", AND PLACED SO THAT BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

SHEET 1 OF 1	DESIGN BY: DOUG GROVESTEEN APPROVED: 5/23/2003	REVISED: BY: DATE:	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	PERIMETER BARRIER - STRAW BALES			
	STANDARD DETAIL: 13.Ø7-C			

INLET PROTECTION DETAIL - BLOCK AND GRAVEL



PLAN VIEW



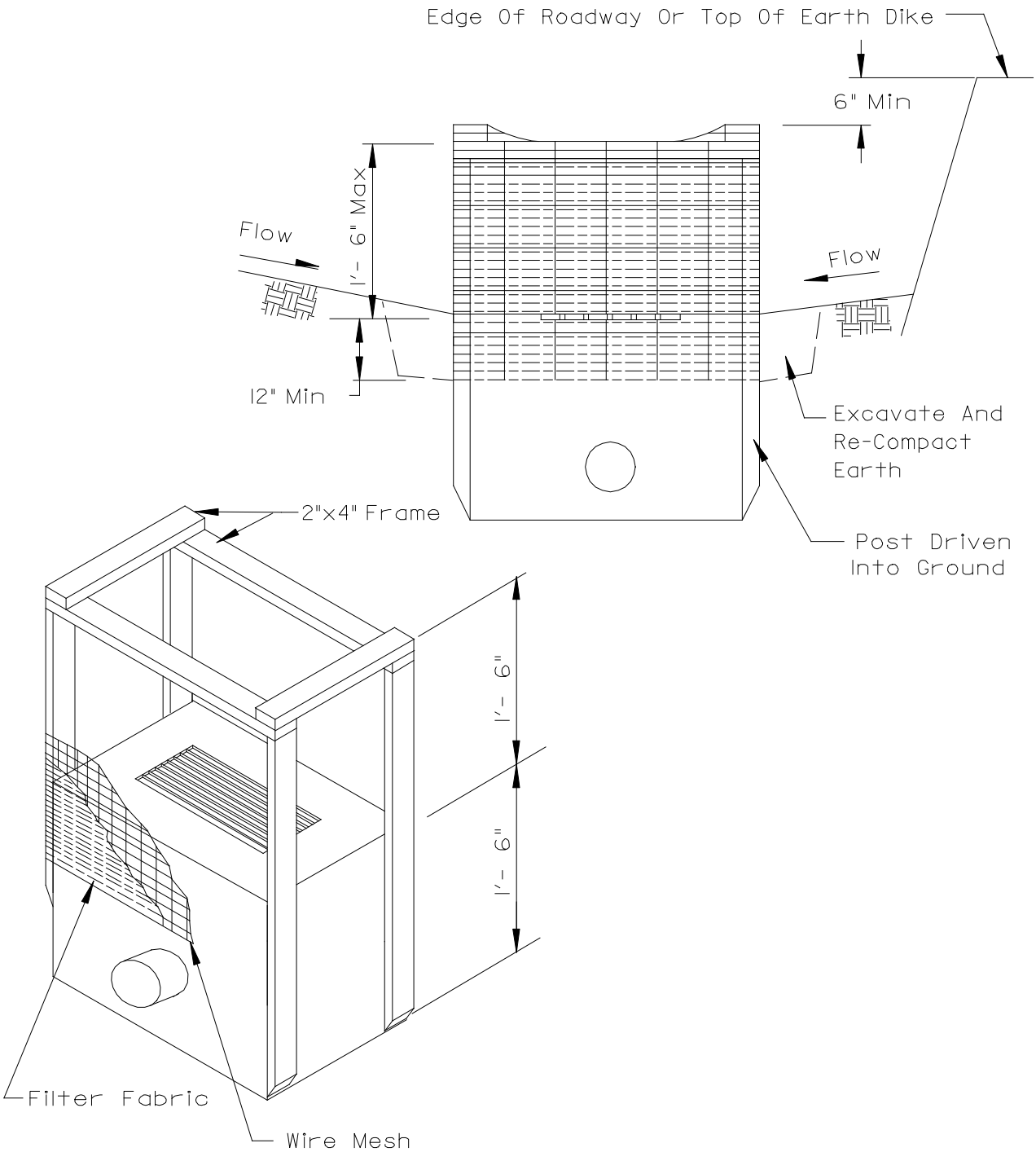
SECTION A-A

NOTES:

1. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to 1/2 the design depth. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.
2. The sediment trap shall be removed and the area stabilized when the constructed drainage area has been properly stabilized.
3. The wire screen shall be hardware cloth or comparable wire wesh with 1/2 inch openings.
4. The gravel shall meet requirements for coarse aggregate with IDOT gradations of CA-1, CA-2 or CA-3.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	INLET PROTECTION - BLOCK AND GRAVEL			
	STANDARD DETAIL: 13.07-D			

INLET PROTECTION DETAIL - FABRIC DROP

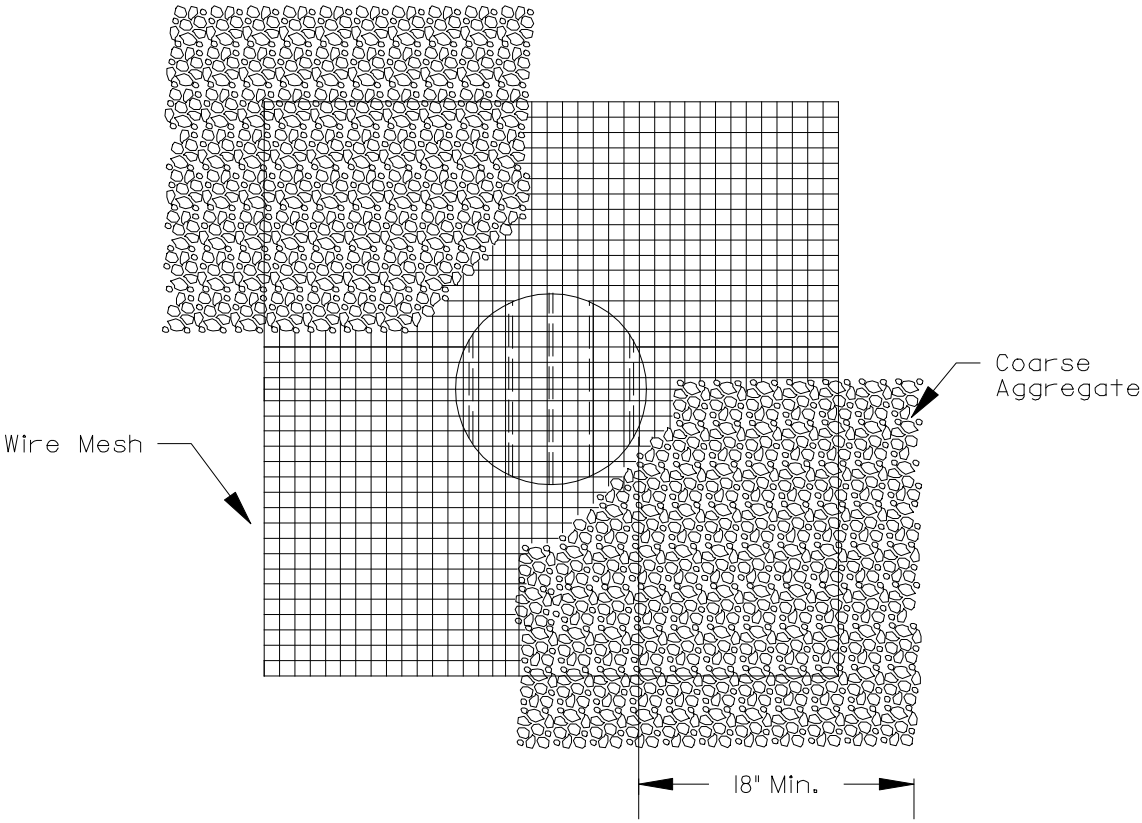


NOTES:

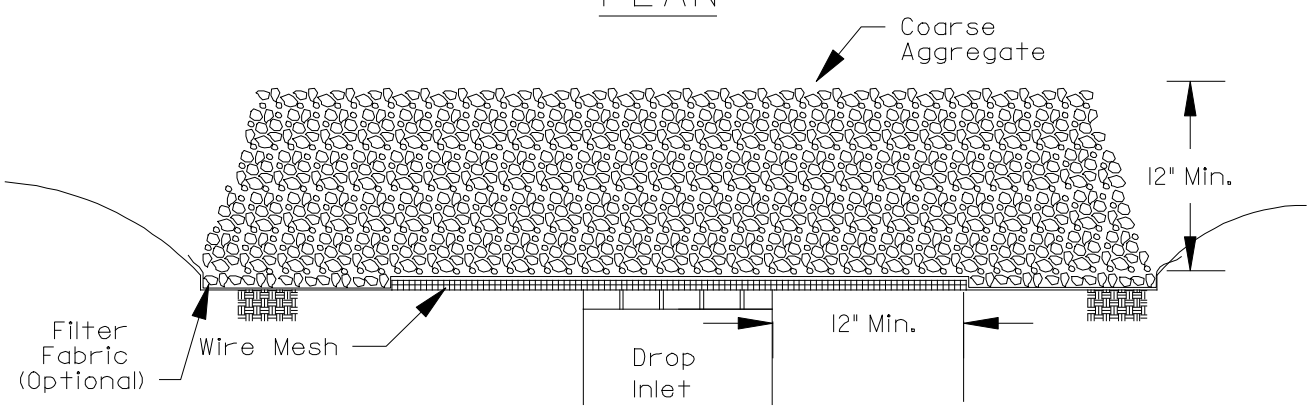
1. Filter fabric shall meet the requirement of material specification 592 GEOTEXTILE table 1 or 2, class I, with an EOS of at least 30 for nonwoven and 50 for woven.
2. The wire mesh shall have a maximum opening of at least 6 inches.
3. Limit drainage area to the inlet protection to 1 acre.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	INLET PROTECTION - FABRIC DROP			
	STANDARD DETAIL: 13.07-E			

INLET PROTECTION DETAIL
GRAVEL AND WIRE MESH



PLAN

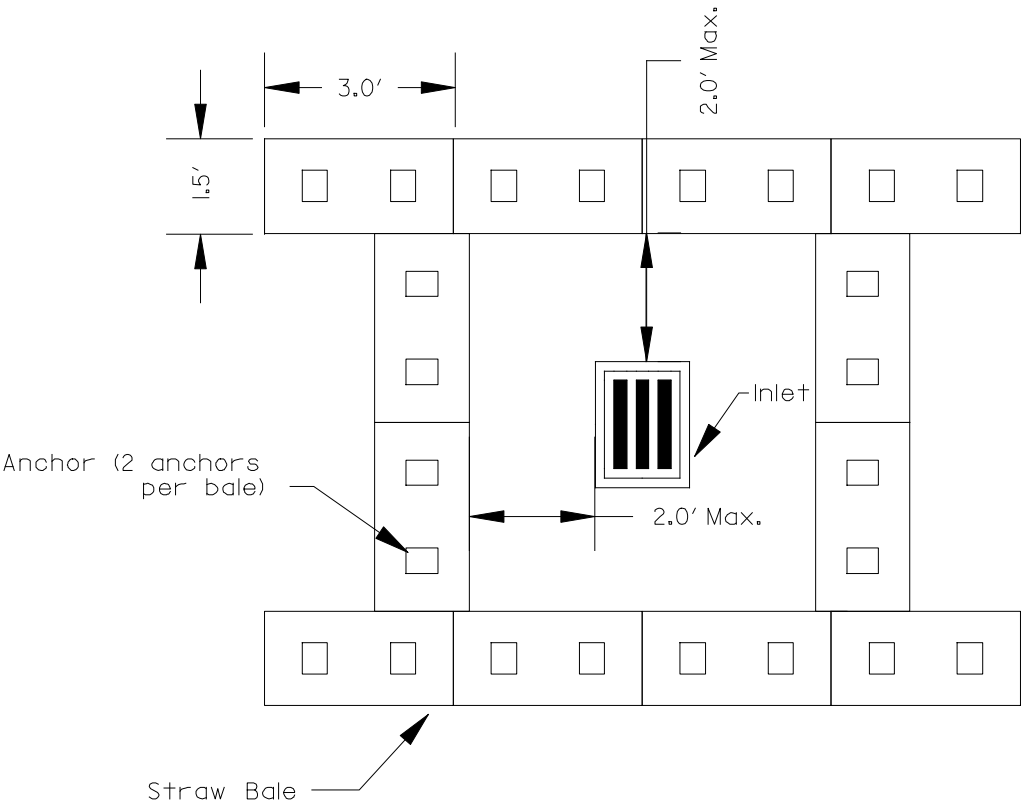


SECTION

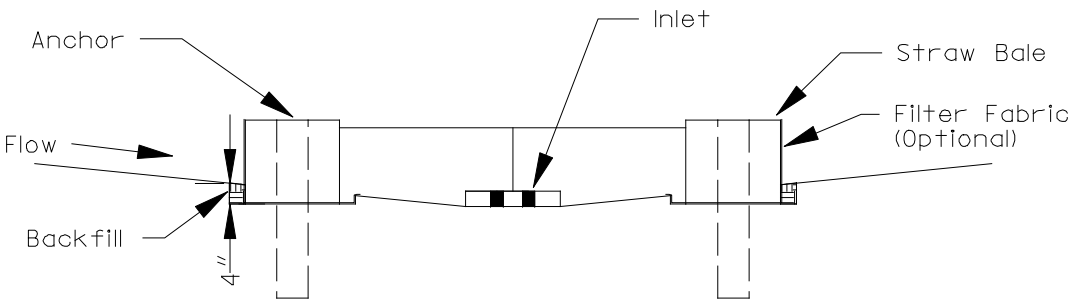
NOTES:
1. Hardware cloth or comparable wire mesh must have a maximum of ½ inch openings.
2. Hardware cloth or wire mesh must extend a minimum of 12 inches beyond each side of the inlet opening; if more than one strip of mesh is necessary, strips shall be overlapped a minimum of 6 inches.
3. Coarse aggregate shall meet one of the IDOT gradations CA-1 or CA-3. CA-2 can be used when filter fabric is used.
4. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE Table 1 or 2, Class 1 with AOS of at least 30 for nonwoven and 50 for woven.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	INLET PROTECTION - GRAVEL AND WIRE			
	STANDARD DETAIL: 13.07-F			

