ENGINEERING DESIGN CRITERIA

FOR

PUBLIC WORKS IMPROVEMENTS

City of Rockford, Illinois
Department of Public Works

July 1, 1988 REVISED March 1997

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The following document represents standard criteria for the design of public works improvements in the City of Rockford. The document represents information current at the time of publication.

The City of Rockford believes that the criteria furnished herewith is accurate and reliable, and much care has been taken in its preparation. However, no responsibility, financial or otherwise, can be accepted for any omissions or consequences arising out of the use of this material, including loss of profit, indirect, special, or consequential damages.

The references used throughout the document are listed in Appendix B. "Standard Specifications" refers to the "Standard Specifications for Road and Bridge Construction", published by the Illinois Department of Transportation. All documents refer to the current edition.

Any questions should be directed to the Director of Public Works for clarification.

1.01 Project Number

All projects, roadway, sewer, water, subdivision, etc., will require a project number. Project numbers will be assigned by the Engineering Division of the Public Works Department according to the Section, Township, and Range in which the project is located.

1.02 Deviation from Policies

Deviations from these design policies shall be approved by the City Engineer after consultation with the Director of Public Works. Reasons for deviation shall be clearly set forth, documented, and kept on file.

1.03 Bids over Estimate

Unless there is a just cause, contracts shall not be awarded for any bids that are more than 5% higher that the approved estimate. Where applicable, concurrence of IDOT shall be taken before awarding a contract.

1.04 Alternative Designs

Wherever possible, ***alternative design concepts***, with sketches and cost estimates, shall be analyzed before proceeding with the preliminary and the final designs. However, care must be taken to make sure that the structural adequacy and/or the needs of the project are not compromised in finding a most economical solution. The Director of Public Works shall have the authority to select the best possible alternative design.

1.05 Plan Approval

All work which involves existing, or future public facilities is required to have plans and specifications submitted to the City Engineer's office for approval. No construction is permitted until the approval of plans and specifications has been issued.

1.06 Changes in Plans after Approval

If changes to the plans and specifications are necessary after approval by the City Engineer they shall be re-submitted showing all changes. Approval of the changed plans and specification shall then be required by the City Engineer.

1.07 Joint Projects

All joint improvements, i.e., projects jointly funded by City-County or City-State, shall have a itten agreement of all parties concerned before starting design work on the project.

1.08 JULIE Information on Plans

The design plans shall show the type and nature of all utility facilities (mains and services) located within the limits of the R.O.W. and indicate all owners, and their addresses.

The utilities must be shown with appropriate ***symbols***. The vertical and horizontal location of utilities, to be relocated or adjusted, shall be shown on the plans.

1.09 Traffic Control and Detours

The design plans shall include a Traffic Control Plan (TCP). The TCP shall consist of the design for placement of all signs, signals, markings, barricades, barrels, warning lights, flaggers, and other devices as well as routes for detours which are to be used to regulate, warn or guide traffic during construction of the improvement. All designs shall be in conformance with the current edition "Manual on Uniform Traffic Control Devices".

The TCP shall be prepared under the general direction of at least one person certified as a Worksite Traffic Supervisor by the American Traffic Safety Services Association, Inc.

Advance warning signs for lane closures, intermediate information signs and standard signs shall be installed in accordance with the ***Illinois Highway Standards***. Cones will not be allowed as a traffic control device.

1.10 Engineering Services - Statement of Qualifications

Consultant selection procedures for professional services relating to design and construction shall follow the City of Rockford "Code of Ordinances".

The City of Rockford invites written Statements of Qualifications (SOQ's) from qualified architectural/engineering firms (A/E) for engineering services related to projects contained in the City of Rockford Capital Improvements Plan (CIP).

The SOQ's are to be delivered to the Director of Public Works for the City of Rockford, City Hall, 425 East State Street, Rockford, Illinois 61104.

The projects and their descriptions are included with the invitation. Each of the described projects are reviewed for possible interest with a single SOQ submitted for all projects. The City of Rockford will then use the SOQ throughout the calendar year to determine from which firms to request proposals. SOQ's shall include the following information:

a.) Description of specialized experiences and technical competence of the firm and its personnel in relation to the type of services required by the selected project.

b.) The resumes of the individuals who will be engaged in the project.

c.) Description of engineering services to be subcontracted.

d.) A description of the ability of the firm to perform the work within a reasonable time considering the firms current and planned work load.

e.) A list of similar projects completed by the firm with respect to the personnel who will be engaged in the project.

Once the SOQ's have been received, the City will review for each project the material submitted and select 2 to 6 firms for further consideration. These firms are invited to submit proposals to the Purchasing Manager.

The A/E Selection Committee consists of the Director of Public Works, Purchasing Manager and an Alderman who is Chairman of the Rockford City Council Code and Regulation Committee. Staff support is provided by the City Engineer, the Construction Program Engineer and the Water Superintendent.

All respondents shall be required to comply with all applicable laws on Fair Employment Practices, Equal Employment and Business Opportunity.

The City hereby notifies all respondents that it will affirmatively insure that in regard to any contract entered into pursuant to this advertisement, minority and/or women business enterprise will be afforded full opportunity to submit SOQ's and will not be discriminated against on the grounds of race, color, or national origin in consideration for any award.

1.11 Engineering Services - Requests for Proposals

The City of Rockford invites written Requests for Proposals (RFP's) to qualified A/E firms for engineering services related to projects contained in the CIP.

The RFP's are to be delivered in sealed envelopes marked with the project name to the Purchasing Manager of the City of Rockford.

The specified project and description are enclosed with the request. The described project should be reviewed and two copies of the RFP submitted for the project.

RFP's for the project shall include, but not be limited to, the following information:

a.) Education, experience or expertise of the firm's principals and key employees.

b.) The firm's general experience, ability and history of performance similar to the project under consideration.

c.) Availability of adequate personnel, equipment and facilities to complete the work in the required time.

d.) The name or names of individuals in the firm who will be assigned key project responsibilities with particular attention to the qualifications, competence and past performance as related to this specific project.

e.) Statement of Project Understanding. This item should include the firm's approach to design and problem areas and management of the overall project. It should incorporate communication, relative firm location, cost control and construction services, if required.

f.) The present work load and present and future commitments of available personnel, particularly those key persons expected to be assigned to the project.

g.) Design Schedule: This schedule should be a time frame outline for basic services of the Engineer and should include time requirements of the Engineer to perform:

1.) Preparation of a Design Report indicating the considerations involved and alternative solutions available to the City and opinion of probable cost.

2.) Prepare preliminary design documents consisting of final design criteria, preliminary drawings and opinion of probable cost.

3.) Prepare final bid documents which would include plans, R.O.W. plats and legal descriptions, and preparation of permits required by governmental agencies.

h.) An outline of the firm's hourly fee schedule. This should include the following:

1.) Exhibit A - Range of payroll costs for the employee grades that are anticipated to perform work on the project.

2.) Exhibit B - The determination of the overhead and fringe benefit factor and profit that will be later multiplied by the payroll costs to achieve the consultant fees. Fees for

service on subject project will be computed from the rates and factors shown on these exhibits.

Once the RFP's have been received, the A/E Selection Committee will review the material and, if required, request an interview. The Committee will then negotiate a contract with their first choice. If, for some reason, it is not possible to reach agreement on a fee or the terms of the contract, the Committee would then terminate the negotiation and consider their second choice.

All respondents shall be required to comply with all applicable laws on Fair Employment Practices, Equal Employment and Business Opportunity. The City hereby notifies all respondents that it will affirmatively insure that in regard to any contract entered into pursuant to this advertisement, minority and/or women business enterprise will be afforded full opportunity to submit RFP's and will not be discriminated against on the grounds of race, color, or national origin in consideration for any award.

1.12 Agency Requirements

The design shall comply with the requirements established by the agency providing funding, City , State, Federal.

1.13 Design Responsibilities

All engineering designs, whether done by a consultant working for the City, a consultant working for a developer, or by the City Engineers Office shall provide:

a.) Design report including, where ever possible, a minimum of two alternative design concepts.

b.) Preliminary design.

c.) Final design.

1.14 R.O.W. Acquisition Policies

R.O.W. acquisition shall be according to the "City of Rockford Acquisition and Relocation Assistance Policies and Procedures".

1.15 Utility Coordination

The Design Engineer shall be responsible to contact all utilities and place on plans all known information on the location of said utilities.

Preliminary and final design plans must be submitted to each utility for review.

1.16 Permits

Water/IEPA

Plans involving the extension of City Water Mains shall require an Illinois Environmental Protection Agency (IEPA) permit.

Sewer

Plans involving the extension of sanitary sewers shall require an IEPA Construction Permit.

Waterway Permits

Permits, (if required), to construct drainage structures, channel changes, point discharges into an existing stream, creek, river or lake, must be secured from the Illinois Department of Natural Resources, the Army Corps of Engineers and the IEPA.

R.O.W. Permits

All work proposed within the public R.O.W. may require a permit issued by one or more of the following, City, State, County, Township, the Department of Public Works, Engineering Division.

1.17 Bond Requirements

Contracts awarded by the City shall require contract bonds in the penal sum of the full amount of the contract, guaranteeing the faithful performance of the work in accordance with the terms of the contract.

All work proposed within the public R.O.W. requires a surety bond to be executed and filed with the City Engineer's Office prior to the start of work.