INLET PROTECTION DETAIL
STRAW BALE BARRIER



PLAN

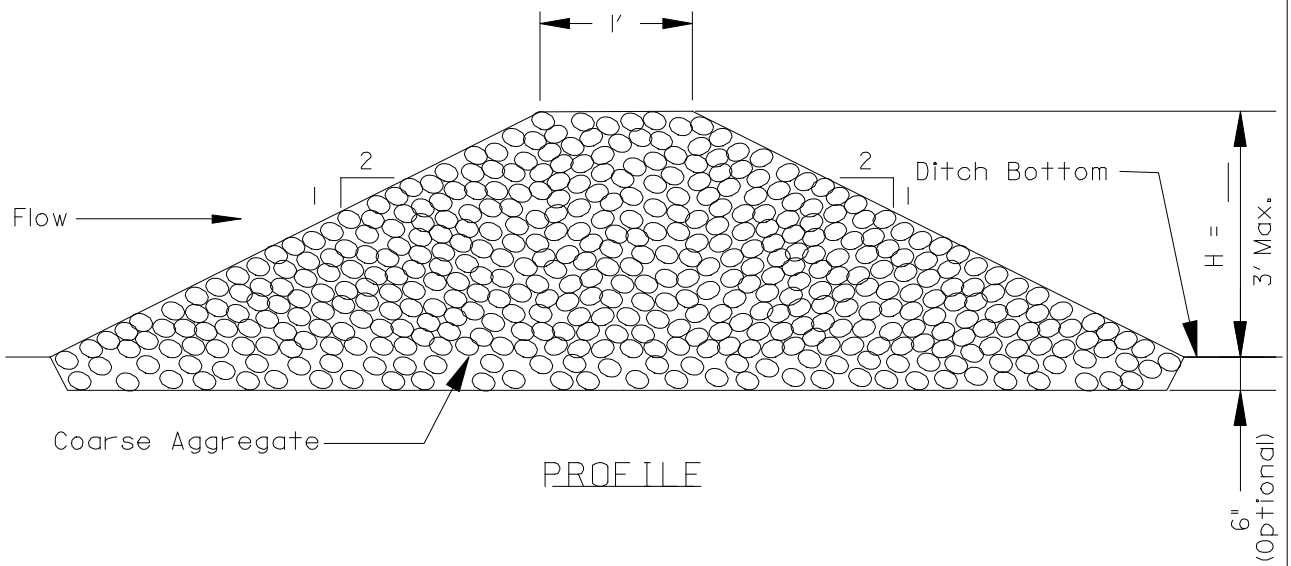


SECTION

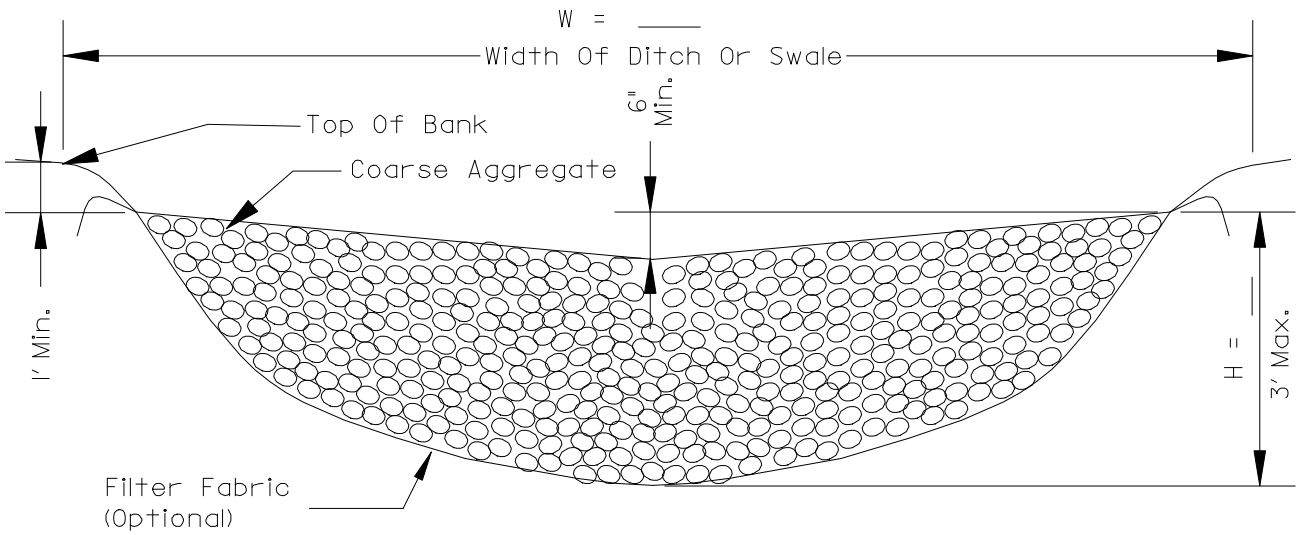
NOTES:
1. The immediate land area around the inlet should be relatively flat (less than 1% slope) and located so that the accumulated sediment can be easily removed.
2. The inside edge of the bales shall be a maximum of 2 feet from the edge of the inlet.
3. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE Table 1 or 2, Class 1 with AOS of at least 30 for nonwoven and 50 for woven.
4. Anchors shall be rebar, steel pickets or 2" x 2" stakes, and shall be long enough to extend at least 1.5 to 2.0 feet into the ground when the top is flush with the bale.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	INLET PROTECTION - STRAW BALE			
	STANDARD DETAIL: 13.07-G			

ROCK DITCH CHECK – COARSE AGGREGATE



PROFILE



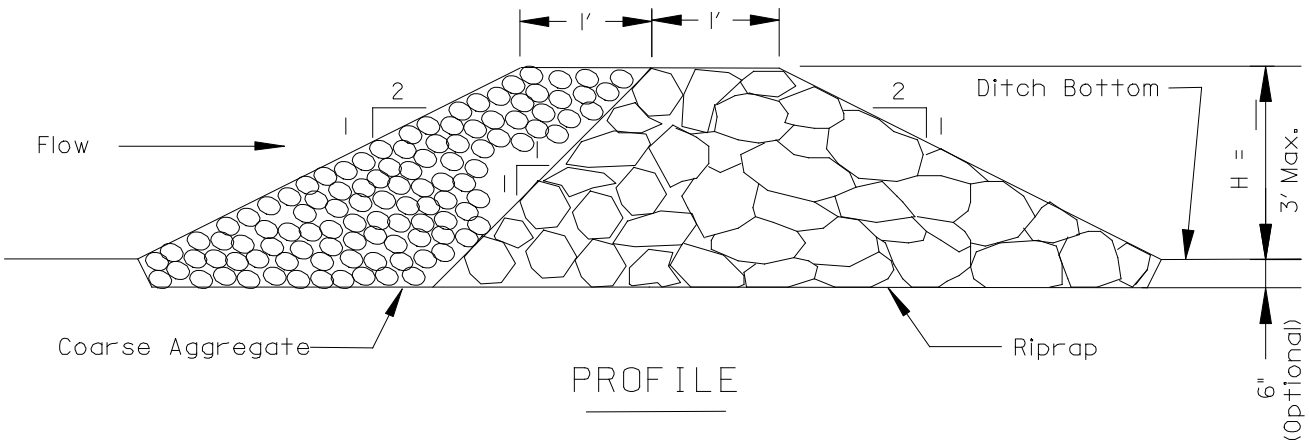
CROSS SECTION

NOTES:

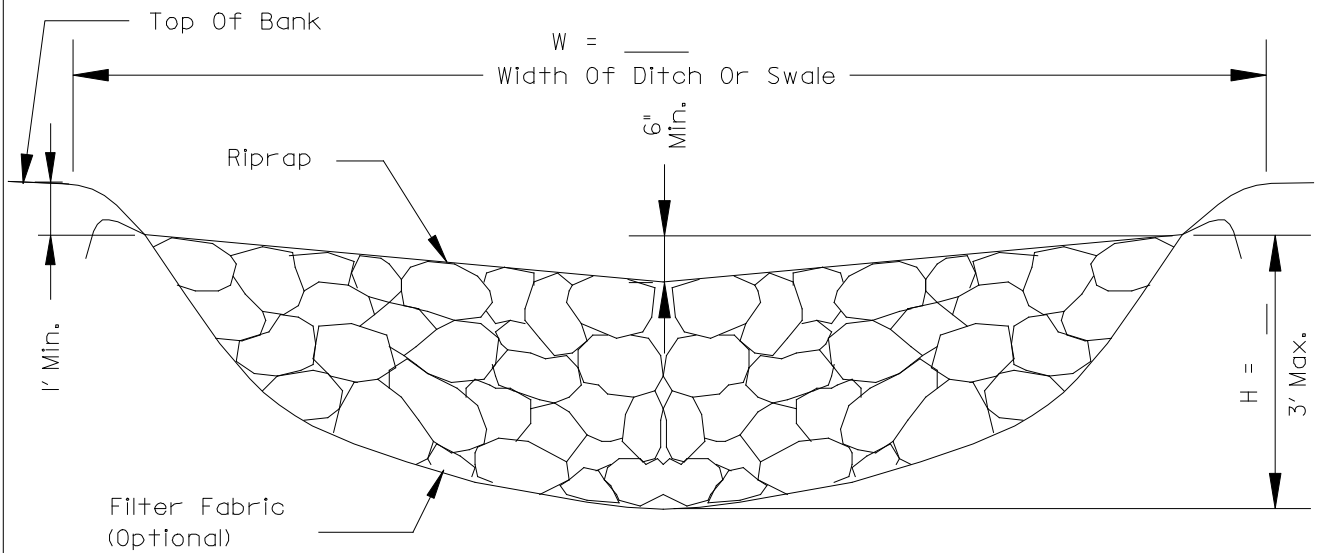
1. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE, Table 1 or 2, Class I, II, or IV and shall be placed over the cleared area prior to the placing of rock.
2. Coarse aggregate shall meet one of the following IDOT gradations, CA-1, CA-2, CA-3, or CA-4 and be placed according to construction specification 25 ROCKFILL using placement Method I and Class III compaction.
3. For added stability, the base of the dam may be keyed 6 inches into the soil.
4. See plans for spacing of dams and H dimensions.
5. Drainage area to each dam shall be less than 2 acres.
6. Use ROCK CHECK DAM-RIPRAP IL-605R for drainage areas of 2 to 10 acres.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	ROCK DITCH CHECK - COARSE AGGREGATE			
	STANDARD DETAIL: 13.07-H			

ROCK DITCH CHECK - RIPRAP



PROFILE



CROSS SECTION

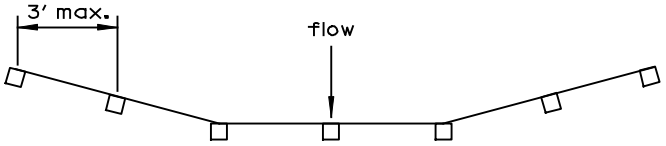
CENTERLINE LOOKING DOWNSTREAM

NOTES;

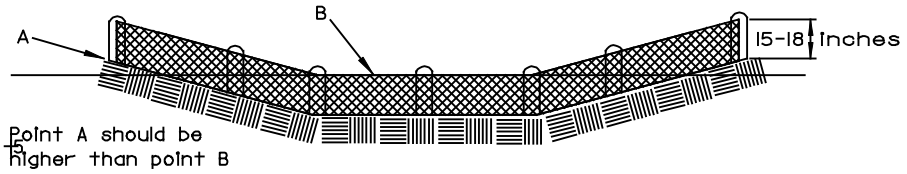
1. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE, Table 1 or 2, Class I, II, or IV and shall be placed over the cleared area prior to the placing of rock.
2. Coarse aggregate shall meet one of the following IDOT gradations, CA-1, CA-2, CA-3, or CA-4.
3. Riprap shall meet IDOT gradation RR-3 or RR-4 and meet Quality Designation A.
4. Coarse aggregate and riprap shall be placed according to construction specification 25 ROCKFILL using placement Method I and Class III compaction.
5. For added stability, the base of the dam may be keyed 6 inches into the soil.
6. See plans for spacing of dams and H dimensions.
7. Maximum drainage area to each dam is 10 acres.
8. ROCK CHECK DAM-COARSE AGGREGATE IL-605CA may be used for drainage areas under 2 acres.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	ROCK DITCH CHECK - RIPRAP			
	STANDARD DETAIL: 13.07-1			

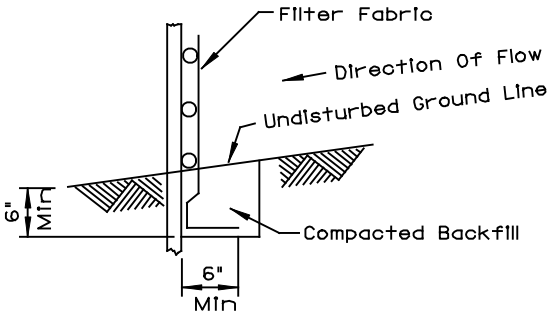
SILT FENCE DITCH CHECK



PLAN VIEW



SECTION VIEW



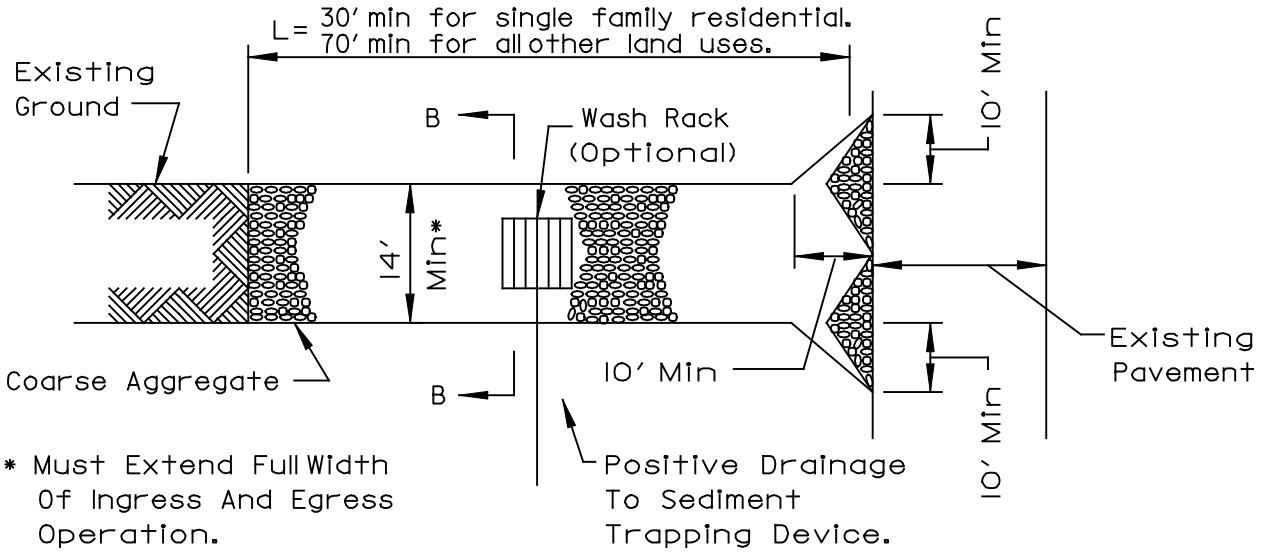
FABRIC ANCHOR DETAIL

NOTES

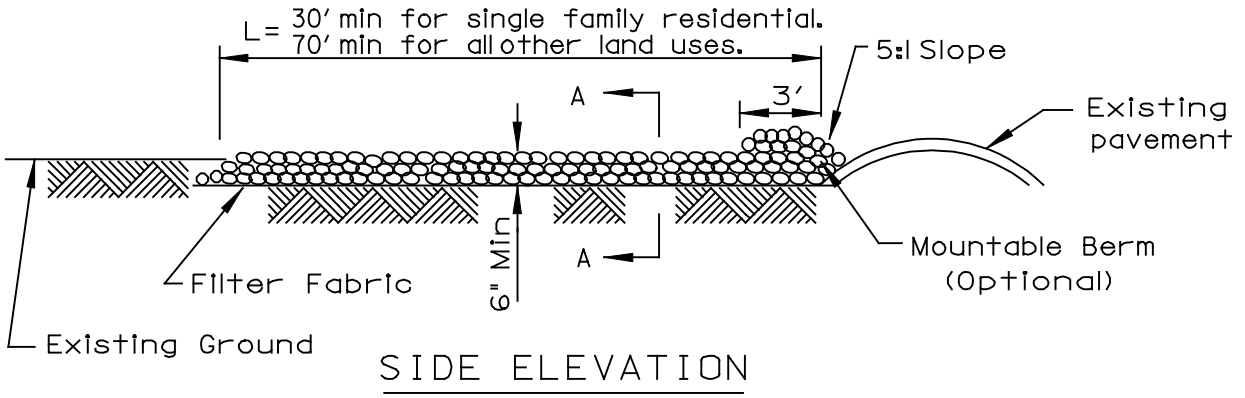
1. Filter fabric shall meet the requirements of Material Specification 592-- Geotextile, Table 1 or 2, Class 1.
2. Top and bottom wires of the wire support shall be a minimum 9 gauge; intermediate wires shall be a minimum of 11 gauge. The maximum opening shall be 6 inches.
3. Fence posts shall be standard T or U steel posts or wood with a minimum cross sectional area of 3.0 square inches. Posts shall be a minimum of 60 inches long.
4. The posts shall be driven a minimum of 24 inches into the ground. Post spacing shall be 3 foot maximum.
5. The wire support (or alternative support structure) is required.
6. The height of a silt fence shall be a minimum of 15 inches and a maximum of 18 inches above the original ground surface.
7. When splices are necessary, the fabric should be spliced at a support post with a minimum 6 inch overlap.
8. The silt fence shall be entrenched to a minimum depth of 8 inches, with an additional 6 inches extending along the bottom of the trench in the up-slope direction. The trench shall be backfilled and the soil compacted over the fabric.
9. The filter fabric and wire support, if used, must be securely fastened to the posts using 1 inch long heavy duty wire staples, tie wires or hog rings. The fabric shall not be stapled to trees.
10. Silt Fence Ditch Checks shall be installed as soon as possible after final grading has been completed.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003 SILT FENCE DITCH CHECK STANDARD DETAIL: 13.07-J	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT

STABILIZED CONSTRUCTION ENTRANCE DETAIL



PLAN VIEW



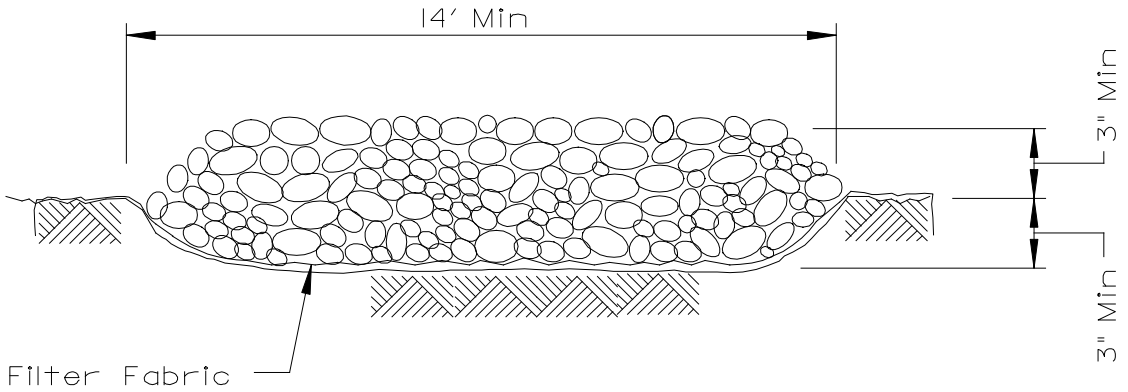
SIDE ELEVATION

NOTES:

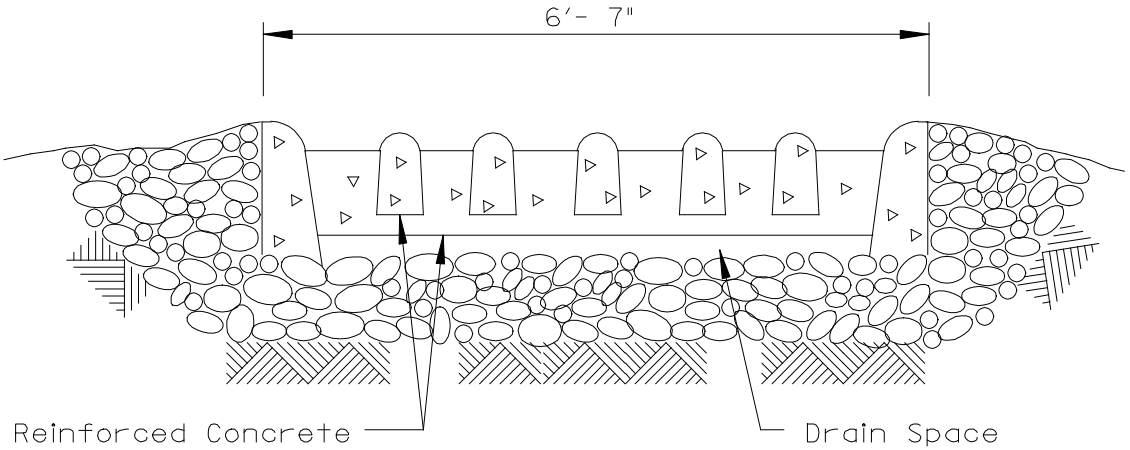
1. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE, Table 1 or 2, Class I, II or IV and shall be placed over the cleared area prior to the placing of rock.
2. Rock or reclaimed concrete shall meet one of the following IDOT coarse aggregate gradation, CA-1, CA-2, CA-3 or CA-4 and be placed according to construction specification 25 ROCKFILL using placement Method 1 and Class III compaction.
3. Any drainage facilities required because of washing shall be constructed according to manufacturers specifications.
4. If wash racks are used they shall be installed according to the manufacturer's specifications.

SHEET 1 OF 2	DESIGN BY : DOUG GROVESTEEN REVISED : 3/01/2004	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	STABILIZED CONSTRUCTION ENTRANCE			
	STANDARD DETAIL: 13.07-K1			

STABILIZED CONSTRUCTION ENTRANCE DETAIL



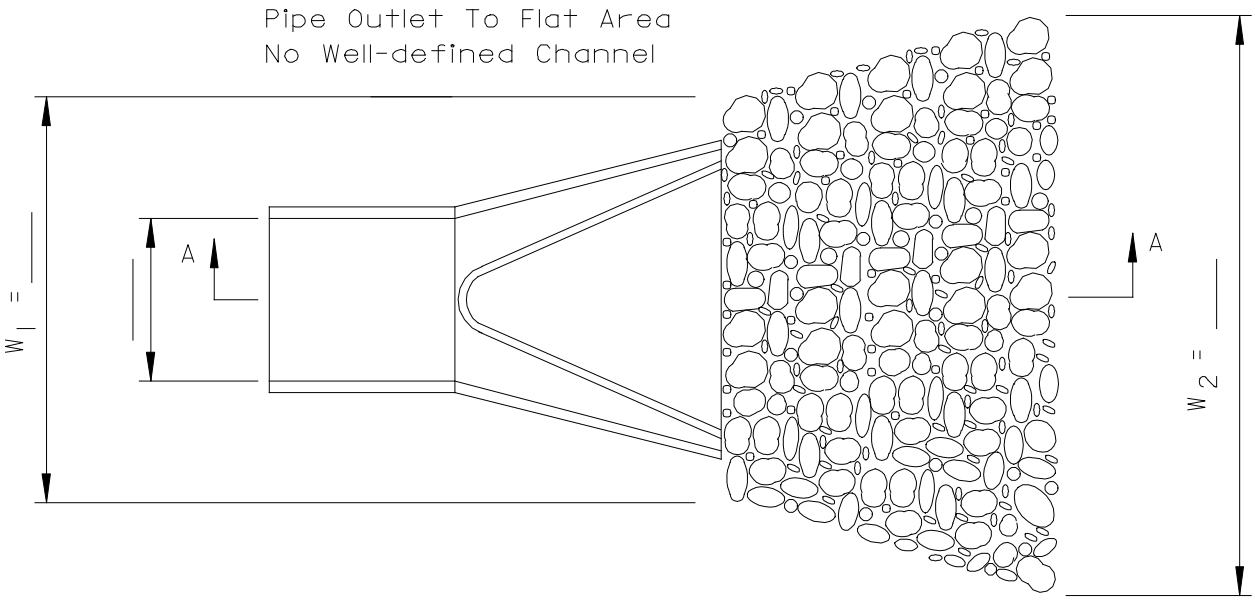
SECTION A–A



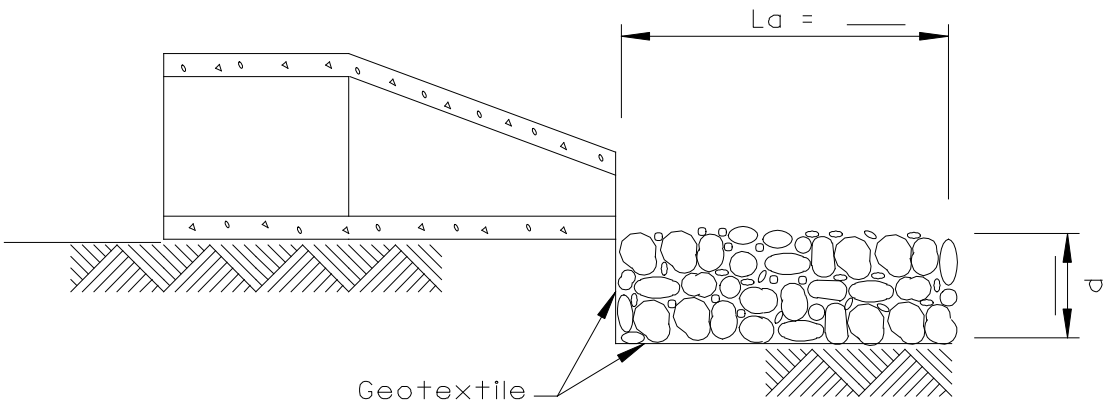
SECTION B–B

SHEET 2 OF 2	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003 STABILIZED CONSTRUCTION ENTRANCE STANDARD DETAIL: I3.07-K2	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT

PIPE OUTLET TO FLAT AREA



PLAN



SECTION A–A

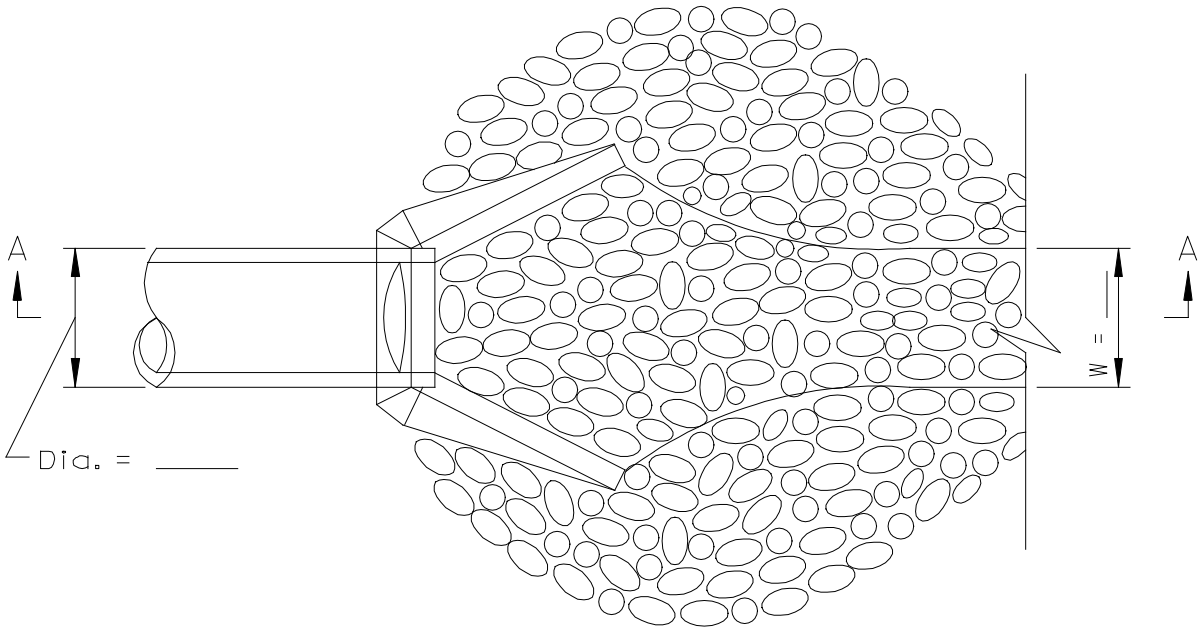
NOTES:

1. The filter fabric shall meet the requirements in material specifications 592 GEOTEXTILE Table 1 or 2, class I, II or III.
2. The rock riprap shall shall meet the IDOT requirements for the following gradation: RR _____, Quality _____.
3. The riprap shall be placed according to construction specification 601 LOOSE ROCK RIPRAP. The rock may be equipment placed.

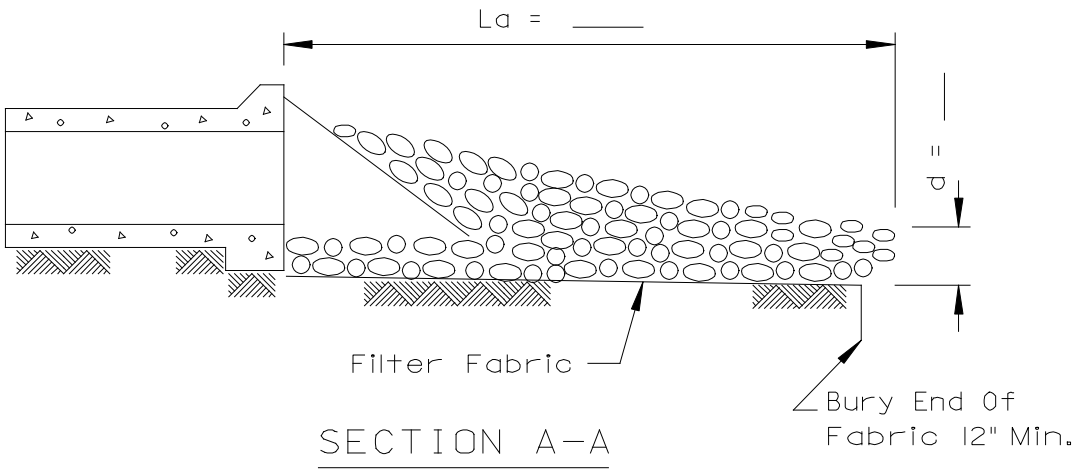
SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
	PIPE OUTLET TO FLAT AREA			
	STANDARD DETAIL: 13.07-L			

PIPE OUTLET TO CHANNEL

Pipe Outlet To Well-Defined Channel



PLAN



SECTION A–A

NOTES:

1. The filter fabric shall meet the requirements in material specification 592 GEOTEXTILE Table 1 or 2, Class I , II or III .
2. The rock riprap shall meet the IDOT requirements for the following gradation _____ .
3. The riprap shall be placed according to construction specification 61 LOOSE ROCK RIPRAP. The rock may be equipment placed.

SHEET 1 OF 1	DESIGN BY : DOUG GROVESTEEN REVISED : 5/23/2003 PIPE OUTLET TO CHANNEL STANDARD DETAIL: 13.07-M	APPROVED BY : DATE :	SCALE NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT

CHAPTER 14 - Design and Construction Standards for Recreational Facilities

14.01 INTRODUCTION

The purpose of this section is to establish criteria and guidelines for the development of neighborhood parks within future developments. This section is designed to assist developers, planners, and engineers in the location, shape, access, linkage, grading and seeding of park lands to be dedicated for park purposes.

14.02 NEIGHBORHOOD PARK STANDARDS

A. Size - The size of a neighborhood park site shall be appropriate to the leisure and recreational needs of the service population and shall be consistent with required donations. The following illustrates the amount of land area generally required for a neighborhood park:

Neighborhood park - Minimum 7 acres

B. Shape - Generally park sites should be rectangular or nearly rectangular in shape.

C. Location - Whenever possible, park sites should be located near the geographic center of the service areas. In areas where park sites and/or school sites already exist or have been previously planned, the proposed park donation shall be located adjacent to or provide appropriate linkage with the existing sites. The following plan shall be adhered to in determining the location(s) of park sites:

"Bloomington Park & Recreation Comprehensive Plan"

D. Access - Access to park sites shall be provided for convenient pedestrian and vehicular ingress and egress as well as for visual identity. A minimum of 300 feet of street frontage will be required, measured along the curb. Any access way shall be improved with a hard surfaced walkway 1.2 meters (four feet) in width, constructed in accordance with Chapter 5 of this Manual. The number of accesses will vary with the location and type of park site and its relationship to surrounding land uses. Frontage along a major arterial road may be counted as an access point when sidewalks along that major arterial are present. All access to park sites shall meet current American with Disabilities Act (ADA) requirements.

E. Linkage - The linkage of proposed parks with existing parks or with other desirable land uses (i.e. schools, convenience commercial areas, cultural or institutional centers) shall be encouraged.

F. Grading - The proposed grading of a park site shall be suitable for park purposes and shall not differ greatly from that of surrounding land uses. Grades less than 2% or more than 10% will not be acceptable. Exceptions to this may be granted if the developer can show an acceptable secondary use for the grading. Examples are earth berming for visual buffer or aesthetic interest, a sled hill or toboggan run, backstop for special activities, amphitheater, etc.

G. Vegetation - Land donated for park purposes shall be planned and designed to minimize impact to vegetation of ecological or aesthetic value. Existing vegetation of value shall be adequately identified and protected from damage during the construction process. The City shall be given the right to remove/salvage from an area proposed for clearing any desirable plant materials for which the developer has no intended use.

H. Erosion Control - The developer will be responsible for controlling erosion in accordance with Chapter 13 of this Manual on the park sites until final acceptance of improvements by the City.

I. Retention/Detention (if part of a recreational facility)

1. Retention

a. Water Quality Criteria - Water quality criteria adopted by the Illinois Pollution control Board will be used as the basis for evaluating the quality of ponded water.

b. Water Quality Maintenance - The developer shall provide plans for aeration, chemical treatment, or other means to ensure water quality standards are maintained.

c. Pond Design

i. Slopes from Bank

1. Top 1 meters (3 ft) of normal pool and the total depth of the required detention volume shall have a 6:1 slope; then 3:1 to bottom.
2. In areas selected for the planting of aquatic and emerging aquatic vegetation, slope requirements will change with cultural requirements of vegetation type.

ii. Depth - Minimum of 25% of normal water level area is to be 3 to 5 meters (10 - 15 ft) in depth.

iii. Shape - Pond configuration shall be natural in appearance featuring varying slopes running down to shoreline. Shoreline shall undulate at varying degrees around the pond perimeter. Provisions in configuration of pond shall allow for ease in dredging and other maintenance considerations.

iv. Size - No ponds shall be smaller than one acre.

v. Bank Stabilization - Protection against erosion and water level fluctuations is required. Stabilization may be provided through the following means:

1. Complete establishment of perennial ground cover with water tolerant grasses.
2. Construction of retaining walls.
3. Use of rip-rap underlain by gravel placed in the zone to be exposed during seasonal water fluctuations. Minimum zone to be covered is 1 meter (3 ft) above normal water level and 2 meters (6 feet) below the normal water level.

vi. Management

1. Draw down facilities shall be provided to allow for the complete drainage of the lake. Draw down capability is necessary to facilitate fish management and lake cleaning.
2. Sedimentation - Developer will provide engineering plans estimating probable quantities of sediment coming off the watershed at five year intervals. Developer will then install sediment traps to handle the aforementioned sediment. A cleaning/dredging plan shall be included. All engineering and installation to be approved by the City of Bloomington.

Retention basin design shall comply with Chapter 6 of this Manual of Practice.