The costs of future public improvements proposed by subdivisions or developers shall be in accordance with Chapter 27 of the Code of Ordinances.

1.18 Public Improvement/Subdivision Acceptance

All projects involving the installation or construction of public facilities shall receive final inspection by the City prior to acceptance. Completion of all items, and passage of all required inspection or tests is mandatory. Final acceptance by the City shall be in letter form only, from the Department of Public Works.

PLAN AND SPECIFICATION REQUIREMENTS

2.01 Plan & Profile Sheet

Plans shall be drawn with ink on mylar (or shall be reproduced on mylar) and shall be of sufficient detail to show at least the following within, and 10' outside of the R.O.W.

Existing Features (Shown in relatively light lines)

a.) Plan Views

1.) Existing pavement, curbs and shoulders.

2.) Sidewalks and driveways.

3.) Fences.

4.) Trees and utility poles.

5.) Manholes, inlets, catch basins, headwalls, valve vaults, telephone vaults, risers, etc.

6.) Drainage structures and ditches.

7.) Storm Sewers, sanitary sewers, water mains, and other underground utilities.

8.) Water shut-offs.

9.) Property lines and lot pins.

b.) Profile Views (Based upon City Datum)

1.) Centerline profile of roadway with elevations at 50' intervals.

2.) Invert elevations of all manholes, inlets, valves and vaults.

3.) Profile of existing water, storm and sanitary sewer.

Proposed Improvements

a.) Location showing roadways, sanitary sewers, water mains, storm sewers, street names,
lot numbers, street addresses (if available), assigned manhole numbers, and a Benchmark index.

b.) In the plan view newly constructed roadway, storm sewer, sanitary sewer and services with location measurements from property pins, water main and services with location measurements from property pins, related stationing, etc., shall be in heavy lines and appropriately designated.

c.) In the profile view will be shown the original centerline grades in the original R.O.W. as well as the documented profile or transverse grades of any existing storm and sanitary sewers, culverts, ditches, water main, underground telephone or electric conduit or gas main., (relatively fine line with proper identification) Improvements in storm and sanitary sewers, culverts, ditches, manholes, inlets, catch basins, water mains, centerline profiles of planned roadway stationing, etc. will be shown in heavy lines properly identified.

d.) On both views, elevations, horizontal and vertical curve information slope data, quantities, stationing, benchmarks, dimensions, descriptive and directive notes, etc. will be drafted.

e.) Typical roadway sections with stationing will be presented, based upon design requirements.

2.02 Scale

Plans shall be drawn on single Plan and Profile sheets, 24" x 36", at a horizontal scale of 1" = 20' and a vertical scale of 1" = 5'.

2.03 Location of North Arrow

The north arrow shall be bold and clearly marked, with north generally oriented to the top, or right side of the plan sheet.

2.04 Reproducible Record Drawings

Upon completion of construction and prior to final acceptance by the Public Works Department, the engineer shall provide one set of record drawings for the project on Disk. These shall be drawn on single Plan and Profile sheets 24" x 36" at a horizontal scale of 1" = 20' and a vertical scale of 1" = 5'. The record set shall be drawn with ink on mylar (or shall be reproduced on mylar) and shall be of sufficient detail to show all requirements listed above.

2.05 3 Step Design Process - Design Report

A Design Report must be prepared with appropriate exhibits indicating clearly the following:

a.) Considerations involved and the alternative solutions available and setting forth the Engineer's findings and recommendations with opinions of probable costs including construction, R.O.W., construction inspection and contingencies.

b.) Five copies of the Report shall be submitted to the City Engineer for review. The designer may be required to present the report in person.

c.) For bridge projects, the Engineer shall prepare the Hydraulic Report and shall submit it to the Illinois Department of Transportation for approval.

2.06 3 Step Design Process - Preliminary Design

After authorization to proceed with the Preliminary Design Phase, the Engineer shall:

a.) Prepare preliminary design documents consisting of final design criteria, preliminary drawings, and outline specifications.

b.) Based on the information contained in the preliminary design documents, submit an opinion of probable costs for the Project including construction costs, R.O.W., construction inspection, contingencies, and compensation for all consultants.

c.) Furnish five copies of the preliminary design documents and cost estimates and present and review them in person with the City Engineer.

d.) For bridge projects, during the preliminary design phase, the Engineer shall prepare and submit or apply for all other required reports and/or permits.

e.) The Engineer shall provide a soils survey according to Section 4, for core borings, laboratory tests and/or inspection of samples and material.

2.07 3 Step Design Process - Final Design

After authorization to proceed with the Final Design, Engineer shall:

a.) Perform all necessary engineering work incidental to complete design surveys and prepare detailed construction plans, specifications and cost estimates for the completion of the Project.

b.) If required by the City Engineer, arrange and attend a meeting with representatives of the City and all interested agencies and utility companies for an on-site inspection and evaluation meeting with plan-in-hand. The Engineer agrees to abide by any changes which result from such meeting and incorporate all such changes in the plans and specifications prior to final submission to the City.

c.) Produce such documents and design data as may be required for, and assist in the preparation of, the required documents to obtain permits and approvals of such governmental authorities as have jurisdiction over design criteria applicable to the Project, and assist in obtaining such approvals by submission of plans and specifications to Illinois EPA.

d.) Furnish the City five copies of all plans, as required, specifications, cost estimates, and all necessary contract documents in complete form, and if required, shall present and review them in person with City.

e.) Advise the City Engineer of needed R.O.W. map, if required, showing all current property ownership involved along with R.O.W. easement documents, prepare plats and legal descriptions for deeds and easements.

f.) Establish required survey control both horizontally and vertically necessary to complete the Project.

2.08 Guarantee of Work

Engineers shall be held fully and totally responsible for their designs and for any liabilities resulting there from. When IDOT procedures require the City Engineer to sign projects designed by the Engineer, the Engineer shall give a letter to the City Engineer stating that the Engineer is fully and totally responsible for the design and that the Engineer acknowledges the fact that the City Engineer has signed only "IN GOOD FAITH".

2.09 Design Drafting

Plans shall be drawn on single Plan and Profile sheets 24" x 36" at a horizontal scale of 1" = 20' and a vertical scale of 1" = 5'. The plans shall be drawn with ink on mylar (or shall be reproduced on mylar) and shall be of sufficient detail to show minimally the following:

Existing Features (Shown in relatively light lines)

a.) Plan Views

1) Original pavement curbs and shoulders.

2) Sidewalks and driveways.

3) Fences within 10' of R.O.W. or proposed R.O.W. easements.

4) Trees and utility poles within 10' of R.O.W. or proposed R.O.W. easements.

5) Manholes, inlets, catch basins, headwalls, valve vaults, telephone vaults, etc. within 10' of R.O.W. or proposed R.O.W. easements.

6) Drainage structures and ditches within 10' of R.O.W. or proposed R.O.W. easements.

7) Storm sewers, sanitary sewers, watermains, and other underground utilities (where accessible) within R.O.W. or proposed R.O.W. easements, size, elevations, material, etc.

8) Water shut-offs within 10' of R.O.W. or proposed R.O.W. easements.

9) Property pins where they can be found.

b.) Profile Views

1) Centerline profile of roadway at 50' on centers or at contour breaks.

2) Top and invert elevations of all manholes, valve vaults, other vaults, inlets, catch basins, headwalls, (on plan view also).

NOTE: Within 10' of R.O.W. means anything within R.O.W. and within 10' outside R.O.W.
Proposed Improvements.

Proposed Features

a.) Location showing roadways, sanitary sewers, water mains, storm sewers, street names,
lot numbers, street addresses (if available), assigned manhole numbers, and a Benchmark index.

b.) In the plan view newly constructed roadway, storm sewer, sanitary sewer and services with location measurements from property pins, water main and services with location measurements from property pins, related stationing, etc., shall be in heavy lines and appropriately designated.

c.) In the profile view will be shown the original centerline grades in the original R.O.W., transverse grades of any existing storm and sanitary sewers, culverts, ditches, water main, underground telephone or electric conduit or gas main. (relatively fine line properly identified) Improvements in storm and sanitary sewers, culverts, ditches, manholes, inlets, catch basins, water mains and centerline profiles of planned roadway stationing will be shown in heavy lines properly identified.

d.) On both views, elevations, horizontal and vertical curve information slope data, quantities stationing, benchmarks, dimensions descriptive and directive notes, etc. will be drafted.

Proposed Cross Sections

a.) Use 1" = 5' vertical and 1" = 10' horizontal unless a special scale to clarify a congested section or to get extra large sections on the sheet is necessary.

b.) Show scales used on first sheet of cross sections and again on each sheet when different scale is used.

c.) Stations should progress from bottom to top of sheet with stationing placed on right side.

d.) Plot centerline by elevation.

d.) Label at least two even 5' elevation lines on both sides of each plotted cross section.

2.10 **Right of Products**

The City of Rockford is entitled to the rights of products of all its projects.

ROADWAY FUNCTIONAL CLASSIFICATION

3.01 Functional Classification System

All streets shall be classified according to their functional use in conformance with the **current** RATS "Functional Classification System".

Principal Arterial - This type of street serves the major centers of activity of a metropolitan area, the highest traffic volume corridors, and should carry a high proportion of the total urban area travel. The geometric design and traffic control measures for this type of street are used to facilitate the safe movement of through traffic.