2. Detention - Detention basin design shall comply with Chapter 6 of this Manual of Practice. The major consideration in the design of a detention basin being proposed for recreational use is its suitability for dual use of land--detention and recreation. In order to facilitate review of park areas, the proposed outline of the detention at the approximate high water line shall be illustrated on the preliminary plan. City maintained detention basins shall have pipe underdrains in accordance with Chapter 6 of this Manual.

3. Park Site Credit - for retention and detention basins, the extent to which the design standards are adhered to will be the basis by which the amount of park land credit will be determined. A reduced amount of park land credit may be granted should a proposed park site be deficient in one or more of the above-cited park design standards.

14.03 IMPROVEMENT STANDARDS AND SPECIFICATIONS.

The park site shall be improved according to the following standards and specifications (park sites shall be final platted park sites):

A. Utilities - The park site shall be fully improved with water, sanitary sewer, storm sewer, and electric service. At the time of installation of public improvements in the subdivision or planned unit development, the developer shall install the above-mentioned utilities for the park site in accordance with the City approved engineering plans. This work shall be completed prior to the issuance of the first occupancy permit in the subdivision or planned unit development which includes said park site. If the park site has an auxiliary function as a storm water control facility, then the drainage structures shall be installed during rough grading.

B. Grading - The park site should be rough graded in a similar manner as adjacent lots. Rough grading should take place at the time of rough grading of adjacent lots for the purpose of building construction, and be completed before occupancy permits are issued within the subdivision or planned unit development. Grading shall be done in accordance with the grading plans prepared in compliance with Chapter 1 of this Manual, and approved by the Bloomington Parks And Recreation Department. Grading shall include the preparation of the subsoil so that it is graded and uniformly compacted so it will be parallel to the proposed finished grade. The subgrade material shall be loosened and fine graded to a depth of two to four inches, and all stones over four inches in size, sticks, rubbish and other foreign substances shall be removed.
All depressions which may cause future drainage problems shall be filled with acceptable subgrade material. Positive drainage must be ensured in the direction of swales, or as indicated on a master drainage plan. Finished grades should be uniform of slope between points for which elevations are given, or from such points to existing slopes.

NOTE: The long term storage of overburden on a park site is prohibited, though temporary storage may be granted in some cases. Terms of such temporary storage shall be determined by the Bloomington Parks and Recreation Department.

C. Topsoil - At the time topsoil is first placed in the subdivision or planned unit development, it shall also be spread on the park site. Topsoil shall be fertile, friable, natural topsoil typical of topsoil free of flooding. It shall be without a mixture of subsoil or slag and shall be free of stones, sticks, rubbish, and other extraneous matter, and shall not be delivered or used while in a frozen or muddy condition. Topsoil shall not contain toxic substances which may be harmful to humans or to plant growth. Topsoil shall be spread evenly and lightly compacted to a minimum depth of six inches. Humps or depressions shall be graded and rolled until satisfactory grade is obtained. Completion of fine grading shall be within six months of the completion of rough grading.

D. Seeding - Seeding operations should occur during the spring (between March 1 and May 15) or preferably, late summer (August 20 to September 30). The seed mixture shall be a 70% mixture of Kentucky Bluegrass, 20% Perennial Rye Grass (Citation, Manhattan or Penfine) and 10% Chewing Fescue. All seeds shall be certified, 98% purity/80% germination. The seed bed shall be fresh, new crop seed. The method of seeding may be varied at the discretion of the developer as long as a smooth, uniform and stabilized turf is established. the developer shall be required to maintain turf to full establishment.
This work shall occur immediately after the placement of top soil, fine grading and installation of sidewalks.

14.04 MAINTENANCE STANDARDS

The park site shall be maintained by the developer until the improvements as specified in Section 14.03 of this Manual have been formally accepted by the Bloomington Parks and Recreation Department. Maintenance of the park site shall include:

1. The mowing of the site at least once a month during the spring, summer and fall.
2. The removal of all rubbish and debris.

Until such time as a park site has been accepted by the Bloomington Parks and Recreation Department, the developer may be held liable for any damages that may occur on such a park site. Upon formal acceptance of the park site improvements by the Parks and Recreation Department, the Parks and Recreation Department will assume maintenance of the park site.

Appendix

Exhibit		Reference
A1	Owner's Certificate (Individual)	1.05(C)2c.
A2	Owner's Certificate (Multiple)	1.05(C)2c.
A3	Owner's Certificate (Corporate)	1.05(C)2c.
B	Surveyor's Certificate	1.05(C)2c.
C	Drainage Certificate	1.05(C)2c.
D	County Clerk's Certificate	1.05(C)2c.
D-1	City Clerk's Certificate	1.05(C)2c.
E1	Director of Engineering and Water's Certificate	1.05(C)2c.
E2	Plat Officer's Certificate	1.05(C)2c.
F	Final Plat Payment, Performance & Workmanship Bond Secured by Corporate Surety	Code 24.4.6.1
F1	Final Plat Payment, Performance & Workmanship Bond Secured by Corporate Surety (Contractor)	Code 24.4.6.1
G	Final Plat Payment, Performance & Workmanship Bond Secured by Cash Escrow	Code 24.4.6.1
G1	Escrow Receipt - Subdivider's Public Improvement Payment, Performance & Workmanship Bond	Code 24.4.6.1
H	Final Plat Payment, Performance & Workmanship Bond Secured by Irrevocable Letter of Credit	Code 24.4.6.1
H1	Irrevocable Letter of Credit	Code 24.4.6.1
I	Adjacent Substandard Roadway Improvement Guarantee Secured by Corporate Surety	Code 24.4.6.1
J	Adjacent Substandard Roadway Improvement Guarantee Secured by Cash Reserve	Code 24.4.6.2
K	Adjacent Substandard Roadway Improvement Guarantee Secured by Irrevocable Letter of Credit	Code 24.4.6.2
K1	Irrevocable Letter of Credit	Code 24.4.6.2
L	Special Flood Hazard Area Development Permit Application	1.05(A)2e.
M	Final Plat Lot, Outlot & Public Improvement Configuration Key (example)	1.05(C)2b(iii)
N	Estimate of Cost (example)	1.08
P	Design Formulas, Charts, Tables, Forms & Examples of Calculations for Storm Sewers, Drainage Ways & Retention/ Detention Basins	6.02 & 6.03
Q	Design of Sewers Ratio of Peak Flow To Daily Average Flow	7.03(A)

EXHIBIT A1
OWNER'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

KNOW ALL MEN BY THESE PRESENTS, That I, the undersigned, hereby certify that I am the owner of all the premises embodied in the attached Plat of the _____ Subdivision to the City of Bloomington, McLean County, Illinois, and that I have caused said Plat to be made and that it is a true and correct plat of "The _____ Subdivision to the City of Bloomington, McLean County, Illinois, is laid off in lots and streets by _____ Illinois Professional Land Surveyor Number _____; and I, the undersigned, hereby dedicate and set apart to the City of Bloomington for general public and utility use forever all of the streets, highways and other public areas as indicated and shown on said Plat; and I further dedicate the easements therein set forth to the City of Bloomington for general utility purposes.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this _____ day of _____.

_____

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that he signed, sealed and delivered the said instrument as his free and voluntary act for the uses and purposes therein set forth, including the release and waiver of Homestead, and also including the dedication of all streets, highways and other public areas to the use of the general public forever, and including the grant of certain utility easements to the City of Bloomington, Illinois.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

(S E A L)

EXHIBIT A2
OWNER'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, hereby certify that we are the owners of all the premises embodied in the attached Plat of the _____ Subdivision to the City of Bloomington, McLean County, Illinois, and that we have caused said Plat to be made and that it is a true and correct plat of the _____ _____ Subdivision to the City of Bloomington, McLean County, Illinois, and is laid off in lots and streets by _____ Illinois Professional Land Surveyor Number _____; and we, the undersigned, hereby dedicate and set apart to the City of Bloomington for general public and utility use forever all of the streets, highways and other public areas as indicated and shown on said Plat; and we further dedicate the easements therein set forth to the City of Bloomington for general utility purposes.

IN WITNESS WHEREOF, We have hereunto set our hands and affixed our seals this ___ day of _____.

_____(SEAL)

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for said County and State aforesaid, do hereby certify that _____ and _____, personally known to me to be the same persons whose names are subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed, sealed and delivered the said instrument as their free and voluntary act for the uses and purposes therein set forth, including the release and waiver of Homestead, and also including the dedication of all streets, highways and other public areas to the use of the general public forever, and including the grant of certain general utility easements to The City of Bloomington, Illinois.

Given under my hand and notarial seal this ____ day of _____.

_____
Notary Public

(S E A L)-

EXHIBIT A3
OWNER'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, hereby certify that we are the owners of all or part of the premises embodied in the attached Plat of the_____ Subdivision of the City of Bloomington, McLean County, Illinois and; that the undersigned, _____ a/an _____ Corporation, the owner of said premises, have caused said Plat to be made and that it is a true and correct Plat of the __ _____ Subdivision to the City of Bloomington, McLean County, Illinois, and is laid off into lots and streets by _____, Illinois Professional Land Surveyor Number _____; and we, the undersigned, hereby dedicate and set apart to the City of Bloomington for general public and utility use forever, all of the streets, highways and other public areas as indicated and shown on said Plat; and we further dedicate the easements therein set forth to the City of Bloomington, for general utility purposes.

IN WITNESS WHEREOF, We have hereunto set our hands and affixed our seals this ___ day of _____.

A _____Corporation,

BY:_____

ATTEST: Its_____

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____ _____, personally known to me to be the _____ of _____, a _____ Corporation, and _____, personally known to me to be the _____ of said Corporation, whose names are subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that as such _____ and _____, of said Corporation and caused the seal of said Corporation to be affixed thereto pursuant to authority given by the Board of Directors of said Corporation as their free and voluntary act and as the free and voluntary act and deed of said Corporation, for the uses and purposes therein set forth, including the dedication of all streets, highways and other public areas to the use of the general public forever, and including the grant of certain general utility easements to the City of Bloomington, Illinois.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

(S E A L)

EXHIBIT B
SURVEYOR'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, _____, Illinois Professional Land Surveyor Number _____, do hereby certify that I have surveyed, in accordance with the laws of the State of Illinois, and with the Ordinances of the City of Bloomington, _____ _____ for the following described property, to-wit:

I further certify that I have subdivided the same into _____ lots and streets as shown on the attached plat and further certify that it contains _____ acres.

Iron pins identify all lot corners as shown on said plat and all measurements are given in feet and decimals thereof. All streets and easements designated on said plat are dedicated for public use.

Said subdivision is to be known as _____, City of Bloomington, McLean County, Illinois.

I further certify that the foregoing plat accompanying this certificate correctly represents the above described property as subdivided.

I further certify that (said subdivision lies within) (no portion of said subdivision lies within) 500 feet of any surface drain or water course serving a tributary area of 640 acres or more.

Name of Firm of Surveyor: Registered Land Surveyor No.:

_____ _____

_____
Address

Date:_____

EXHIBIT C
DRAINAGE STATEMENT

_____, Registered Professional Engineer, and _____

_____ being the owner(s) of the premises heretofore platted by _____

_, Illinois Professional Land Surveyor No._____ to be and become _____to the City of Bloomington, McLean County, Illinois do hereby certify that to the best of their knowledge and belief, the drainage of surface waters will not be changed by the construction of said Subdivision or Planned Unit Development, or any part thereof; or that if such surface water drainage will be changed, reasonable provisions have been made for collection and diversion of such surface waters into public areas or drains which the Owner has a right to use and that such surface waters will be planned for in accordance with generally accepted engineering practices so as to reduce the likelihood of damage to the adjoining property because of the construction of the Subdivision or Planned Unit Development.

I further certify that all or portions of Lots _____are within the Special Flood Hazard Area, as identified by the Federal Emergency Management Agency.

_____
Registered Professional Engineer
OWNER(S):

_____

_____

EXHIBIT D
COUNTY CLERK'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, _____, County Clerk of McLean County, State of Illinois, do hereby certify that on the __ _____ day of _____, there were no delinquent taxes unpaid, special assessments or delinquent special assessments against the tract of land shown on the plat attached to this certificate and described in the Certificates of the Surveyor attached hereto and to said plat.

_____
County Clerk, McLean County, Illinois

(Seal of Said County)

EXHIBIT D-1
CITY CLERK'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, _____, City Clerk of said City, do hereby certify that the foregoing is a true and complete copy of an original _____ presented, passed and approved at a regular meeting of said City Council held on the _____ day of _____ , 20 _____ , by an affirmative vote of the majority of all members selected to said Council, the vote having been taken by yeas and nays and entered on the record of the proceedings of said Council.

Witness my hand and seal of said City of Bloomington, this _____ day of _____ , A.D. 20 _____.

_____
City Clerk

EXHIBIT E1
PLAT CERTIFICATION
DIRECTOR OF ENGINEERING AND WATER'S CERTIFICATE

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

I, _____, Director of Engineering and Water for the city of Bloomington, Illinois, hereby certify that the land improvements described in the annexed plat and the plans and specifications therefor meet the minimum requirements of said City outlined in Chapter 24 of the Bloomington City Code.

Dated at Bloomington, Illinois, this _____ day of _____.

EXHIBIT E2
PLAT CERTIFICATION *

STATE OF ILLINOIS)
) SS
COUNTY OF MCLEAN)

Approved by the County Board, McLean County, Illinois, this _____day of _____.

_____
County Plat Officer

* For plats *outside* the corporate limits.

EXHIBIT F
FINAL PLAT PAYMENT, PERFORMANCE AND WORKMANSHIP BOND
SECURED BY OWNER'S CORPORATE SURETY

KNOW ALL MEN BY THESE PRESENTS, that *(owner and/or subdivider of property)* hereinafter called the Principal, and *(the corporation serving as surety)* hereinafter called Surety, are guaranteeing the obligation of the Principal) are held and firmly bound unto the City of Bloomington, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of $ *(amount of bond)* lawful money of the United States, for which we, and each hereby bind ourselves to be truly made by us, our heirs, executors, administrators, successors and assigns, jointly and severally by the following presents:

Sealed and dated this ____ day of _____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision to the City of Bloomington under the name and title of *(name of subdivision)* , McLean County, Illinois, per plat of _____Professional Land Surveyor, Illinois Professional Land Surveyor No._____, consisting of *(number of lots in subdivision)* lots and streets, dated *(date of final plat)* and the plan of which Plat has received preliminary approval by the Planning Commission of the City of Bloomington and the City Council , and which Plat will be finalized upon the Principal's meeting and the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided, and for which a final plat will be presented, and for which property this Bond is given, is described as follows, to-wit:

(Legal Description of the property in the Subdivision)

WHEREAS said principal is required by ordinance of the City of Bloomington to provide sanitary sewer and water, curb and gutter, street base and surface, sidewalks, storm sewers, street lights, pay all inspection fees and other costs set forth in said ordinance and provide a complete and accurate set of as built plans, all of which said work is to be done per exact specifications and plans as provided by said ordinance and as heretofore established by the City of Bloomington; and

WHEREAS said Principal and Surety promise and guarantee that all construction on said proposed improvements shall be done in a workmanlike manner and in compliance with the ordinances of the City of Bloomington, and subject at all times to the inspection and approval by said Obligee and its authorized officers and employees, and shall be completed on or before *(two years after the date of Council approval of the subdivision)* and upon further guarantee that all damage or liability is caused or results from the construction, operation or repairs made by the said Principal to said streets, utility conduits, etc., pursuant to the terms of said plans and specification, will be repaired and the Obligee herein, its officers or employees saved harmless from any and all claims whatsoever arising from the operations of the Principal for and during the period from the acceptance of this bond by said Obligee and for one year after the completion and acceptance by said Obligee of all matters and things required by said ordinance and herein bonded to be done.

NOW, THEREFORE, the condition of this obligation is such that if the above bonded Principal shall well and truly keep, do and perform each and every, all and singular, the matters and things in said plans and specifications, required and set forth and specified to be done by said Principal and performed by said subdivider at the time and in the manner in said code specified, or shall pay over, make good, reimburse and save the above-named Oblige harmless from all loss and damages which said Obligee may sustain by reason of failure or default on the part of said Principal so to do or from defects in the aforesaid improvements appearing within one (1) year after their acceptance by the City, then this obligation shall be null and void; otherwise, same shall remain in full force and effect.

PRINCIPAL: _____

_____

SURETY: _____

(Appropriate Notary Certificate for Principal and Surety)

EXHIBIT F

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____ .