Minor Arterial - This type of street interconnects with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of traffic mobility while providing access to abutting property; subject to the necessary control of entrances, exits and curb use so as to increase the capacity and improve the safety characteristics of the street.

Collector - This type of street provides both land access to abutting property and traffic circulation within residential neighborhoods, commercial and industrial areas. The urban collector should collect traffic from these areas and the local street system and channel it into the arterial system.

Industrial, Commercial -This type of street serves only to provide access to abutting industrial and commercial properties.

Local Residential - This type of street comprises all facilities not on one of the above systems. This type of street serves only to provide access to abutting property and service to residential and commercial areas.

SOIL SURVEY AND REPORT

4.01 Purpose

The purpose of the soil survey report is to provide significant information for design or decision on the following subjects:

The final location of the proposed improvements.

The suitability of materials for use in embankments.

The design of the roadway section.

The need for subgrade treatment, the type of treatment required and the need for intercepting drains.

4.02 Location of Borings

Borings for pavements shall be made at alternating right and left locations along the centerline of the proposed pavement at a minimum of 300' intervals and shall extend to a depth of not less than 6' below subgrade elevation.

Borings shall also be made for intersecting roads included in this project. Where rock is encountered, the boring shall be discontinued at the surface of rock.

4.03 Subgrade Treatment

Where soil conditions are encountered during the soils survey that may be expected to effect strength of the subgrade, the soil engineer shall make recommendations for the most economical subgrade treatment.

4.04 Laboratory Testing

The laboratory testing shall consist of the mechanical analysis, the Atterberg limits, and the Illinois Bearing Ratio of all soils that will be in direct support of the subbase. The results of laboratory tests, and all other pertinent data, shall show the grain size classification (soil type) for all significant soil types in the profile.

The results of such analysis shall be included in the Soil Report. The grain size classification shall be based on the entire sample, in which sand grains will be considered as larger than 0.074 mm in diameter, and silt as having diameters smaller than 0.005 mm.

4.05 General Information and Recommendations

General description of the proposed improvement shall include the location of the beginning and ending stations by section, or by street name. It shall also include surface type and width, number of traffic lanes, median, intersections or grade separations, and any other information which may be of value in the proper interpretation of the soil survey data.

A detailed description of the investigation shall consist of:

a.) Date when the field soils survey and investigation were made.

b.) Climatic conditions during investigation and for at least three months previous to the

start of the investigation.

c.) General description of terrain with special emphasis on drainage and erosion patterns.

c.) Any conditions of high water, flooding, etc., which may have been noted and which might be of value in the design.

e.) General description of soils encountered.

f.) Condition of existing comparable roads in the area.

g.) Traffic analysis data for the design period.

Definite recommendations shall be made relative to the construction of embankments, drainage installation, subgrade treatment (including removal and replacement), stability recommendations, the use of channel change materials, the special handling of unusual soil types or other pertinent factors affecting the design.

4.06 Location Sketch

A map or sketch showing the general location of the section shall be made a part of each soil report.

4.07 Data Sheets

The results of all laboratory tests listed in Section 4.04 shall be made a part of the Soil Report. Based on the soil survey and the laboratory analysis the soils engineer shall recommend the most economical pavement structure which is practical to construct. The project shall be divided into as many selected lengths as is necessary to achieve this end. Subgrade treatments shall be recommended for conditions in any selected length considered necessary to properly support the pavement structure.

The drainage class shall be Good, Fair, Poor or Very Poor drainage. The drainage classification shall not be determined on the basis of soil tests alone, but shall also take into account the topography and the entire soil profile to determine the drainage classification. It is important to remember that, while the soil group may be determined by means of laboratory tests results alone, the drainage conditions are established by the surface and subsurface characteristics of the site.

4.08 Soil Profile

Soil profiles providing a graphical record of the results of the investigation shall be included in the Soil Report.

5.01 Design Speed

The design speed, in miles per hour, for determining the roadway geometric design elements for the various street classifications shall be as follows:

Principal Arterial	**50**
Minor Arterial	**45**
Collector	**40**
Local Industrial/Commercial	**35**
Local Residential	**30**

5.02 Street and Capacity

The design hour volume of traffic (DHV) used in the design of arterial streets will be the 30th highest hourly volume. As a rule, the design hour volume will be considered to be approximately 8% to 10% of the average daily traffic for a 24-hour period.

Design criteria for urban arterial streets shall be in accordance with the current "Highway Capacity Manual-(HCM)". The HCM methodology shall be used to measure level of service. A minimum acceptable level of service for urban arterial streets and intersections is D.

An Intersection Design Study (IDS) shall be required for any intersection formed by any combination of the highest three roadway classifications, **arterial, minor arterial and collector (including commercial and industrial collector).**

5.03 Traffic Impact Study

The developer shall be responsible for the cost of preparing a traffic impact study and any revision thereto. The requirement of a traffic impact study shall apply to all site plans submitted to the Traffic Engineering Division for review that meet or exceed one or more of the following at full build-out of the project:

1) **The increase in traffic generated by the development is greater than or equal to 10% of the total existing vehicle trips on the adjacent street system.**
2) **The development generates 1,000 or more daily trip ends as determined by the average daily trip rate from the current ITE trip Generation Report.**
3) **May cause an existing or proposed intersection within the scope of the site plan to meet the warrants for traffic signal installation.**
4) **May cause an existing signalized intersection within the scope of the site plan currently operating at a peak hour level of service C or better to degrade to a peak hour level of service D or worse.**
5) **May aggravate an existing traffic problem location such as high accident location or an intersection with confusing geometry.**

6.01 Street Design Standard and Roadway Width

All streets within the City of Rockford shall be designed and built to the minimum urban street design standards shown in the following table. Additional right of way, through or turning lanes
shall be required or installed as warranted.

6.02 Traffic Lane Widths

The standard traffic lane width exclusive of separate turn lanes shall be a minimum of 11' **for new constructed lanes**. The minimum width shall not be less than 11' for reconstruction if conditions are warranted.

For arterial and industrial streets the lane width shall be a minimum of 12'.

6.03 Auxiliary Turning Lanes

In order to reduce the speed differential between the turning vehicles and the through traffic, separate turning lanes may be considered on all intersections involving arterial, collector streets, and at all major shopping center entrances and industrial subdivisions park entrances.

The determination of the need auxiliary lanes are based on the warrant analysis of the current IDOT "Highway Design Manual, section on Auxiliary Turn Lanes" and other factors. A 12' width shall be used on all designated turning lanes. Design elements of separate turning lanes shall be based on the intersection capacity analysis.

A two way left turn lane in the center of the roadway for the exclusive use of left turning vehicles in either direction may be provided on all arterial and commercial and industrial streets. The need for this additional lane shall be determined by adjacent land use, basic traffic information, and accident history involving left turning vehicles.

For new commercial and industrial subdivision, or development, the developer(s) shall be responsible for the cost of constructing any additional lanes and separate turning lanes as part of that subdivision or development. All required street improvements shall be approved by the City Traffic Engineer.

6.05 Parking Lane Width

No parking should be permitted on arterial, commercial, and industrial streets. On local residential and collector streets, the parking lane shall be 8' in width.

6.06 R.O.W. Width

The minimum R.O.W. shall be 120' in width **for principal** arterial streets **and 100'-150' for minor arterial streets, 80' for industrial and commercial collectors**, **80' for residential collector streets**, and 60' for **local** industrial, commercial and residential streets.

If medians or boulevards are to be constructed approval must be secured prior to design and additional R.O.W. may be required depending upon the design and width of the median.

6.07 Shoulders

Where no curb and gutter is constructed there shall be a minimum of 5' wide bituminous shoulder, 2" in depth placed on a 8" aggregate base.

6.08 Medians

Medians are to be designed only on arterial streets. The width may vary from a minimum of 4' to a maximum of 30' measured pavement edge to pavement edge. **Generally, medians installed at intersections are used to restrict left turn movements from driveways and to provide a safe island for pedestrians stand on when crossing at or near a signalized intersection. At intersection, a separate left turn lane may be designed in the median area with 6' raised median and 12' turn lane. However, the requirement and the design for this type of installation of a left turn lane must be reviewed and approved by the City Traffic Engineer.**

Boulevards constructed as part of local streets shall conform to the same design standards as set forth for arterial streets**. Additional right of way may be required.**

6.09 Street Grades

The maximum and **minimum** vertical street grade for arterial, industrial, and collector streets shall meet current IDOT requirements.

6.10 Curb and Gutter Section

The standard curb and gutter cross section shall be M6.18.

Where the street paving is integral P.C. concrete there shall be no joint between the curb and gutter section and the pavement. The minimum grade for gutter drainage will be 0.3%.

6.11 Cross Slope (Sidewalk to Curb)

The area between the sidewalk and curb will normally be grass and shall slope at a minimum rate of ¼ "/ft from the sidewalk toward the curb. This shall provide for the drainage of land within the street R.O.W. to the gutter.

The minimum space, primarily for storage of snow, will be 8' between the sidewalk and curb.

6.12 Side Clearance

No obstructions of any type, including traffic control devices, shall be closer than 2' to the back edge of the curb **and a minimum of 6' to the edge of pavement without curb**. This clearance requirement also applies to obstructions within the medians.