_____
Notary Public

EXHIBIT F1
FINAL PLAT PAYMENT, PERFORMANCE AND WORKMANSHIP BOND
SECURED BY CONTRACTOR'S CORPORATE SURETY

KNOW ALL MEN BY THESE PRESENTS, that ___*(contractor for owner and/or subdivider of property)*__ hereinafter called the Principal, and__*(the corporation serving as surety)*___ hereinafter called Surety, are guaranteeing the obligation of the Principal) are held and firmly bound unto the City of Bloomington, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of $__*(amount of bond)*__ lawful money of the United States, for which we, and each hereby bind ourselves to be truly made by us, our heirs, executors, administrators, successors and assigns, jointly and severally by the following presents:

Sealed and dated this ____ day of _____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision to the City of Bloomington under the name and title of __*(name of subdivision)*__ , McLean County, Illinois, per plat of __*(name of Professional Land Surveyor)*__ , Illinois Professional Land Surveyor No._____, consisting of __*(number of lots in subdivision)*__ lots and streets, dated __*(date of final plat)*__ and the plan of which Plat has received preliminary approval by the Planning Commission of the City of Bloomington and the City Council , and which Plat will be finalized upon the Principal's meeting and the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided, and for which a final plat will be presented, and for which property this Bond is given, is described as follows, to-wit:

(Legal Description of the property in the Subdivision)

WHEREAS said principal is required by ordinance of the City of Bloomington to provide sanitary sewer and water, curb and gutter, street base and surface, sidewalks, storm sewers, street lights, pay all inspection fees and other costs set forth in said ordinance and provide a complete and accurate set of as built plans, all of which said work is to be done per exact specifications and plans as provided by said ordinance and as heretofore established by the City of Bloomington; and

WHEREAS said Principal and Surety promise and guarantee that all construction on said proposed improvements shall be done in a workmanlike manner and in compliance with the ordinances of the City of Bloomington, and subject at all times to the inspection and approval by said Obligee and its authorized officers and employees, and shall be completed on or before *(two years after the date of Council approval of the subdivision)* and upon further guarantee that all damage or liability is caused or results from the construction, operation or repairs made by the said Principal to said streets, utility conduits, etc., pursuant to the terms of said plans and specification, will be repaired and the Obligee herein, its officers or employees saved harmless from any and all claims whatsoever arising from the operations of the Principal for and during the period from the acceptance of this bond by said Obligee and for one year after the completion and acceptance by said Obligee of all matters and things required by said ordinance and herein bonded to be done.

NOW, THEREFORE, the condition of this obligation is such that if the above bonded Principal shall well and truly keep, do and perform each and every, all and singular, the matters and things in said plans and specifications, required and set forth and specified to be done by said Principal and performed by said subdivider at the time and in the manner in said code specified, or shall pay over, make good, reimburse and save the above-named Oblige harmless from all loss and damages which said Obligee may sustain by reason of failure or default on the part of said Principal so to do or from defects in the aforesaid improvements appearing within one (1) year after their acceptance by the City, then this obligation shall be null and void; otherwise, same shall remain in full force and effect.

PRINCIPAL: _____

_____

SURETY: _____

(Appropriate Notary Certificate for Principal and Surety)

EXHIBIT F1

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT G
FINAL PLAT PAYMENT, PERFORMANCE AND WORKMANSHIP BOND
SECURED BY CASH ESCROW

KNOW ALL MEN BY THESE PRESENTS, that *(owner and/or subdivider of the property)* hereinafter called the Principal, is/are held and firmly bound unto the City of Bloomington, McLean County, Illinois, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of *(amount of cash escrow)* lawful money of the United States, for which he/she/they hereby bind *(himself/herself/itself/themselves)* to be truly made by _____ him/her/their heirs, executors, administrators, successors and assigns, jointly and severally, by the following presents.

Sealed and dated this ___ day of _____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision or planned unit development to the City of Bloomington under the name and title of *(name of subdivision)* , McLean County, Illinois, per plat of *(name of Professional Land Surveyor)* Illinois Professional Land Surveyor No. _____, consisting of *(number of lots in subdivision)* lots and streets, dated *(date of final plat)* and the plan of which Plat has received preliminary approval by the Planning Commission and City Council of the City of Bloomington, and which Plat will be finalized upon the Principal's meeting the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided, and for which a final plat will be presented, and for which property this Guarantee is provided, is described as follow, to-wit:

(Legal Description of the property in the Subdivision)

WHEREAS said Principal is required by ordinance of the City of Bloomington to provide sanitary sewer and water mains, curb and gutter, street base and surface, sidewalks, storm sewers, street lights, pay all inspection fees and other costs set forth in said ordinance and provide a complete and accurate set of as built plans, all of which said work is to be done per exact specifications and plans as provided by said ordinance and as heretofore established by the City of Bloomington; and

WHEREAS said Principal's promise and guarantee that all construction on said proposed improvements shall be done in a workmanlike manner and in compliance with the ordinances of the City of Bloomington, and subject at all times to the inspection and approval of said Obligee and its authorized officers and employees, and shall be completed on or before *(two years after the date of Council approval of the subdivision)* and upon further guarantee that all damage or liability is caused or results from the construction, operation or repairs made by the said Principal to said streets, utility conduits, etc., pursuant to the terms of said plans and specifications, will be repaired and the Obligee herein, its officers or employees saved harmless from any and all claims whatsoever arising from the operations of the Principal for and during the period from the acceptance of this guarantee by said Obligee and for one year after the completion and acceptance by said Obligee of all matters and things required by said ordinance and herein guaranteed to be done.

NOW, THEREFORE, the condition of this obligation is such that if the above Principal shall well and truly keep, do and perform each and every, all and singular, the matters and things in said plans and specifications, required and set forth and specified to be done by said Principal and performed by said subdivider at the time and in the manner in said documents specified, or shall pay over, make good, reimburse and save the above-named Obligee harmless from all loss and damaged which said Obligee may sustain by reason of failure or default on the part of said Principal so to do or from defects in the aforesaid improvements appearing within one (1) year after their acceptance by the City, then this obligation shall be null and void; otherwise, same shall remain in full force and effect.

PRINCIPAL:

_____

_____

EXHIBIT G

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT G1
ESCROW RECEIPT
SUBDIVIDER'S PUBLIC IMPROVEMENT
PAYMENT, PERFORMANCE AND WORKMANSHIP BOND

The undersigned bank or savings and loan association by its duly authorized officers and agents, acknowledges and certifies to the undersigned Subdivider or Owner, and to the City of Bloomington, McLean County, Illinois, effective the ____day of_____ as follows:

1. That it maintains a regular office for the transaction of its business in McLean County, Illinois.
2. That it has received and now holds in escrow, pursuant to the terms hereof, the sum of _____ _____ received from the undersigned Subdivider(s).
3. That this escrow account has been established by the undersigned Subdivider as security on said Subdivider's Public Improvement Payment, Performance and Workmanship Bond for _____(name of subdivision) as provided in _____SEC. 24.3-4_____ of the Municipal Code of the City of Bloomington, McLean County, Illinois, 1969, as amended, to the date thereof, and shall be held and disbursed in accordance with said Bond, said Ordinance, and as follows:
   (a) The account, plus interest earned thereon, shall be held by the undersigned, conditioned upon performance by the Principal on its Subdivider's Public Improvement Payment, Performance and Workmanship Bond furnished to the City of Bloomington for the improvements required as shown on the Final Plat of the above mentioned Subdivision, the preparation of as-built plans and the payment of inspection and testing fees.
   (b) All withdrawals of the principal from the account shall be made subject to the release of the City of Bloomington by the Director of Engineering and Water, and the same may be paid as work progresses and is completed, subject also to the said Engineer's approval.
   (c) At or at any time after the expiration of the two- year performance period specified in said Bond and upon certification by the Director of Engineering and Water that the principal has failed to perform in accordance with the terms and requirements of said Bond or the City's Subdivision Code, which said certification shall contain an enumeration of such failures and deficiencies, all funds remaining on deposit or such portion thereof as the Director of Engineering and Water deems necessary to complete, repair or replace the public improvements within the subdivision or portions thereof, prepare such as-built plans, pay such inspection and testing fees and take or perform any other actions necessary to guarantee that the Subdivision will conform in every respect with its approved Final Plat and the applicable codes, ordinances and requirements of the City of Bloomington shall be paid over to the City of Bloomington.

(d) Upon the completion of the improvements and total approval and final acceptance for maintenance of all subdivision improvements within said subdivision by the Director of Engineering and Water of the City, $_____ _____ shall remain upon deposit in the escrow account as a workmanship guarantee until expiration of one year after the approval and acceptance by the City of Bloomington or until such later date as any written claim by the City against the escrow account is finally resolved.

BY:_____

Its_____

ATTEST:

_____

Its_____

EXHIBIT H
FINAL PLAT PAYMENT, PERFORMANCE AND WORKMANSHIP BOND
SECURED BY IRREVOCABLE LETTER OF CREDIT

KNOW ALL MEN BY THESE PRESENTS, that *(owner and/or subdivider of the property)* hereinafter called the Principal, is/are held and firmly bound unto the City of Bloomington McLean County, Illinois, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of $ *(amount of bond)* lawful money of the United States, for which he/she/they hereby bind *(himself/herself/itself/themselves)* to be truly made by _____his/her/their heirs, executors, administrators, successors and assigns, jointly and severally, by the following presents.

Sealed and dated this ___ day of _____, _____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision to the City of Bloomington under the name and title of *(name of subdivision)* , McLean County, Illinois, per plat of *(name of Professional Land Surveyor)* Illinois Professional Land Surveyor No._____, consisting of *(number of lots in subdivision)* lots and streets, dated *(date of final plat)* and the plan of which Plat has received preliminary approval by the Planning Commission and the City Council of the City of Bloomington, and which Plat will be finalized upon the Principal's meeting the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided, and for which a final plat will be presented, and for which property this Bond is given, is described as follows, to-wit:

(Legal Description of the property in the Subdivision)

WHEREAS said Principal is required by ordinance of the City of Bloomington to provide sanitary sewer and water mains, curb and gutter, street base and surface, sidewalks, storm sewers, street lights, pay all inspection fees and other costs set forth in said ordinance and provide a complete and accurate set of as-built plans, all of which said work is to be done per exact specifications and plans as provided by said ordinance and as heretofore established by the City of Bloomington; and

WHEREAS said Principal's promise and guarantee that all construction on said proposed improvements shall be done in a workmanlike manner and in compliance with the ordinances of the City of Bloomington, and subject at all times to the inspection and approval of said Obligee and its authorized officers and employees, and shall be completed on or before *(two years after the date of Council approval of the subdivision)* and upon further guarantee that all damage or liability is caused or results from the construction, operation or repairs made by the said Principal to said streets, utility conduits, etc., pursuant to the terms of said plans and specifications, will be repaired and the Obligee herein, its officers or employees saved harmless from any and all claims whatsoever arising from the operations of the Principal for and during the period from the acceptance of this bond by said Obligee and for one year after the completion and acceptance by said Obligee of all matters and things required by said ordinance and herein bonded to be done.

NOW, THEREFORE, the condition of this obligation is such that if the above bonded Principal shall well and truly keep, do and perform each and every, all and singular, the matters and things in said plans and specifications, required and set forth and specified to be done by said Principal and performed by said Principal at the time and in the manner in said documents specified, or shall pay over, make good, reimburse and save the above-named Obligee harmless from all loss and damages which said Obligee may sustain by reason of failure or default on the part of said Principal so to do or from defects in the aforesaid improvements appearing within one (1) year after their acceptance by the City, then this obligation shall be null and void; otherwise, same shall remain in full force and effect.

PRINCIPAL:

_____

_____

EXHIBIT H

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT H1
IRREVOCABLE LETTER OF CREDIT

THE_____ DATE:_____
(Name of financial institution)

TO: The City of Bloomington

We hereby authorize you to draw from our financial institution up to an aggregate amount of $ __*(amount of security required)*__ United States Dollars from the account of ___*(name of developer)*__ in connection with ___(*name of the subdivision)*___.

This Letter of Credit is available to you upon your presentation of a request for payment, accompanied by: a signed statement by the Director of Engineering and Water of the City of Bloomington that *(name of developer)* has failed to complete the required construction of on- or off-site public improvements for the _____ _____ Subdivision in accordance with the City's Land Subdivision Code and the Subdivider's Final Plat Public Improvement Payment, Performance and Workmanship Bond dated the __ day of _____.

We hereby agree to honor each draft drawn under and in compliance with the terms of this letter, if and when duly presented at this office in _____, Illinois, until the expiration of one year after the approval and acceptance by the City of all subdivision improvements within said subdivision, or until such later date as any written claim by the City against the subdivider or his financial institution is finally resolved.

The irrevocable credit established by us shall remain in effect without regard to any default in payments of sums owned by us, the owner and/or developer, and without regard to other claims which may have against the owner and/or developer. sixty (60) days prior to the expiration of this irrevocable credit we shall notify the Bloomington City Council , by certified letter return receipt requested, of the impending expiration date. This commitment shall not terminate without such notice. It is recognized that the municipality is according the owner and/or developer the permission to proceed with the development project expressly upon the guarantee of the irrevocable nature of this commitment. It is further acknowledged that the consideration for this irrevocable commitment is provided by agreements between this financial institution and the developer. The sum of this credit shall, however, be reduced in the amount of disbursements made from time to time in accordance with the terms under which this credit is extended as set out above.

BY:_____

ATTEST: _____ Its_____

Its_____

EXHIBIT I
ADJACENT SUBSTANDARD ROADWAY IMPROVEMENT GUARANTEE
SECURED BY CORPORATE SURETY

KNOW ALL MEN BY THESE PRESENTS, that *(owner and/or subdivider of the property)*, hereinafter called the Principal, and *(the corporation serving as surety and guaranteeing the obligation of the Principal)* hereinafter called Surety, are held and firmly bound unto the City of Bloomington, McLean County, Illinois, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of $ *(amount of bond)* lawful money of the United States, for which we and each hereby bind ourselves to be truly made by us, our, heirs, executors, administrators, successors and assigns, jointed and severally, by the following presents.

Sealed and dated this___day of_____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision to the City of Bloomington under the name and title of *(name of subdivision)* , McLean County, Illinois, per plat of *(name of Professional Land Surveyor)* Illinois Professional Land Surveyor No. _____consisting of *(number of lots in subdivision)* lots and streets, dated *(date of final plat)* and the plan of which Plat has received preliminary approval by the Planning Commission and the City Council of the City of Bloomington, and which Plat will be finalized upon the Principal's meeting the further requirements of the Land Subdivision Code of the City of Bloomington.

WHEREAS said subdivider is required by ordinance of the City of Bloomington to contribute one-half (1/2) of the cost of improving any and all sub-standard roadway or roadways abutting or bordering on said subdivision in accordance with Section 24.4.6.2; and

WHEREAS the _____Subdivision borders and abuts portions of the following substandard roadways:

and

WHEREAS the Principal promises and guarantees to make such a contribution upon receipt of a Certificate of Completion signed by the Director of Engineering & Water of the City of Bloomington certifying that one or more of the above-listed adjacent substandard roadways has been improved to meet or exceed the applicable street standards of the City of Bloomington in accordance with Section 24.4.6.2; and

WHEREAS the undersigned has secured this obligation by posting a corporate surety bond in accordance with Section 24.3-4 B with the City of Bloomington.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the undersigned contributes one-half the cost of improving any of such adjacent substandard roadways which are improved in accordance with Section 24.4.6.2 or in the event that one or more of such adjacent substandard roadways are improved to meet or exceed all City street standards and that improvement is completed in accordance with Section 24.4.6.2, and (I, We) am (are) notified at the address listed below in writing of that completion, and make the contribution described in this Guarantee and required by the City's Land Subdivision Code within 60 days from the date of mailing, this obligation shall be null and void. Otherwise, the same shall remain in full force and effect.

PRINCIPAL:

_____

_____

SURETY:

_____

_____

Receipt of surety bond acknowledged this____day of_____, _____.

CITY OF BLOOMINGTON, ILLINOIS,

BY: _____

Its_____

Exhibit I

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT J
ADJACENT SUBSTANDARD ROADWAY IMPROVEMENT GUARANTEE
SECURED BY CASH RESERVE

KNOW ALL MEN BY THESE PRESENTS: That *(owner and/or subdivider of the property)* , hereinafter called the Principal is/are held and firmly bound unto the City of Bloomington, McLean County, Illinois, a Municipal Corporation hereinafter called the "Obligee" in the penal sum of $ *(amount of cash reserve)* lawful money of the United States, for which he/she/they hereby binds *(himself/herself/itself/themselves)* to be truly made by us/our heirs, executors, administrators, successors and assigns jointly and severally by the following presents:

SEALED and DATED this_____day of _____, _____, at Bloomington, McLean County, Illinois.