6.13 Intersection Design

Intersections shall have centerline offsets of not less than **150'.**

No more than two streets should intersect at any one point.

Streets shall be designed to intersect as nearly as possible at right angles.

Horizontal curves within intersections should be avoided.

6.13 Street Alignment

Compound curves and broken back curves are prohibited.

Reversing curves without an intervening tangent will not be permitted. On arterial and collector streets, tangents at least 100' long shall be designed between reverse curves. On residential, commercial, and industrial streets, tangents at 50’ long

Sight Distance - Center line sight distances for all streets shall be designed in accordance with **current ASSHTO guidelines.**

The minimum length of vertical curves will be governed by the Algebraic Differential and shall comply with current ASSHTO guidelines.

7.01 Pavement Cross Slope

The pavement cross slope shall be designed in accordance with the current IDOT standards.

7.02 Pavement Material and Thickness

The pavement material and thickness shall be designed in accordance with the IDOT "Design Manual".

Minimum pavement section shall not be less than 8" aggregate base course and 3" bituminous concrete for flexible pavements. A rigid pavement shall have a minimum pavement section of 4" aggregate base and 6" non-reinforced P.C. concrete.

7.03 Joints

All joints spacing shall be in accordance with the current IDOT standards.

8.01 Warrants for Installation

Traffic control signals shall be installed only at those locations having a need for this type of control as determined by at least 1 of the following 11 established signal warrants as detailed in the MUTCD. **All signal design elements and configurations must conform to MUTCD standard requirements.**

Warrant 1 - Minimum Vehicular Volume.

Warrant 2 - Interruption of Continuous Traffic.

Warrant 3 - Minimum Pedestrian Volume.

Warrant 4 - School Crossing.

Warrant 5 - Progressive Movement.

Warrant 6 - Accident Experience.

Warrant 7 - Systems Warrant.

Warrant 8 - Combination of Warrants.

Warrant 9 - Four Hour Volumes.

Warrant 10 - Peak Hour Delay.

Warrant 11 - Peak Hour Volume.

8.02 Number and Location of Signal Faces

A minimum of 2 signal faces shall be designed for each approach of through traffic. These signal indications will normally be located on the far side of the intersection a minimum of 40' and a maximum of 120' from the stop line. **Supplemental signal faces should be considered when the signal is the first one on a particular highway; or the roadway is striped four lane or is wider than 55 feet; or the nearest signal face is 150 feet or more beyond the stop line; and where visibility of the signal is affected by alignment or obstructions**. A near right signal may be provided as a secondary indication at selected intersections.

A supplemental far side signal face in addition to the mast mounted signal, is permissible for the control of an exclusive or permissive turn lane.

8.03 Height of Signal Faces

The bottom of the housing of a signal face, not mounted over a roadway, shall not be less than 8' nor more than 15' above the sidewalk or, if none, above the pavement grade at the center of the roadway.
The bottom of the housing of a signal face suspended over a roadway shall not be less than 15' nor more than 19' above the pavement grade at the center of the roadway.

Optimum visibility and adequate clearance should be the guiding considerations in deciding signal height, within the above limits. Grades on approaching streets may be important factors in determining the most appropriate height.

8.04 Number of Lenses per Signal Face

Each signal face, except for pedestrian signals, shall have at least 3 lenses but not more than 5. The lenses shall be red, yellow and green in color, and shall give a circular or arrow type of indication. Allowable exceptions to the above are:

a.) Where a single section green arrow lens is used alone to indicate a continuous movement.

b.) Where one or more indications are repeated for reasons of safety or impact.

c.) Where a dual indication signal section is used to display alternately a green arrow and a yellow arrow.

8.05 Size and Design of Signal Lenses

The shape of all signal lenses shall be circular **and 12" nominal diameter.**

Arrows shall be pointed vertically upward to indicate a straight-through movement and in a horizontal direction to indicate a turn at approximately right angles. When the angle of the turn is substantially different from a right angle, the arrow should be positioned in an upward slope approximately equal to that of the turn.

Each arrow lens shall show only 1 arrow direction. The arrow shall be the only illuminated part of the lens visible.

In no case shall letters or numbers be displayed as part of the vehicular signal indication.

8.06 Transverse Location of Traffic Signal Supports and Controller Cabinets

In the placement of signal supports, primary consideration shall be given to ensuring the proper visibility of signal faces. However, in the interest of safety, signal supports and controller cabinets should be placed as far as practicable from the edge of the traveled way without adversely affecting signal visibility.

Supports for post-mounted signal heads at the side of a street with curbs shall have a horizontal clearance of not less than 4' from the back of the vertical curb. Where there is no curb, supports for post-mounted signal heads shall have a horizontal clearance of not less than 2' from the edge of a shoulder within the limits of normal vertical clearance or **a minimum of 10 feet behind the edge of pavement, whichever is greater**. A signal support shall not obstruct a sidewalk.

8.07 Mast Arm Assembly and Poles

Mast arm assemblies and poles shall be made of galvanized steel. Other mast arm assemblies and poles may be used with prior written approval from the IDOT.

All mast arm poles shall be located at a minimum of 6 feet behind the back of curb. Where there is no curb, the mast arm poles shall be located at a minimum of 10 feet behind the edge of pavement or 2 feet behind the edge of shoulder, whichever distance is greater.

Mast arm shall be located to utilize a 14 to 55 foot mast arm assembly. The mast arm lengths shall be in 2 foot, even increments up to 54 feet (i.e. 14,16,...52, 54).. The outer traffic signal head on a mast arm assembly is to be placed 2 feet in from the end of the mast arm.

8.08 Incidental Items

Both post top and bracket mounted signal heads shall be made of **an approved material**. Mast arm mounted signal heads shall be made of polycarbonate resin. All signal head housings shall be finished in federal yellow color and the doors and visors shall be flat black.

Back plates shall be installed on all mast arm mounted signal heads. Post top and bracket mounted heads shall be furnished with back plates as directed by the City Traffic Engineer.

All pedestrian signal heads shall be furnished with polycarbonate lenses having the legend "Don't Walk" in the upper section and "Walk" in the lower section.

Over the roadway traffic signals shall be mounted on a mast arm assembly and pole. Span wire mounting is to be used for temporary signals only and is not acceptable for permanent installations.

Traffic signal electric cable shall have a combination of insulation and jacket as specified in the **current "**Standard Specifications for Traffic Control Items".

9.01 Box Culverts

Design selection of culverts shall require careful consideration of the balance between hydraulics, topographic constraints, potential hazards, and installation costs. State requirements must also be considered such as, policy, design, and permitting, as outlined in the **current** "Guide to the Hydraulic Design of Bridges and Culverts on Local Systems".

For drainage structures designed to carry local streets, water overtopping the structure from 100-year frequency storms shall not flood the roadway to a depth greater than 12" above the roadway crown.

For drainage structures designed to carry any street other than a local street, water overtopping the structure from a 100-year frequency storm shall not flood the roadway to a depth greater than 6" above the roadway crown.

The design discharge for culverts shall be determined by the Rational Method. The overall culvert system shall accommodate the 100-year discharge in such a manner that significant flood damages will not be caused by culvert installation. The accommodation shall include limited overflows for all designs based on discharges less than the 100-year discharge.

9.02 Open Ditches

Open ditches will be allowed when topography does not allow the installation of storm sewers, when the projected flow is too large to economically place in a storm sewer, or when an open ditch currently exists. Channels shall be designed to carry the 25-year flood frequency.

9.03 Channel Cross Sections

Longitudinal Slope shall provide mean velocities above 2.0 fps to prevent siltation, however, maximum velocities should not exceed 8.0 fps to prevent erosion.

Side slopes shall not be steeper than 3:1 for natural channels. Lined channels may have steeper side slopes.

Channel bottom widths should be at least twice the channel depth whenever practical. Design depths shall be as shallow as practical.

A freeboard between 1' and 2' shall be sufficient in straight channels. Additional freeboard shall be added to the outside channel edge along curves.

Protection against erosion must be provided to insure that channels maintain their design dimensions and to avoid downstream sedimentation.

9.04 Bridges

All bridges and their appurtenances shall be designed in accordance with the **current** IDOT "Bridge Manual".

STORM SEWER DESIGN

10.01 Design Flows

Storm water flows shall be based on the Rational Formula, Q = CIA where C is the coefficient of runoff, I is the rain intensity in inches per hour, and A is the area in acres. Rainfall intensity curves are shown in the **current** IDOT "Design Manual".

The storm sewer system shall be designed to carry the 25-year frequency flow except in storm sewer runs receiving runoff from only local streets and adjacent lots which require a 5-year frequency design. All storm sewer pipe shall be a minimum of 12" in diameter.

All sewers shall have a slope that will give a mean velocity, when flowing full, of not less than 3.0 fps based on Kutters formula. Where velocities greater than 10.0 fps are attained, special provision shall be made to protect against displacement, erosion or shock.

10.02 Inlet Design Standards

Inlets and pipes shall be located and sized so that conditions are met for a 5-year storm. Streets, except for arterial, shall have one 12' lane for the movement of traffic free of storm water flowing or ponding in the gutter. Arterial streets shall have 2 such lanes free of storm water. Intake design shall be Specials inlets and 700 inlets.

10.03 Pipe Standards

The type material permitted for storm sewers shall be as specified in the **current** "IDOT Standard Specifications".