WHEREAS a Petition has heretofore been filed with the City Council of the City of Bloomington for the acceptance of a tract of land as a subdivision to the City under the name and title _____*(name of the subdivision)*_____ McLean County, Illinois, per plat of *(name of Professional Land Surveyor)* Illinois Professional Land Surveyor No.___ ___, consisting of *(number of lots in the subdivision)* lots and streets, dated *(date of the final plat)* and the plan of which plat has received preliminary approval by the Planning Commission and the City Council of the City of Bloomington and which plat will be finalized upon the Principals meeting the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided and for which the final plat will be presented and for which this guarantee is provided is as follows, to-wit:

WHEREAS said Principal is required by ordinance of the City of Bloomington to contribute one-half of the cost of improving any and all sub-standard roadway or roadways abutting or bordering on said subdivision in accordance with Section 24.4.6.2; and

WHEREAS the _____ Subdivision borders and abuts portions of the following substandard roadways: and

WHEREAS the Principal promises and guarantees to make such a contribution upon receipt of a Certificate of Completion signed by the Director of Engineering & Water of the City of Bloomington certifying that one or more of the above-listed adjacent substandard roadways of the City of Bloomington in accordance with Section 24.4.6.2; and

WHEREAS the undersigned has secured this obligation by posting _____($_____) with the City of Bloomington.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the undersigned contributes one-half the cost of improving any of such adjacent substandard roadways which are improved in accordance with Section 24.4.6.2, this obligation shall be null and void. Otherwise, the same shall remain in full force and effect.

In the event that one or more of such adjacent substandard roadways are improved to meet or exceed all City street standards and that improvement is completed in accordance with Section 24.4.6.2, and (I, We) am notified at the address listed below in writing of that completion, and fail to make the contribution described in this Guarantee and required by the City's subdivision ordinance within 60 days from the date of mailing, the City may utilize all or such portion of the reserve account established as security for this guarantee plus accumulated interest thereon for the purpose of making the required contribution.

PRINCIPAL: _____

_____

Receipt of _____($_____) as a reserve for subdivider's adjacent substandard roadway improvement guarantee acknowledged this _____day of_____,

CITY OF BLOOMINGTON, ILLINOIS,

_____

Its_____

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT K
ADJACENT SUBSTANDARD ROADWAY IMPROVEMENT GUARANTEE
SECURED BY IRREVOCABLE LETTER OF CREDIT

KNOW ALL MEN BY THESE PRESENTS, that *(owner and/or subdivider of the property)* hereinafter called the Principal, is/are held and firmly bound unto the City of Bloomington, McLean County, Illinois, a Municipal Corporation, hereinafter called the Obligee, in the penal sum of $ *(amount of bond)* lawful money of the United States, for which he/she/they hereby bind ourselves to be truly made by us/our heirs, executors, administrators, successors and assigns, jointly and severally, by the following presents.

Sealed and dated this _____ day of _____, ____, at Bloomington, McLean County, Illinois.

WHEREAS, a Petition has heretofore been filed with the City Council of the City of Bloomington for acceptance of a tract of land as a subdivision to the City of Bloomington under the name and title of *(name of subdivision)* , McLean County, Illinois, per plat of *(name of Professional Land Surveyor)* Illinois Professional Land Surveyor No. _____, consisting of *(number of lots in subdivision)* lots and streets, dated *(date of final plat)* and the plan of which Plat has received preliminary approval by the Planning Commission and the City Council of the City of Bloomington, and which Plat will be finalized upon the Principal's meeting the further requirements of the Land Subdivision Code of the City of Bloomington.

The legal description of the property sought to be subdivided, and for which a final plat will be presented, and for which property this guarantee is given is described as follows, to-wit:

WHEREAS said Principal is required by ordinance of the City of Bloomington to contribute one-half of the cost of improving any and all substandard roadway or roadways abutting or bordering on said subdivision in accordance with Section 24-4.6.2; and

WHEREAS the _____ Subdivision borders and abuts portions of the following substandard roadways:

and

WHEREAS the undersigned promises and guarantees to make such a contribution upon receipt of a Certificate of Completion signed by the Director of Engineering and Water of the City of Bloomington certifying that one or more of the above listed adjacent substandard roadways has been improved to meet or exceed the applicable street standards of the City of Bloomington in accordance with Section 24.4.6.2; and

WHEREAS the undersigned has secured this obligation by posting an irrevocable letter of credit in accordance with Section 24.4.6.2 with the City of Bloomington.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the undersigned contributed one-half (1/2) the cost of improving any of such adjacent substandard roadways which are improved in accordance with Section 24.4.6.2, this obligation shall be null and void. Otherwise, the same shall remain in full force and effect.

In the event that one or more of such adjacent substandard roadways are improved to meet or exceed all City street standards and that improvement is completed in accordance with Section 24.4.6.2, and (I/We) (am/are) notified at the address listed below in writing of that completion, and fail to make the contribution described in this Guarantee and required by the City's subdivision ordinance within 60 days from the date of mailing, the City may utilize all or such portion of the letter of credit established as security for this guarantee plus accumulated interest thereon for the purpose of making the required contribution.

PRINCIPAL: _____

_____

NOTARY'S CERTIFICATE

STATE OF ILLINOIS)
) SS.
COUNTY OF MCLEAN)

I, the undersigned, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, an individual, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed the above instrument as their own free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ day of _____.

_____
Notary Public

EXHIBIT K1
IRREVOCABLE LETTER OF CREDIT

THE _____ DATE:_____
(NAME OF FINANCIAL INSTITUTION)

TO: The City of Bloomington

We hereby authorize you to draw from our financial institution up to an aggregate amount of $ __*(amount of security required)*_ United States Dollars from the account of _____*(name of the developer)*_____.

This Letter of Credit is available to you upon your presentation of a request for payment, accompanied by: a signed statement by the Director of Engineering & Water of the City of Bloomington that __*(name of the developer)*_ has failed to make payment for the required construction of the adjacent substandard roadway improvement for the _____ _____ Subdivision in accordance with the City's Land Subdivision Code and the Subdivider's Adjacent Substandardized Roadway Improvement Guarantee dated the _____ day of _____, _____.

We hereby agree to honor each draft drawn under and in compliance with the terms of this letter, if and when duly presented at this office in _____, Illinois until the expiration of one year after the approval and acceptance by the City of all public improvements adjacent to said subdivision, or until such later date as any written claim by the City against the subdivider or his financial institution is finally resolved.

The irrevocable credit established by us shall remain in effect without regard to any default in payments of sums owed by us, the owner and/or developer, and without regard to other claims which may have against the owner and/or developer. Sixty (60) days prior to the expiration of this irrevocable credit we shall notify the Bloomington City Council, by certified letter return receipt requested, of the impending expiration date. This commitment shall not terminate without such notice. It is recognized that the municipality is according the owner and/or developer the permission to proceed with the development project expressly upon the guarantee of the irrevocable nature of this commitment. It is further acknowledged that the consideration for this irrevocable commitment is provided by agreements between this financial institution and the developer. The sum of this credit shall, however, be reduced in the amount of disbursements made from time to time in accordance with the terms under which this credit is extended as set out above.

BY:_____

ATTEST:_____ Its_____

Its_____

Receipt of _____ ($_____) as a reserve for subdivider's adjacent substandard roadway improvement guarantee acknowledged this _____ day of _____ .

CITY OF BLOOMINGTON, ILLINOIS

BY: _____

Its _____

EXHIBIT L
APPLICATION FOR DEVELOPMENT PERMIT - SPECIAL FLOOD HAZARD AREA

(1) Permit Application _____, Variation Application _____

(2) Application Number (C.O.B.) Date Date Received (C.O.B.)

_____ _____ _____

(3) Name, Address, Phone No. of Applicant: Name, Address, Phone No. of Applicant's Agent:

_____ _____

_____ _____

_____ _____

_____ _____

(4) Describe in detail the proposed activity, the purpose and intended use; if additional space is required attach additional sheets.

_____

_____

_____

_____

(5) Location of Activity Legal Description

_____ _____
Address

_____ __ ___ ___ ___ ___
¼ Sec. Twp. Rge. P.M.

_____
Tax Assessor's Description

_____
Name of Waterway

_____ _____ _____
P.I.N. Subdivision Lot No.

(6) Proposed date to commence _____

Proposed date to complete _____

Have any portion of these proposed activities been completed?

__ Yes __ No If yes, attached detailed explanation.

Has any agency with jurisdiction denied approval for these proposed activities?

__ Yes __ No If yes, attach detailed explanation and all related agency documentation.

(7) ADDITIONAL REMARK OR COMMENTS, attach detailed explanation (Applications for variation shall submit justification for such request.

_____
_____
_____
_____
_____

ADDITIONAL INFORMATION TO BE SUBMITTED:

Application shall be accompanied by the following:

1. Drawings of the site, drawn to scale, showing property line dimensions and clearly showing those parts of the site below the base flood elevation.

2. Existing and proposed grade elevations. Clearly indicate all changes in grade resulting from the proposed improvements.

3. The direction of flow or surface drainage and flood flow.

4. The location of all water courses and drainage facilities. Clearly indicate existing and proposed.

5. The location and dimensions of all buildings (existing and proposed). Clearly indicate the elevation of the lowest floor (including basements) of all buildings (per Chapter 28 of the Municipal Code)

List all approvals or certifications required by other agencies having jurisdiction for any structures, construction, discharges, deposits, or other activities described in this application:

ISSUING AGENCY	TYPE OF APPROVAL	IDENTIFICATION	DATE APPROVED	
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

APPLICATION FOR DEVELOPMENT PERMIT - SPECIAL FLOOD HAZARD AREA

Application is hereby made for authorization of the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete and accurate.

I further certify that I possess the authority to undertake the proposed activities.

_____
Signature of Applicant or Authorized Agent

The following is to be completed by or for the Director of Engineering & Water:

1. Does the base flood elevation shown for the site in the application correspond to the base flood elevation from the city datum?

   Yes __ No ___

2. Are any other local, state and federal permits required?

   Yes ___ No ___ If yes, which?

Notify the applicant which other permits are required.

Refer to Chapter 28 of the Municipal Code for all other requirements.

Approved _____, _____
Director of Engineering & Water

CONDITIONS OF APPROVAL:

EXHIBIT M

EXAMPLE OF FINAL PLAT LOT, OUTLOT, PUBLIC IMPROVEMENT CONFIGURATION KEY

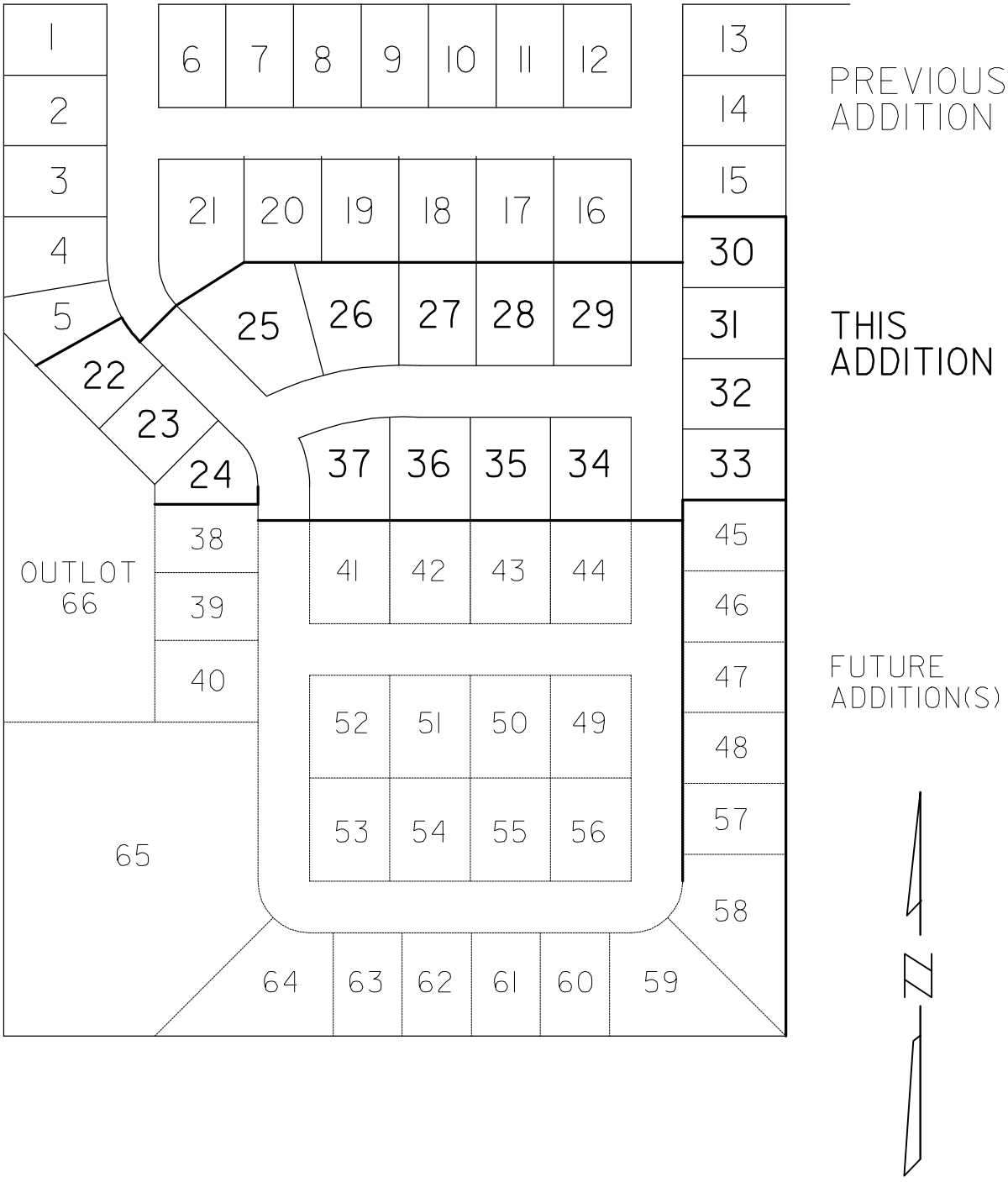


EXHIBIT N
ESTIMATE OF COST
(EXAMPLE)

Project: _____

Estimator: _____

Date: _____

	Item	Quantity	Unit Cost	Cost
	Earthwork			
1.	Earth Excavation	1000 C.Y.	$4	$4000
2.	Borrow Excavation	500 C.Y.	$5	$2500
3.	Topsoil Placement	2000 S.Y.	$1.50	$3000
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$20,000
	Sanitary Sewer System			
1.	8” VCP Sanitary Sewer	1000 L.F.	$12	$12,000
2.	6” VCP Sanitary Sewer	200 L.F.	$10	$2000
3.	Manholes	3 Ea.	$1000	$3000
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$30,000
	Storm Sewer System			
1.	12” RCP Storm Sewer	500 L.F.	$12	$6000
2.	Manholes - 4’ dia.	2 Ea.	$800	$1600
3.	Inlets Type A-3	2 Ea.	$450	$900
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$10,000

Exhibit N

Water Mains				
1.	6” D.I. CL50 Water Main	1000 L.F.	$10	$10,000
2.	6” Gate Valve & Box	4 Ea.	$300	$1200
3.	Steamer Fire Hydrant	2 Ea.	$900	$1800
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$25,000
Streets				
1.	PCC Pavement - 6” 2000 S.Y.		$13	$26,000
2.	Curb & Gutter Ty. B6.18	1500 L.F.	$ 8	$12,000
3.	Driveway Pavement - 6” 300 S.Y.		$20	$ 6,000
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$50,000
Sidewalk				
1.	PCC Sidewalk - 6” 1000 S.F.		$2.50	$2500
2.	PCC Sidewalk - 4” 2000 S.F.		$2.25	$4500
3.	Sidewalk Special Ty. 1	50 S.F.	$5	$250
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$8000
Erosion & Sediment Control				
1.	Seeding Ty. A	2 Ac.	$400	$800
2.	Seeding Ty. B	4 Ac.	$500	$2000
3.	Straw Bales	50 Ea.	$5	$250
	.	.	.	.
	.	.	.	.
	.	.	.	.
Subtotal				$5000
TOTAL CONSTRUCTION COST				$148,000

EXHIBIT P
DESIGN FORMULAS, CHARTS, TABLES, FORMS & EXAMPLES
OF CALCULATIONS FOR STORM SEWERS, DRAINAGE WAYS, & RETENTION/DETENTION FACILITIES

TABLE OF CONTENTS

Exhibit P
1 - a

STORM FREQUENCY INTENSITIES

YEAR

TIME (Min.)	2	3	5	10	25	50	100
1	4.32	4.68	5.40	6.36	7.68	8.76	9.96
2	4.32	4.68	5.40	6.36	7.68	8.76	9.96
3	4.32	4.68	5.40	6.36	7.68	8.76	9.96
4	4.32	4.68	5.40	6.36	7.68	8.76	9.96
5	4.32	4.68	5.40	6.36	7.68	8.76	9.96
6	4.25	4.60	5.31	6.26	7.55	8.62	9.79
7	4.18	4.53	5.23	6.17	7.42	8.47	9.62
8	4.10	4.45	5.15	6.07	7.28	8.33	9.46
9	4.03	4.38	5.06	5.98	7.15	8.18	9.29
10	3.96	4.30	4.98	5.88	7.02	8.04	9.12
11	3.82	4.14	4.80	5.66	6.77	7.74	8.79
12	3.67	3.99	4.62	5.45	6.52	7.45	8.46
13	3.53	3.83	4.44	5.23	6.26	7.15	8.14
14	3.38	3.68	4.26	5.07	6.01	6.86	7.81
15	3.24	3.52	4.08	4.80	5.76	6.56	7.48
16	3.14	3.40	3.95	4.65	5.58	6.35	7.24
17	3.04	3.30	3.82	4.50	5.40	6.14	7.01
18	2.93	3.18	3.68	4.35	5.22	5.94	6.77
19	2.83	3.07	3.55	4.20	5.04	5.73	6.54
20	2.73	2.96	3.42	4.05	4.86	5.52	6.30
21	2.66	2.89	3.35	3.96	4.75	5.40	6.16
22	2.60	2.82	3.27	3.86	4.64	5.28	6.02
23	2.53	2.76	3.20	3.77	4.52	5.16	5.87
24	2.47	2.69	3.12	3.67	4.41	5.04	5.73
25	2.40	2.62	3.05	3.58	4.30	4.92	5.59
26	2.37	2.58	3.00	3.52	4.23	4.84	5.50
27	2.34	2.54	2.94	3.46	4.16	4.75	5.40
28	2.30	2.50	2.89	3.40	4.08	4.67	5.31
29	2.27	2.46	2.83	3.34	4.01	4.58	5.21
30	2.24	2.42	2.78	3.28	3.94	4.50	5.12
31	2.19	2.37	2.72	3.21	3.86	4.41	5.01
32	2.14	2.32	2.66	3.15	3.78	4.31	4.91
33	2.10	2.26	2.61	3.08	3.69	4.22	4.80
34	2.05	2.21	2.55	3.02	3.61	4.12	4.70
35	2.00	2.16	2.49	2.95	3.53	4.03	4.59
36	1.97	2.12	2.45	2.90	3.47	3.96	4.51
37	1.93	2.09	2.41	2.85	3.41	3.89	4.43
38	1.90	2.05	2.36	2.79	3.35	3.82	4.35
39	1.86	2.02	2.32	2.74	3.29	3.75	4.27
40	1.83	1.98	2.28	2.69	3.23	3.68	4.19
41	1.80	1.95	2.25	2.65	3.18	3.63	4.13
42	1.77	1.92	2.21	2.61	3.13	3.57	4.07

TIME (Min.)	YEAR 2	3	5	10	25	50	100
43	1.75	1.89	2.18	2.57	3.09	3.52	4.00
44	1.72	1.86	2.14	2.53	3.04	3.46	3.94
45	1.69	1.83	2.11	2.49	2.99	3.41	3.88
46	1.67	1.81	2.08	2.46	2.95	3.37	3.83
47	1.65	1.79	2.05	2.43	2.91	3.32	3.78
48	1.62	1.76	2.03	2.39	2.86	3.28	3.72
49	1.60	1.74	2.00	2.36	2.82	3.23	3.67
50	1.58	1.71	1.97	2.33	2.78	3.19	3.62
51	1.56	1.69	1.95	2.30	2.75	3.15	3.58
52	1.54	1.67	1.93	2.28	2.72	3.12	3.54
53	1.53	1.66	1.91	2.25	2.69	3.08	3.51
54	1.51	1.64	1.89	2.23	2.66	3.05	3.47
55	1.49	1.62	1.87	2.20	2.63	3.01	3.43
56	1.48	1.62	1.85	2.18	2.60	2.98	3.39
57	1.46	1.61	1.83	2.16	2.58	2.95	3.36
58	1.45	1.61	1.81	2.13	2.55	2.92	3.32
59	1.43	1.60	1.79	2.11	2.53	2.89	3.29
60	1.42	1.60	1.79	2.11	2.53	2.89	3.25
65	1.38	1.55	1.72	2.02	2.42	2.77	3.15
70	1.33	1.49	1.66	1.96	2.35	2.68	3.05
75	1.29	1.44	1.61	1.90	2.27	2.60	2.95
80	1.24	1.39	1.55	1.83	2.20	2.51	2.85
85	1.2	1.33	1.50	1.77	2.18	2.42	2.75
90	1.16	1.28	1.44	1.70	2.04	2.33	2.64
95	1.11	1.23	1.39	1.64	1.96	2.24	2.54
100	1.07	1.17	1.33	1.57	1.89	2.15	2.44
105	1.02	1.12	1.28	1.51	1.81	2.07	2.34
110	0.98	1.07	1.22	1.44	1.73	1.98	2.24
115	0.93	1.01	1.17	1.38	1.65	1.89	2.14
120	0.89	0.96	1.11	1.31	1.57	1.80	2.04

This table is derived from the Illinois State Water Survey Circular 172; dated 1989; "Frequency Distributions of Heavy Rainstorms in Illinois."

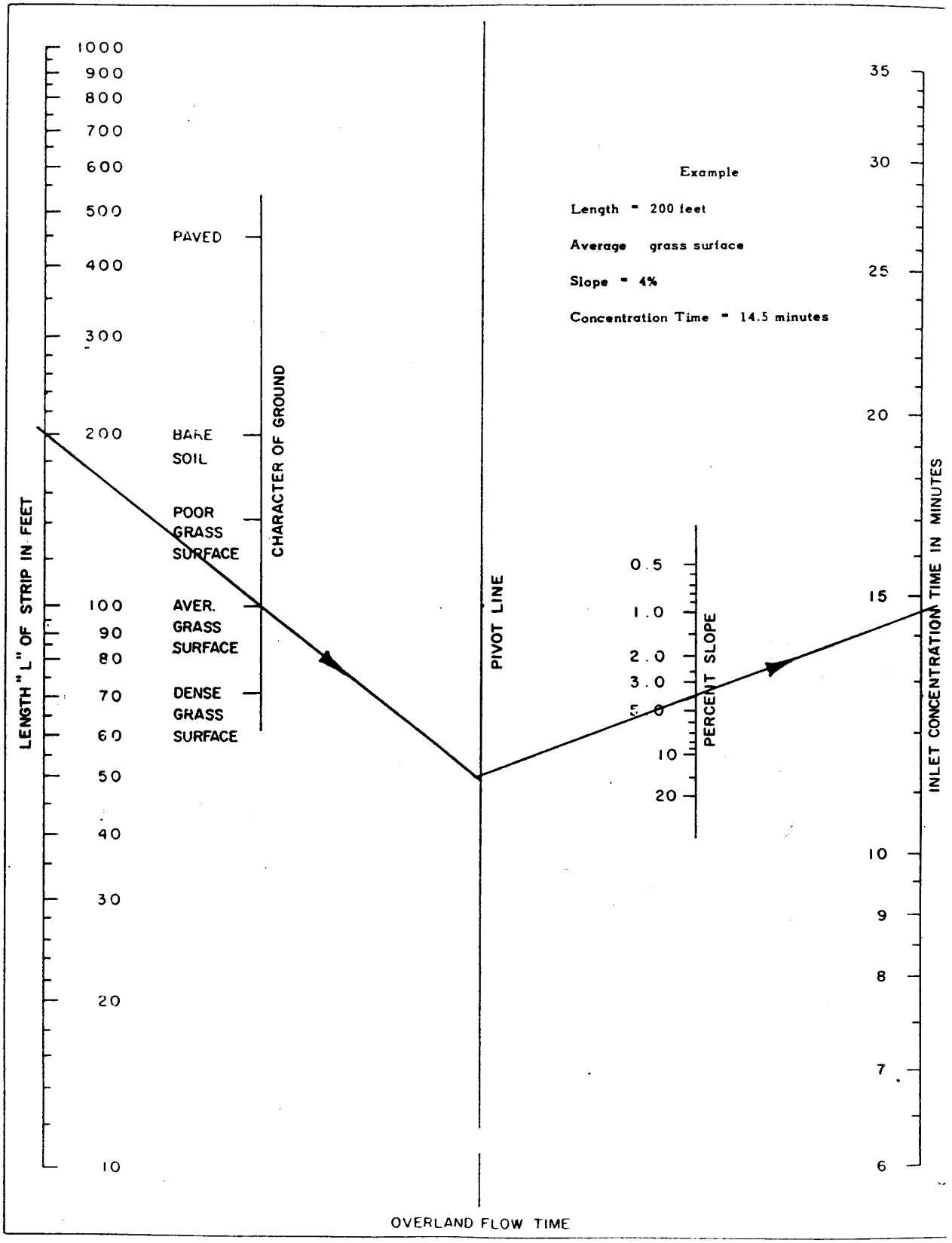
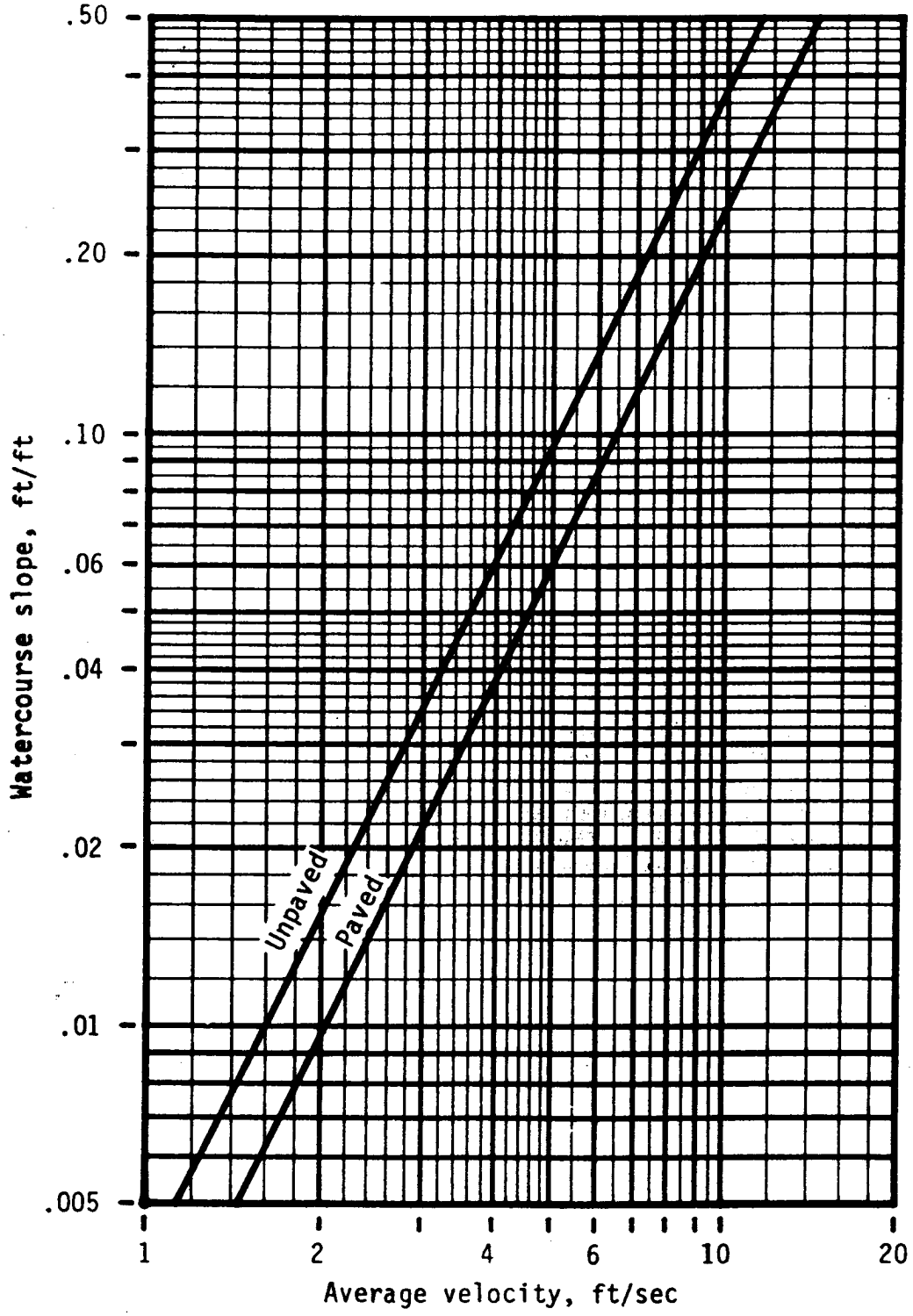


Figure 6-110.01 f



Average velocities for estimating travel time for shallow concentrated flow.

RUNOFF COEFFICIENTS

VALUES OF C - Runoff / Rainfall			RUNOFF COEFFICIENT C	
TYPE OF DRAINAGE AREA SURFACES			MIN.	MAX.
ROOFS, slag to metal			0.75	0.95
PAVEMENTS	Asphalt		0.70	0.95
	Concrete		0.80	0.95
	Gravel, from clean and loose to clayey and compact		0.25	0.70
R.R. YARDS			0.20	0.40
EARTH SURFACES	Sand, from uniform grain size, no fines to well graded some clay or silt	Bare	0.15	0.50
		Light Vegetation	0.10	0.40
		Dense Vegetation	0.05	0.30
	Loam, from sandy or gravelly to clayey	Bare	0.20	0.60
		Light Vegetation	0.10	0.45
		Dense Vegetation	0.05	0.35
	Gravel, from clean gravel and gravel sand mixtures, no silt or clay to high clay or silt content	Bare	0.25	0.65
		Light Vegetation	0.15	0.50
		Dense Vegetation	0.10	0.40
	Clay, from coarse sandy or silty to pure colloidal clays	Bare	0.30	0.75
		Light Vegetation	0.20	0.60
		Dense Vegetation	0.15	0.50
COMPOSITE AREAS	City, business areas		0.70	0.95
	City, dense residential areas, vary as to soil & Vegetation		0.50	0.65
	Suburban residential areas, vary as to soil & vegetation		0.35	0.55
	Rural Districts, vary as to soil & vegetation		0.10	0.25
	Parks, Golf Courses, etc., vary as to soil & vegetation		0.10	0.35
LAWNS	Sandy soil, flat 2%		0.05	0.10
	Sandy soil, average 2% to 7%		0.10	0.15
	Sandy soil, steep, 7%		0.15	0.20
	Heavy soil, flat 2%		0.13	0.17
	Heavy soil, average 2% to 7%		0.18	0.22
	Heavy soil, steep 7%		0.25	0.35

NOTE: Values of "C" for earth surfaces are further varied by degree of saturation, compaction, surface irregularity and slope, by character of subsoil, and by presence of frost or glazed snow or ice.

STORM SEWER COMPUTATION SHEET

DESIGN STORM ______ YEAR FREQUENCY

PROJECT: ____________________

DATE: ____________________ ENGINEER: ____________________

LOCATION		LENGTH (ft.)	BASIN NO.	AREA "A" (acres)		RUNOFF "C" COEFFICIENT	"A" X "C"		FLOW TIME (min.)			TIME OF CONCENTRATION	RAINFALL "I" INTENSITY	TOTAL RUNOFF Q-CIA (cfs)	DIAMETER PIPE (inches)	CAPACITY FULL (cfs)	VELOCITY (fps)		INVERT ELEVATION		MANHOLE INVERT DROP	SLOPE OF SEWER %
FROM STATION	TO STATION			INCREMENT	TOTAL		INCREMENT	TOTAL	TO UPPER END	IN GUTTER	IN SECTION						FLOWING FULL	DESIGN FLOW	UPPER END	LOWER END		

EXHIBIT P
1f
Capacity Design Calculations for Storm Water Detention by the Rational Method

For an area of development of over 2 hectars (5 acres) but less than 8 hectars (20 acres):

The rational method of determining stormwater detention requirements is based on the equation Q = CIA. The rational method of determining detention is generally used to determine the volume of stormwater storage needed to compensate for increased runoff due to development. A step by step procedure is as follows:

1. Determine allowable release rate. This is equal to the discharge rate for a 3 year frequency storm under pre-development conditions.
   a. Determine the pre-developed "C" factor using a weighted average of the factors given in exhibit P-1d.
   b. Determine the pre-developed time of concentration (t_c) based on slope and ground cover using exhibits P-1b and P-1c.
   c. Using the pre-developed "C" factor and time of concentration (t_c), determine the rainfall intensity for a 3 year frequency storm (I_3) from exhibit P-1a.
   d. Determine the peak discharge rate in cubic feet per second (Q_3) for a 3 year frequency storm using the rational equation, Q=CIA where "A" is the drainage area in acres.