10.04 Manhole Standards

Manholes shall be installed at the end of each line, at all changes in grade, size or alignment, or at distances not greater than 350'.

The minimum diameter of manholes shall be 48". The minimum diameter of the opening at the top of the manhole shall be 22".

When a smaller sewer joins a larger size pipe, the invert of the larger sewer should be lowed sufficiently to maintain the same energy gradient. An approximate method for securing this result is to place the 0.8 depth point of both sewers at the same elevation.

10.05 Protection of Water Supplies

Separation between water mains and storm sewers, storm sewer appurtenances, or other storm sewer structures shall be as in accordance with the **current** "Standard Specifications for Water and Sewer Main Construction in Illinois". Whenever possible, storm sewers shall be designed not less than 10' horizontally from water mains.

a.) When it is impossible to accomplish a 10' horizontal separation between a water main and a sewer, the water main invert must be at least 18" above the sewer crown and the water main and sewer must be designed in separate trenches. If separate trenches are not possible, the water main must be designed on a shelf of undisturbed earth located as far as possible from the sewer.

b.) Wherever it is impossible to accomplish the separations required above, both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for water tightness at the maximum expected surcharge head.

c.) Whenever a water main crosses a sewer, the water main invert must be at least 18" above the sewer crown for all portions of the water main located less than 10' from the sewer.

d.) When it is impossible to accomplish the vertical separation required above both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for watertightness at the maximum expected surcharge head wherever the water main is less than 10' from the sewer. A full 20' length of water main pipe shall be centered at the point of sewer crossing.

e.) When it is necessary that a water main cross under a sewer the sewer invert must be at least 18" above the water main crown for all portions of the water main located less than 10' from the sewer. The sewer must also be supported to prevent settling.

10.06 Proper Back-filling

Back-filling excavations shall be with a select fill material, as approved by the City, placed in 6" layers, loose measurement, and compacted to not less than 95% of standard laboratory density.

SANITARY SEWER DESIGN

11.01 Type of Flows Permitted

All sanitary sewage flows shall be based on the adopted comprehensive plan and existing zoning and land uses for the area under consideration.

Sanitary sewers and storm sewers shall be kept separate. No combined sewers shall be constructed.

Footing drains, downspouts, air conditioning water, etc. will not be allowed to discharge into the sanitary sewer system.

11.02 Design Flows

All sewers shall have a slope that will give a mean velocity when flowing full, of not less than 2.0 fps based on Kutters formula. Where velocities greater than 15.0 fps are attained special provisions as stated in Section 23.32 of the "Illinois Recommended Standards for Sewage Works" shall be made to protect against displacement, erosion or shock.

Peak design flow shall be determined in accordance with the "Illinois Recommended Standards for Sewage Works".

When a smaller sewer joins a larger one, the invert of the larger sewer shall be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

11.03 Pipe Standards

Sanitary sewer pipes shall be reinforced concrete, vitrified clay, ductile iron, PVC or ABS composite sewer pipe. All pipe used must conform to the "Sanitary District of Rockford Specifications". All sanitary sewers shall be a minimum 8" diameter.

Sanitary sewers shall be sufficiently deep so as to receive sewage by gravity from basements as well as to prevent freezing.

11.03 Pipe Standards (con't)

Sanitary sewer joints shall be designed to minimize infiltration and to prevent the entrance of roots. Allowable infiltration shall not exceed 200 gal/in/mi/day. Joints shall be of a type accordance with all current design and construction standards as specified by the Rock River Water Reclamation District.

Service wyes of a material equal in quality to the main sewer shall be installed wherever a residential service is anticipated. A 4" wye shall be installed. House services connected with tees are not acceptable.

11.04 Manhole Standards

Manholes shall be installed at the end of each line, at all changes in grade, size, or alignment, or at distances not greater than 400' for sewers for 15" or less in diameter and 600' for sewers 18" to 30".

A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24" or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24" the invert shall be filleted to prevent solid deposition.

The minimum diameter of manholes shall be 48". The minimum diameter of the opening at the top of the manhole shall be 24".

The flow channel through sanitary sewer manholes shall be made to conform in shape and slope to that of the sewers. Typical manholes are shown on Figures 13 and 14.

11.05 Protection of Water Supplies

Separation between water mains and sewers, sewer appurtenances, or other sewerage structures shall be in accordance with the "Standard Specifications for Water and Sewer Main Construction in Illinois".

a.) Whenever possible, water mains shall be laid no less than 10' horizontally from sewer, sewer appurtenance or other sewerage structure.

b.) When it is impossible to accomplish a 10' horizontal separation between a water main and a sewer, the water main invert must be at least 18" above the sewer crown and the water main and sewer must be constructed in separate trenches are not possible, the water main must be constructed on a shelf of undisturbed earth located as far as possible from the sewer.

c.) Wherever it is impossible to accomplish the separations required above, both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for watertightness at the maximum expected surcharge head.

d.) Whenever a water main crosses a sewer, the water main invert must be at least 18" above the sewer crown for all portions of the water main located less than 10' from the sewer.

e.) When it is impossible to accomplish the vertical separation required above both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for watertightness at the maximum expected surcharge head wherever the water main is less than 10' from the sewer. A full 20' length of water main pipe shall be centered at the point of sewer crossing.

f.) In addition to the above, when it is necessary that a water main cross under a sewer the sewer invert must be at least 18" above the water main crown for all portions of the water main located less than 10' from the sewer. The sewer must also be supported to prevent settling.

11.06 Proper Back-filling

Back-filling excavations shall be with a select fill material, as approved by the City, placed in 6" layers, loose measurement, and compacted to not less than 95% of standard laboratory density.

WATER DISTRIBUTION SYSTEM DESIGN

12.01 Material Standards

All water mains shall be constructed of Class 52 Ductile Iron pipe for all sizes through 12" and Class 51 Ductile Iron pipe for all sizes larger. All pipe shall be cement mortar lined inside and bituminous coated out.

Pipe-to-pipe joints on straight runs of main shall be push-on type. All joints on fittings and valves, and deflected pipe-to-pipe joints, shall be mechanical type with ductile iron retainer glands.

All fire hydrants shall be traffic barrel, dry-top, with one-5 1/4" main valve, one-4" pumper and two-2 1/2" hose nozzles.

Gate valves shall be used on all pipe less than 12" in diameter, and butterfly valves shall be used on all pipe 12" and larger.

Service branches through 2" diameter shall be constructed of Type K **soft** copper tubing. Service branches larger than 2" shall be constructed of ductile iron pipe.

Construction standards and all materials used in water distribution construction shall comply with the Rockford Water Division Specifications available from the water utility.

12.02 System Design

All mains shall be a minimum of 8" nominal diameter. Larger sizes will be required when needed to satisfy local water demand, fire flows, and/or transmission lines.

Friction losses shall be calculated by the Hazen-Williams formula, using a friction coefficient (C) of 100.

The static head and distribution system flow characteristics can be acquired from the water utility.

Water mains shall be sized so that the pressure at maximum flow conditions is at least 25.0 psig in all parts of the distribution system. In addition, the velocity at maximum flow must be no more than 10.0 fps.

Water mains shall be designed using standard pipe sizes of 8", 12", 16", 20", 24", **30"** and **36"** nominal diameter. When design calculations yield an intermediate pipe size the next larger standard size shall be used.

12.03 Location

All water mains shall be looped except where cul-de-sacs can be served by mains 300' or less in length.

a.) Water mains shall be constructed within public R.O.W. whenever possible.

b.) When it is necessary to construct a water main on private property an easement extending a minimum of **10**' on either side of the main must be recorded.

c.) No water main shall be laid under, nor within 10' of, any building.

No water main shall pass through or come into contact with any part of a sewer manhole or storm sewer inlet structure.

12.04 Protection of Water Supplies

Separation between water mains and sewers, sewer appurtenances, or other sewerage structures shall be as follows:

a.) Whenever possible, water mains shall be laid no less than 10' horizontally from any sewer, sewer appurtenance or other sewerage structure.

b.) When it is impossible to accomplish a 10' horizontal separation between a water main and a sewer, **the bottom of the water main** must be at least 18" above **the top of the sewer** and the water main and sewer must be constructed in separate trenches. Where separate trenches are not possible, the water main must be constructed on a shelf of undisturbed earth located as far as possible from the sewer.

c.) Wherever it is impossible to accomplish the separations required above, both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for watertightness at the maximum expected surcharge head.

d.) Whenever a water main crosses a sewer, **the bottom of the water main** must be at least 18" above **the top of the sewer** for all portions of the water main located less than 10' from the sewer.

e.) When it is impossible to accomplish the vertical separation required above both the water main and the sewer must be constructed of water main materials and the sewer must be pressure tested for watertightness at the maximum expected surcharge head wherever the water main is less than 10' from the sewer. A full 20' length of water main pipe shall be centered at the point of sewer crossing.

f.) In addition to the above, when necessary that a water main cross under a sewer the sewer invert must be at least 18" above the water main crown for all portions of the water main located less than 10' from the sewer. The sewer must also be supported to prevent settling.