2. Determine the peak discharge rate for developed conditions for a 100 year frequency storm.
   a. Determine the post-developed "C" factor using a weighted average of the factors given in exhibit P-1d.
   b. Determine the post-development time of concentration (t_c) based on slope and ground cover using exhibits P-1b and P-1c.
   c. Using the post-developed "C" factor and time of concentration (t_c), determine the rainfall intensity for a 100 year frequency storm (I_{100}) from exhibit P-1a.
   d. Determine the peak discharge rate in cubic feet per second (Q_{100}) for a 100 year frequency storm using the rational equation, Q=CIA where "A" is the drainage area in acres.

3. Determine the required detention volume by by calculating the difference between the average 100 year peak discharge rate and the average 3 year peak discharge rate, assuming said average occurs for one hour (3600 seconds). Volume (in cubic feet) = (3600 sec.) x (Q_{100} - Q_3)/2

Once the volume of detention is determined, a basin and outlet structure is designed such that the required detention volume is provided at an elevation that does not produce discharges in the outlet structure above the allowable. Provision should be provided in the design to allow discharges larger than the design discharge to pass through the detention basin without producing a catastrophic failure (see section 6.02-C-5).

Example:

Determine the storage requirements for the 100-year storm for the basin described below:

1. The existing drainage basin area is 6 acres of average grass on clay soil at 2% slope.

2. Runoff coefficient before development (C_3) from exhibit P-1d is 0.22

3. The developed site will be 70% impervious (parking lots and rooftops) and 30% grass. The runoff coefficient after development is the weighted average of the two conditions:

$C_{100} = 0.7(0.95) + 0.3(0.22) = 0.73$

4. Time of concentration before development (t_c) is based on the longest length of flow (hydraulic length) of the drainage area. Given that the hydraulic length is 500 feet, consisting of 200 feet of sheet flow and 300 feet of concentrated flow in a shallow swale:

a. from exhibit P-1b the flow time for the 200 feet of sheet flow on grass at 2% is 17 minutes.

b. from exhibit P-1c the velocity of flow for the 300 feet of shallow swale at 2% is 2.2 fps, therefore the flow time is 300/2.2 = 136 sec or approximately 2 minutes.

c. The pre-developed t_c is 17 + 2 = 19 minutes

5. The pre-developed rainfall intensity from exhibit P-1a, for a t_c of 19 minutes and a 3 year frequency is:

$I_3 = 3.07$

6. The pre-developed peak runoff is: $Q_3 = C_3 \times I_3 \times A = (0.22) \times (3.07) \times (6 \text{ acres}) = 4.05$ cfs

7. The post-development time of concentration is based on the developed hydraulic length of 250 feet consisting of 50 feet of grass at 2% and 200 of parking lot at 1%:

a. from exhibit P-1b the flow time for the 50 feet of sheet flow on grass at 2% is 9 minutes.

b. from exhibit P-1c the velocity of flow for the 200 feet of paved watercourse at 1% is 2 fps, therefore the flow time is 200/2 = 100 sec or approximately 2 minutes.

c. The post-developed t_c is 9 + 2 = 11 minutes

8. The post-developed rainfall intensity from exhibit P-1a, for a t_c of 11 minutes and a 100 year frequency is: $I_{100} = 8.79$

9. The post-developed peak runoff is: $Q_{100} = C_{100} \times I_{100} \times A = (0.73) \times (8.79) \times (6 \text{ acres}) = 38.50$ cfs

10. The required storage is: Volume = (3600) x (38.50 - 4.05)/2 = 62,010 cubic feet

11. The remainder of the example is a trial and error procedure to size an outlet that will pass 4.05 cfs at a headwater elevation that will provide 62,010 cubic feet of storage

EXHIBIT P
2a

Frequency Distribution for 24-hour Rainfall Storm Period

FREQUENCY (YEARS)	RAINFALL (INCHES)
2	3.02
3	3.27
5	3.76
10	4.45
25	5.32
50	6.08
100	6.92

From: Illinois State Water Survey Circular 172; dated 1989; “Frequency Distributions of Heavy Rainstorms in Illinois”.

-Runoff curve numbers for urban areas[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1]Average runoff condition, and $I_a = 0.2S$.

[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

-Runoff curve numbers for cultivated agricultural lands[1]

Cover description			Curve numbers for hydrologic soil group—			
Cover type	Treatment[2]	Hydrologic condition[3]	A	B	C	D
Fallow	Bare soil	–	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1]Average runoff condition, and I_a = 0.2S.

[2]*Crop residue cover* applies only if residue is on at least 5% of the surface throughout the year.

[3]Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

-Runoff curve numbers for cultivated agricultural lands[1]

Cover description			Curve numbers for hydrologic soil group—			
Cover type	Treatment[2]	Hydrologic condition[3]	A	B	C	D
Fallow	Bare soil	–	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1]Average runoff condition, and $I_a = 0.2S$.

[2]*Crop residue cover* applies only if residue is on at least 5% of the surface throughout the year.

[3]Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good $\geq$ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

-Runoff depth for selected CN's and rainfall amounts[1]

Rainfall	Runoff depth for curve number of—												
	40	45	50	55	60	65	70	75	80	85	90	95	98
	inches												
1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.17	0.32	0.56	0.79
1.2	.00	.00	.00	.00	.00	.00	.03	.07	.15	.27	.46	.74	.99
1.4	.00	.00	.00	.00	.00	.02	.06	.13	.24	.39	.61	.92	1.18
1.6	.00	.00	.00	.00	.01	.05	.11	.20	.34	.52	.76	1.11	1.38
1.8	.00	.00	.00	.00	.03	.09	.17	.29	.44	.65	.93	1.29	1.58
2.0	.00	.00	.00	.02	.06	.14	.24	.38	.56	.80	1.09	1.48	1.77
2.5	.00	.00	.02	.08	.17	.30	.46	.65	.89	1.18	1.53	1.96	2.27
3.0	.00	.02	.09	.19	.33	.51	.71	.96	1.25	1.59	1.98	2.45	2.77
3.5	.02	.08	.20	.35	.53	.75	1.01	1.30	1.64	2.02	2.45	2.94	3.27
4.0	.06	.18	.33	.53	.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43	3.77
4.5	.14	.30	.50	.74	1.02	1.33	1.67	2.05	2.46	2.91	3.40	3.92	4.26
5.0	.24	.44	.69	.98	1.30	1.65	2.04	2.45	2.89	3.37	3.88	4.42	4.76
6.0	.50	.80	1.14	1.52	1.92	2.35	2.81	3.28	3.78	4.30	4.85	5.41	5.76
7.0	.84	1.24	1.68	2.12	2.60	3.10	3.62	4.15	4.69	5.25	5.82	6.41	6.76
8.0	1.25	1.74	2.25	2.78	3.33	3.89	4.46	5.04	5.63	6.21	6.81	7.40	7.76
9.0	1.71	2.29	2.88	3.49	4.10	4.72	5.33	5.95	6.57	7.18	7.79	8.40	8.76
10.0	2.23	2.89	3.56	4.23	4.90	5.56	6.22	6.88	7.52	8.16	8.78	9.40	9.76
11.0	2.78	3.52	4.26	5.00	5.72	6.43	7.13	7.81	8.48	9.13	9.77	10.39	10.76
12.0	3.38	4.19	5.00	5.79	6.56	7.32	8.05	8.76	9.45	10.11	10.76	11.39	11.76
13.0	4.00	4.89	5.76	6.61	7.42	8.21	8.98	9.71	10.42	11.10	11.76	12.39	12.76
14.0	4.65	5.62	6.55	7.44	8.30	9.12	9.91	10.67	11.39	12.08	12.75	13.39	13.76
15.0	5.33	6.36	7.35	8.29	9.19	10.04	10.85	11.63	12.37	13.07	13.74	14.39	14.76

[1]Interpolate the values shown to obtain runoff depths for CN's or rainfall amounts not shown.

TABULAR HYDROGRAPH DISCHARGES (C.F.S./SQ.MILE/INCH OF RUNOFF)

Hydrograph Time ⟶

Time of Concentration ↓	11.0	11.5	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.2	13.5	14.0	14.5	15.0	16.0	18.0	20.0
0.1 hr.	24	51	299	991	746	477	233	152	132	121	111	85	74	70	68	65	52	48	39	33	29	24	18	14
0.2 hr.	23	47	209	509	796	641	424	245	170	138	121	104	85	75	71	68	56	49	40	34	29	24	18	14
0.3 hr.	21	43	141	324	586	658	535	372	251	184	148	124	102	86	77	71	61	51	41	34	30	24	18	14
0.4 hr.	20	39	103	224	419	558	575	451	331	247	190	155	127	105	90	80	66	53	42	35	30	24	18	14
0.5 hr.	18	36	80	166	301	433	496	474	395	309	242	194	158	130	109	94	75	57	43	36	31	25	18	15
0.75 hr.	15	29	57	98	163	248	329	375	388	369	325	276	232	195	165	142	107	76	51	39	33	26	19	15
1.00 hr.	13	24	45	66	107	155	211	258	301	313	316	301	277	247	217	188	146	102	64	46	36	27	19	15
1.25 hr.	11	21	37	51	79	107	147	187	219	249	264	271	267	256	241	219	177	128	81	56	42	29	20	16
1.5 hr.	10	18	31	42	57	81	105	133	164	192	209	227	235	236	236	225	201	153	99	68	50	32	20	16
2.0 hr.	7	14	22	30	38	49	64	80	95	114	133	152	165	175	184	192	190	176	129	93	68	41	23	17

Note: This table is applicable to a basin located at the downstream end of the entire watershed area in question, and valley routing is not required.

EXHIBIT P-2d

Figure 6-I relates two ratios: peak outflow to peak inflow discharge (q_o / q_i) and storage volume to runoff volume (V_s / V_r) for all four rainfall distributions.

The relationships in figure 6-I were determined on the basis of single stage outflow devices. Some were controlled by pipe flow, others by weir flow. Verification runs were made using multiple stage outflow devices, and the variance was similar to that in the base data. The method can therefore be used for both single- and multiple-stage outflow devices.

The only constraints are that (1) each stage requires a design storm and a computation of the storage required for it and (2) the discharge of the upper stage(s) includes the discharge of the lower stage(s).

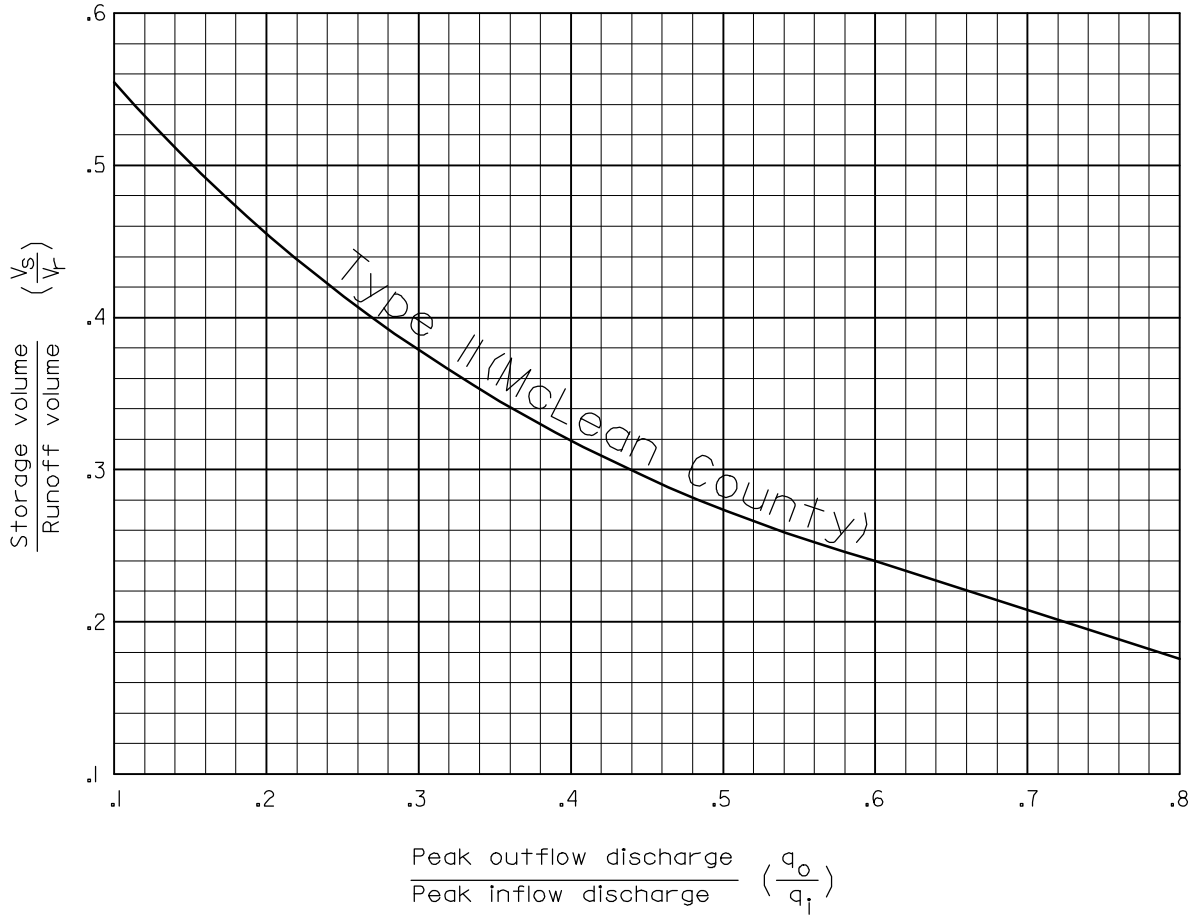


Figure 6-I - Approximate detention basin routing for rainfall type II.

(210-VI-TR-55, Second Ed., June 1986)

Exhibit P - 2e

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DESIGN OF SEWERS
RATIO OF PEAK FLOW TO DAILY AVERAGE FLOW
(REFER TO 35 ILL. ADM. CODE 370.122(b)

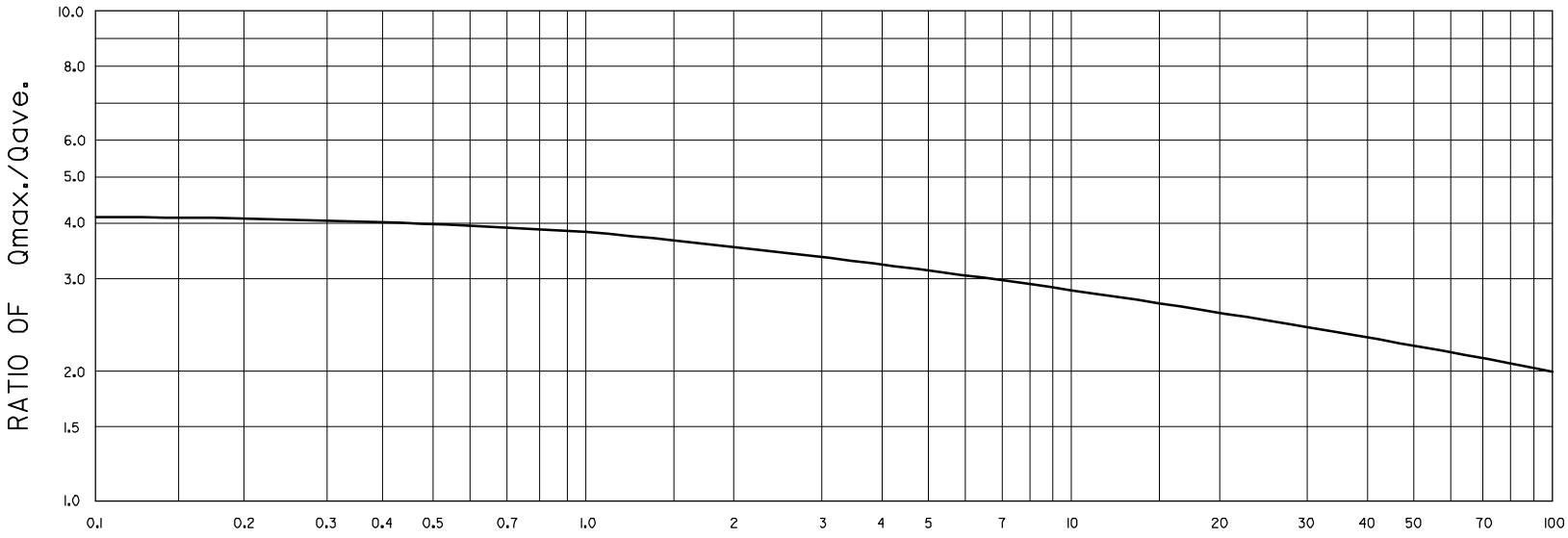

EXHIBIT Q

Qmax: Maximum Rate of Sewage Flow (Peak Hourly Flow)

Qave: Average Daily Sewage Flow

Source: $\frac{Qmax.}{Qave.} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$ (P = population in thousands)

Fair, G.M. and Geyer, J.C. "Water Supply and Waste-Water Disposal"
1st Ed., John Wiley & Sons, Inc., New York (1954), p. 136