12.05 Water Main Grades

Water mains shall have a minimum cover of 6', and a maximum cover of 8' from the top of the pipe to the finished ground surface. Water mains shall be laid at a uniform grade between main junctures. Where a uniform grade is not possible the grade shall be designed so that the number of changes in the direction of slope are the minimum possible.

a.) Where both ends of a section of main are at a lower elevation than an intermediate point, a means of releasing trapped air (e.g. fire hydrant, **air release valve** or bleeder valve) must be provided at the top of the "hill".

b.) Where both ends of a section of main are at a higher elevation than an intermediate point, a means of flushing out sediment (e.g. fire hydrant or bleeder valve) must be provided at the bottom of the "valley."

The minimum radii of curves which may be laid by deflecting mechanical joint pipe at the joints are:

8" - 220' radius
12" - 220' radius
16" - 320' radius
20" - 380' radius
24" - 500' radius
30" - 500' radius
36" - 500' radius

1.) Curve radii shall be measured in the plane defined by centerlines of the pipe.

2.) Curves with smaller radii than permitted above shall be made using fittings (bends and offsets).

12.06 Thrust Blocks

Thrust blocks shall be used wherever there is a change in direction (either horizontal or vertical), and on dead ends. Thrust blocks shall be P.C. concrete formed between the pipe or fitting and the undisturbed trench wall.

12.07 Valves

a.) 3 valves shall be installed at each cross fitting, 2 valves at each tee fitting, and 1 valve on each hydrant branch.

b.) Additional mainline valves shall be installed as needed so that no more than 500' of main will be isolated by any shut-off.

c.) Valves shall be arranged so that no more than 4 need be closed to isolate any section of main.

d.) Valves shall be installed on R.O.W. or property line extended.

e.) **Access to the valve shall be through a pre-cast manhole.**

12.08 Hydrants

Fire Hydrants shall be installed as follows:

a.) 1 fire hydrant shall be installed at every street intersection and at the end of every cul-de-sac.

b.) Additional fire hydrants shall be installed as needed so that hydrants are no more than 500' apart in residential areas and no more than 300' apart in commercial or industrial areas. Distances between fire hydrants shall be measured along roadway centerlines.

c.) Fire hydrants shall be located and shall be installed with the pumper nozzle directed toward the closest roadway.

d.) No part of any fire hydrant shall be located closer than 2' from the back of any curb, driveway or other vehicular traffic surface.

e.) Wherever possible, fire hydrants shall be installed in the unpaved area between the curb and sidewalk, with no part of the hydrant located closer than 2' from the sidewalk.

f.) Where the sidewalk extends to the curb, fire hydrants shall be installed so that no less than 3' of unobstructed sidewalk exists between the hydrant and the R.O.W. line.

g.) **Access to the auxiliary valve and hydrant elbow shall be through a pre-cast manhole.**

12.09 Service Connectors

Every property having frontage along a water main shall be provided with a service connection when the main is constructed unless the property has an existing service connection to another main along which the property fronts. Every property shall have a separate service connection to a water main, and no more than one property shall be served by any connection to a main.

Service connections shall be sized so that the flow velocity at the maximum anticipated demand is no more than 10.0 fps. Service connections must also be sized so that the friction losses between the main and the water meter at maximum demand are no more than 25.0 psig.

a.) 3/4" service connections will allow only when modifying the existing conditions to serve single family residences.

c.) 1" service connections will generally be adequate to serve duplex residences and single family residences with 2 or more full bathrooms.

d.) Service connections for multifamily residences, residences with high water demand rates, commercial and industrial properties will require detailed analyses to determine size.

d.) Combination services (Fire and Domestic) will be allowed with a single valve at the main with access to the valve through a pre-cast manhole, and shall split outside the building with an individual stop on the domestic service located a minimum of (5') five feet from the building or as approved by the City of Rockford Water Division.

Standard service connection sizes are 3/4", 1", 1 1/2", 2", 4" and 6" in addition to the standard water main sizes. When design calculations yield an intermediate service connection size the next larger standard size shall be used.

No service connection shall be larger than the main to which it is connected. On dead end mains no service connection shall be larger than 1/2 the main size.

The separation between the service connections and sewers, sewer appurtenances, or other sewerage structures shall be the same as required for water mains in Section 12.04.

Service connections shall be installed perpendicular to the water main at the point of connection and extend in a straight line to the boundary of the R.O.W. or easement in which the main is located. Where a service perpendicular to the main will not reach the property to be served, the service shall be laid in a straight line between the main and the property line.

Copper service connections shall be connected to the main by a corporation stop and shall be controlled by a curb stop accessible through a curb box. The curb stop and box shall be installed on the R.O.W. line, and shall not be located in or under any service walk or driveway. Where the entire area between the curb and R.O.W. line is paved the top of the curb box must be fitted with a pavement sleeve.

Ductile iron service connections shall be connected to the main by a tapping sleeve and valve or by a tee and standard valve. Access to the valve shall be through a manhole.

12.10 Manholes

Design of water manholes shall conform to the standards of the Rockford Water **Division.**

12.11 Proper Back-filling

Back-filling excavations shall be with a select fill material, as approved by the City, placed in 6" layers, loose measurement, and compacted to not less than 95% of standard laboratory density.

SIDEWALK AND BIKEWAY DESIGN

13.01 Width

Sidewalks shall be at a **minimum** 5' in width except in areas approved by the City where the width may be greater.

Sidewalks shall be located 1' from the property line and shall extend through all driveways.

13.02 Cross Slope

All sidewalks shall slope to the street at a rate of 1/4” per foot.

Sidewalks shall be required on both sides of all streets.

The street edge of the sidewalk surface shall be located above the curb 1/4"per foot for every foot horizontally from the curb.

13.03 Material and Thickness

Sidewalks shall be constructed of **6**" thick non-reinforced P.C. concrete conforming to the **current** IDOT Class standards.

Sidewalks crossing driveways shall be constructed of **6**" thick non-reinforced P.C. concrete conforming to the IDOT standards.

Brick and asphalt bituminous concrete walks shall **not** be permitted.

13.04 Ramps

Ramps are required to be installed at all street intersections, and at other locations required by the City.

13.05 Service Walks

Service walks may be installed in the public R.O.W. The design shall conform to Section 13.

13.06 Classification of Bikeways

Bikeway is defined as any road, path, or way which in some manner is specifically designed as being open to bicycle travel, regardless of whether such facilities are designed for the exclusive use of bicycles or are to be shared with other transportation modes.

The type of bikeway shall be dependent upon the average daily traffic volumes and the posted limit of the adjacent street. If the combination of speed and volume of the adjacent street does not fall into 1 of the following 5 categories, then the type of bikeway shall be dependent upon the speed only.

a.) Roads with a speed limit greater than 40 mph and an average daily vehicular traffic per

lane (ADTL) greater than 6000 shall require a Class I bikeway.

b.) Roads with a speed limit from 35-40 mph and an ADTL of 4000-6000 shall require at least a Class II bikeway.

c.) Roads with a speed limit from 25-35 mph and an ADTL of 1000-4000 shall require at least a Class II bikeway.

d.) Roads with a speed limit less than 30 mph and an ADTL of less than 1000 shall require at least a Class III bikeway.

13.07 Materials

All bikeways shall be constructed of 2" of bituminous concrete, Class B, on a 6" aggregate base.

13.08 Drainage

The surface of all bikeways shall have a cross-slope of 2% for proper drainage.

13.09 Grades

The maximum allowable grade for a bikeway shall be 8% for ascending or descending sections less than or equal to 500'.

The maximum allowable grade for all classes of bikeways shall be 5% for ascending or descending sections greater than 500'.

13.10 Design Speed

The minimum design speed for sections longer than 500' and less than a 5% grade shall be 20 mph.

The minimum design speed for sections shorter than 500' and less than a 5% grade shall be 25 mph.

The minimum design speed for sections longer than 500' and greater than a 5% grade shall be 30 mph.

The minimum design speed for sections shorter than 500' and greater than a 5% grade shall be 30 mph.

13.11 Stopping Sight Distance

The stopping sight distance for a bikeway shall be dependent upon the design speed and the graph on Figure 22.

13.12 Vertical Clearance

The minimum vertical clearance for a bikeway shall be 8'.

13.13 Width

The minimum width for a one-way bikeway shall be 5'. The minimum width for a two-way bikeway shall be 8'. Typical design as shown on Figure 23.

13.14 R.O.W.

The minimum R.O.W. width for a bikeway shall be equal to the bikeway width plus 4'.

13.15 Arterial Offset

The minimum offset distance for a bikeway from a street classified an arterial shall be 5' from the back of curb. This requirement may be reduced if either of the following requirements are satisfied.

a.) A barrier of suitable design to prevent encroachment of vehicles from the adjacent roadway is constructed.

b.) In the case of rural cross sections a turnoff for emergency parking is provided every 1000', or as provided by State law.

13.16 Drainage Grates

All drainage grates shall be bicycle safe and conform to the City standard.

13.17 Bicycle Facilities

All bicycle facilities shall be designed in accordance with the Current the IDOT " Policies and Procedures for Accommodating Bicycle Travel in Highway Improvements" and current AASHTO " Guide For The Development of Bicycle Facilities" manuals.

14.01 **Driveway Design Elements**

All driveway design elements shall conform to the current IDOT " Handbook for the Policy on Permits for Access Driveways to State Highways" manual.

14.02 Driveway Material and Thickness

The driveway apron extending from the roadway to the property line shall be constructed of **6**" non-reinforced P.C. concrete, **8" or a 8**" aggregate base with a 2" bituminous concrete surface, with all materials conforming to **current** IDOT "Standard Specifications".

Driveways constructed of P.C. concrete shall have expansion joints adjacent to the curb, and each side of the public sidewalk. Sidewalks shall extend through the driveway.

14.03 Driveway Width

The maximum driveway width for commercial or industrial zoned properties shall be **24' to** 35' at the property line with a maximum curb opening of 85'. Residential drives shall have a maximum width of **20'** at the property line and 54' at the curb line.

14.04 Driveway Location

All driveways shall be located to provide a maximum clearance distance from an intersecting public road and/or the property line. **Driveway location shall be measured from the edge of pavement of intersecting street to the center line of the proposed driveway.**

All drive ways should be located to provide a maximum distance away from an intersection. Other management methods (raised median, right in/out only, or share driveways) of control access on arterial street should be applied under direction of the City Traffic Engineer , to limiting the number of conflict points, separating basic conflict areas, and limiting deceleration requirements.

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The edge of the driveway flare shall be no closer than 3' to the property line extended as measured at the curb.

Where more than 1 driveway approach serves a single parcel from a common street frontage there shall be a minimum of 6' of straight curb between the near edges of the adjacent driveway aprons.

14.05 Number of Driveways

Normally, only 1 driveway will be permitted for each residential property and **2 driveways for a commercial or industrial property. Additional driveway may be considered and approved by Traffic Engineer based upon parcel size and type of development.**

STREET LIGHTING DESIGN

15.01 Overview

The rapid advancement of roadway lighting hardware technology an analytical techniques provide the design engineer with many options to accomplish lighting goals. In general the IES "Lighting Handbook" shall provide standards for all lighting layouts and designs. Specific design criteria for the City of Rockford are provided here which may be in excess of the IES requirements or may be refinement of these standards.

Current research in the roadway lighting field is concentrated on Pavement Luminance. This theory is based on the level of light reflected by the pavement surface rather than the level of light originating from the lighting source. While this theory has merit in the laboratory, the roadway analysis is heavily dependent on values for the reflectance index of varying pavement types. Unfortunately, research to date has provided these values for new asphalt and concrete pavement surfaces only. Weathered, polished and other imperfections in roadway surfaces has not been addressed. Therefore, the analysis techniques for the City of Rockford shall be based on Pavement Illuminance.

Computer modeling is recommended for all roadway and area lighting designs. The availability of software is such that all design engineers should have access to this resource. Requirements for area designs, such as parking lots, will be difficult if not impossible to comply with using hand methods.

15.02 Illumination Levels

Street lighting installations based on these standards shall be similar or equal to the ecommended standards adopted in the "American National Standard Practice for Roadway Lighting". The chart below summarized these recommendations. Values are in foot candles and represent average maintained illumination levels.

15.02 Illumination Levels (con't)

	URBAN LAND USE		
Roadway Type	Commercial	Intermediate	Residential
Arterial	2.00	1.40	1.00
Collector	1.20	0.90	0.60
Local	0.90	0.60	0.40

TABLE 1.0

The roadway type is based on the **current** "Functional Classification System" developed and approved by the RATS. The land use is based on the **current land use plan** adopted by the City Council. In both cases adjustments can be made where the classification is vague or the area is in the development stage.

15.03 Fabrication and Design Specifications

The City of Rockford shall provide direction on a case by case basis in the area of material fabrication and design. The following general requirements should provide direction:

a.) Contemporary luminaries should be either cobra head, shoe box or interstate design. Material should be aluminum.

b.) Decorative luminaires should be acorn or globe design. Material should be shatterproof.

c.) Contemporary poles should be davit, square tapered or circular tapered. Material should be aluminum, carbon steel or stainless steel. Self-weathering steel should be a avoided in urban environments where contact with pedestrians is possible. Cast iron, concrete and fiberglass should be avoided.

c.) Contemporary poles on bridges and viaducts should be davit design. Luminaires should be shoe box.

15.04 Combination Traffic Signals

All new traffic signal mast arm installations to be installed shall include street lighting. Design of these combination mast arms shall comply with the "Standard Specifications for Traffic Control Items".

15.05 Highway Sign Lighting

All new illuminated overhead sign panels to be installed shall use High Pressure Sodium lighting. Fluorescent fixtures shall not be allowed. Design of these sign panels shall comply with the **current** "Standard Specifications for Traffic Control Items".

16.01 Open Ditches

Where open ditches are provided for drainage, the minimum ditch grade shall be 1.0% and the maximum grade shall be 3.0%. In addition, it will be necessary to place a concrete pipe for drive approaches constructed through the drainage ditch. The size of pipe required shall be determined by the area to be drained.

The cross slope for non-paved ditches shall be a desirable 4:1 slope with a maximum permitted slope of 3:1.

16.02 Energy Dissipaters

All drainage designs shall include consideration of high exit velocities at the outlet. Methods of dissipating the high energy at outlets, such that erosion will not occur, shall be incorporated into the design process.

Energy dissipation methods shall include alignment, channel lining, rock rip-rap, drop structures, stilling basins and ditch checks.

16.03 Detention Basins

Developments which increase the amount of impermeable area such as the construction of roof structures or paved areas shall be subject to the following:

a.) The maximum controlled storm water runoff release rate shall not exceed the natural safe storm water drainage capacity of the downstream system, which has been found to **be 0.2 ft^3 /sec/acre.**

b.) Pipe outlets of less than 12" in diameter shall not be allowed.

b.) Removable orifice plates shall be employed when these pipe size requirements can not be met.

16.04 Dry Bottom Storage

When the maximum controlled storm water runoff release rate shall be exceeded, any or all of the following storm water storage methods shall be provided:

a.) Dry bottom storm water storage areas must be designed to serve a secondary purpose of recreation, open space or similar type of use, which will not be adversely affected by occasional intermittent flooding.

b.) The combination of storage of major floodwater runoff from a 100-year frequency storm and the allowable release rate shall not result in a storage duration in excess of 48 hours.

c.) Minimum grades for turf areas shall be 1.0% and maximum side slopes shall be 25.0%. Storage area side slopes shall follow the natural land contours as closely as practicable, and a minimum of earth excavation shall be used to create the storage facility.

d.) Temporary seeding or other soil stabilization measures shall be established in the storm
water storage area and major floodwater passageway immediately following the construction or reconstruction of these areas. During the construction of the overall development, it is recognized that a limited amount of sediment buildup may occur in the storm water storage area due to erosion. In no case shall the volume of the storage area be reduced to less than 3/4 of the required volume during the construction phase of the development.

e.) Permanent erosion control measures such as mulching, hydroseeding, conventional seeding, nurse crops, fertilizing or sod installation shall be utilized to control soil movement and erosion within the storage area and major floodwater passageway. The installation of these permanent measures shall take place only after the majority of construction and other silt and sediment-producing activities have been completed. Prior to the establishment of the permanent erosion control measures, the required capacity of the storm water storage area and the excess storm water passageway shall be restored.

f.) The control structure shall be provided with an interceptor for trash and debris, and it shall be designed and constructed to prevent soil erosion and not to require manual adjustments for its proper operation. An inlet design that will produce turbulent flow conditions during any portion of the storm water storage cycle will not be acceptable.

g.) Adequate impact stilling basins shall be provided to ensure that downstream soil erosion is alleviated and the regime of the downstream drainage facility is not disturbed.

h.) Each storm water storage area shall be provided with a method of overflow in the event a storm in excess of the design capacity occurs. This overflow facility shall be constructed to function without specific attention and can become a part of excess storm water passageway described in this section.

i.) The entire storm water storage area shall be designed and constructed to fully protect the public health, safety and welfare. If a condition occurs in the storm water storage area which is hazardous to the public health, safety or welfare, the person, agency, or association responsible for the condition will be required to provide approved corrective measures.

j.) Low flow conduits or paved channels shall be provided in storm water storage areas. These conduits or channels shall be so constructed that they will not interfere with the secondary usage of the storage area and will reduce the frequency of time that the storage area will be covered with water.

16.05 Wet Bottom Storage

a.) Wet bottom storm water storage areas shall be designed in compliance with all of the regulations which are applicable and govern the construction of dry bottom storm water storage areas.

b.) The water surface area of the permanent pool shall not exceed 10% of the area of the tributary watershed.

c.) Protection of the shoreline must be provided to alleviate soil erosion due to wave action.

d.) Minimum normal water depth shall be 4'. If fish are to be used to keep the pond clean,

at least 1/4 of the pond area shall be a minimum of 10' deep.

e.) A method shall be provided to lower the pond elevation for cleaning purposes and shoreline maintenance.

f.) Measures shall be included in the design to prevent stagnation. This may be accomplished by fountain aeration or some other method used to ensure aerobic pond conditions.

g.) The volume of water permanently stored shall not be considered to be part of the required excess storm water storage volume.

16.06 Paved Bottom Storage

Design and construction of the pavement base must ensure that there is no pavement damage due to flooding. Control structures in paved areas must be readily accessible for maintenance and cleaning. Vortex control devices will be required.

16.07 Rooftop Storage

Rooftop storage of excess storm water shall be designed and constructed to provide permanent control inlets and parapet walls to contain excess storm water. Adequate structural roof design must be provided to ensure that roof deflection does not occur which could cause the roofing material to fail and result in leakage. Overflow areas must be provided to ensure that the weight of stored storm water will never exceed the structural capacity of the roof.

16.08 Parking Lot Storage

Automobile parking facilities used to store excess storm water must be constructed having a maximum depth of stored storm water of 18".

16.09 Underground Storage

Underground storm water storage facilities must be designed for easy access in order to remove accumulated sediment and debris. These facilities must be provided with a positive gravity outlet.

16.10 Calculations

The volume of required storm water storage shall be calculated on the basis of the maximum value achieved from the runoff of a 100-year frequency storm less the volume of water released through the outlet structure. A generally recognized and substantiated method must be used for these calculations. The control structure shall be designed to maintain as uniform a flow as possible, independent of the storm water storage volume. Where the proposed project or land development contains only a portion of a water shed or contains portions of several watersheds, the storage volume calculations shall be based upon the area of the entire project, development or land use change. The maximum release rate shall be established by multiplying the total acreage of the tributary watershed by **0.2 ft^3/sec/acre**.

Storm water storage areas which will be filled to capacity by high-frequency storms shall be designed in a manner that will protect immediate downstream properties, and all overflow structures shall be designed to function properly and effectively without the necessity of making manual adjustments.

If the orderly management of the storm water runoff can not be achieved by passing the entire tributary area runoff through the storm water storage area, the storm water storage

area shall be constructed to exclude the runoff from the tributary area originating outside of the area to be developed.

16.11 Application

Storm water detention facilities shall be designed by and construction supervised by a registered professional engineer.

Upon completion of construction, a set of record drawings certified by a registered professional engineer shall be submitted to the Department of Public Works.

APPURTENANCES

17.01 Plantings (Other than trees)

Plantings shall be of approved salt resistant variety.

Plantings shall not be placed so as to hinder sight distance or within 40' of an intersection measured from the curb line extended.

17.02 Trees

Trees shall be of an approved salt resistant variety.

Trees shall not be placed so as to hinder sight distance or within 40' of intersections.

Trees may not have branches lower than 8' in vicinity of sidewalks and 15' over street areas.

17.03 Guard Rail

Metal, wood or concrete guard rail shall be constructed according to the **current IDOT specifications.**

17.04 Street Furniture

Street furniture shall mean any structures placed within the R.O.W. for purposes of public use or aesthetics such as benches, pillars, information signs, fountains, trash receptacles and bollards.

Street furniture **shall** not obstruct sight distance, and must be approved by the City Engineer in the form of a written permit.

All street furniture must be attached to foundations or other structure so as not to be easily moved. They must not be hazardous to either pedestrian or vehicular traffic.

17.06 Street Name Sign

It is the developer's responsibility to notify the City and to pay for the initial cost of street name sign(s) and other warranted traffic control devices installations in their newly completed subdivision.

PARKING LOTS

18.01 Pavement

Flexible - All driving and parking areas shall be designed with a minimum 2" bituminous concrete surface, Class B over a 8" compacted aggregate base course.

Rigid - All driving and parking areas, including driveways, shall be constructed of **6**" non-reinforced P.C. concrete, Class X, on a 4" aggregate base.

18.02 Drainage

A system of inlets and pipes connecting to the street storm sewer shall be constructed within each parking lot to accommodate detention requirements as indicated in Section 16. None of the storm water may be diverted to the street at the driveways.

18.03 Lighting

The parking lot pavement shall be lighted to an average 2 horizontal foot candles. The preferred system of illumination is HPS Illuminaires with a mounting height of 30' to 32' or heights approved by zoning requirements. A separate control center with meter shall be provided for each lot. Provisions shall be made for both an "All Night" & "Part Night" circuit using both a time clock and photo control for switching.

18.04 Landscaping

All lots shall be constructed with landscaping areas as specified in the **current** Zoning Ordinance of the City of Rockford.

18.05 Disabled Spaces

Spaces designated for use by handicapped drivers only shall be provided in accordance with State law and the City of Rockford Code of Ordinances.

RAILROAD CROSSINGS

19.01 Material

Molded rubber railroad crossing shall be made of molded linear high density polyethylene or rubber reinforced with steel providing a durable, anti-skid top surface and designed specifically for railroad at grade crossings. The material shall be resistant to moisture, road salts and solvents. The molded pads shall be affixed according to manufacturers recommended procedures. (See Figure 26)

Bituminous Railroad Crossings shall be constructed as shown on Figure 27. Flange or mud rail shall be placed on both sides of each rail and full depth (to the bottom of the tie) bituminous material shall be placed in maximum 3" lifts from outside ties.

Proposed Wood Tie Railroad Crossings shall be submitted to Public Works for approval prior to design.

19.02 Tracks without Superelevation

The vertical alignment of the road (across the tracks) shall have the same grade as that of tangent drawn from the tops of the outer rails of the outermost tracks. Past the outer rails, continue the same grade for a distance of 2'; thence for a distance of 25', the vertical alignment of the approaches shall have a grade that does not exceed 1%; thence, to the railroad R.O.W. line, the vertical alignment shall have a grade that does not exceed 5%.

19.03 Tracks with Superelevation

The vertical alignment of the road (across the tracks) shall have the same grade as that of a tangent drawn from the tops of the outer rails of outermost tracks. Past the outer rails, continue the same grade for a distance of 2'; thence, for a distance of 25', the vertical alignment of the approaches shall not deviate from the said tangent grade by more than 1%, thence, to the railroad R.O.W. line, the vertical alignment of the approaches shall not deviate from the said tangent grade by more than 5%.

19.04 removed

ALLEYS

20.01 Alley Classification

Residential Alley - A route located between local roads used primarily for access to the rear of residential property and not used for general traffic circulation.

Commercial Alley - A route located between commercial streets used primarily for access to the rear of commercial property and not used for general traffic circulation.

20.02 Pavement Width

Residential alleys shall have a pavement width of 16'.

Commercial alleys shall have a pavement width of 20'.

20.03 R.O.W. Width

The R.O.W. shall be 20' for all alleys.

20.04 Alley Grades

The maximum grade for alleys shall be 8% for residential and 6% for commercial or industrial alleys. The minimum grade shall be 0.4% for all types of alleys.

20.05 Pavement Cross-Section

The pavement shall have a 4% inverted crown cross section. This will be as shown on Figure 28.

20.06 Pavement Material and Thickness

Flexible - The minimum flexible pavement for alleys shall be 8" aggregate base with a 2" bituminous concrete surface.

Rigid - The minimum rigid pavement for alleys shall be **6**" of non-reinforced P.C. concrete on a 4" aggregate base.

There will be no curb and gutter sections built as part of alleys.

20.07 Subgrade Requirements

The subgrade shall be compacted to not less than 95% of the standard laboratory density as determined in accordance with AASHTO.

APPENDIX A LIST OF FIGURES Page -A-

All figures referenced in this document are listed below in the order of occurrence, showing title and page of reference.

All publications referenced in this document are listed below in the order of occurrence.

1. "Standard Specifications for Road and Bridge Construction", published by the Illinois Department of Transportation.

2. "Highway Standards", published by the Illinois Department of Transportation.

3. "Manual on Uniform Traffic Control Devices", published by the Illinois Department of Transportation.

4. "Acquisition and Relocation Assistance Policies and Procedures", published by the City of Rockford.

5. "Code of Ordinances", published by the City of Rockford.

6. "Functional Classification System", published by the Rockford Area Transportation Study.

7. "Highway Capacity Manual 1985 - Special Report 209", published by the Transportation Research Board.

8. "Design Manual", published by the Illinois Department of Transportation.

8. "Standard Specifications for Traffic Control Items", published by the Illinois Department of Transportation.

9. "Guide to the Hydraulic Design of Bridges and Culverts on Local Systems", published by the Illinois Department of Transportation.

11. "Bridge Manual", published by the Illinois Department of Transportation.

12. "Standard Specifications for Water and Sewer Main Construction", published by the State of Illinois.

13. "Recommended Standards for Sewerage Works", published by the State of Illinois.

14. "Standards Specifications for Sanitary Sewers", published by the Sanitary District of Rockford.

15. **“Water Division Specifications for the City of Rockford “, published by the Public Works Department.**

16. "IES Lighting Handbook", published by the Illuminating Engineering Society.

16. "American National Standard Practice for Roadway Lighting", published by the Illuminating Engineering Society.

18. "Year 2000 Land Use Plan", published by the City of Rockford.

All acronyms and abbreviations referenced in this document are listed below in the order of occurrence.

ACRONYMS

IDOT Illinois Department of Transportation
TCP Traffic Control Plan
MUTCD Manual on Uniform Traffic Control Devices
SOQ Statement of Qualifications
A/E Architectural / Engineering
RFP Request for Proposal
R.O.W. Right-of-way or rights-of-way
IEPA Illinois Environmental Protection Agency
RATS Rockford Area Transportation Study
DHV Design Hourly Volume
IDS Intersection Design Study
HCM Highway Capacity Manual
P.C. Portland Cement
PVC Polyvinyl Chloride
ABS Asbestos
ADTL Average Daily Traffic per Lane
IES Illuminating Engineering Society
AASHTO American Association of State Highway and Transportation Officials

ABBREVIATIONS

mm Millimeter(s)
mph Miles per hour
fps Foot per second or feet per second