

## **Section 1 – General Information**

### **1.1 Purpose**

The Design Standards Manual has been prepared to implement a policy for design of public improvements within the Metropolitan Area. Public improvements are defined as meeting any of the following:

1. Designed, constructed, and maintained by the Jurisdiction as a public improvement.
2. Designed and constructed by a private owner/developer. The Jurisdiction will maintain the improvements upon acceptance of the improvements.

The information in this Manual is the basic criteria for design of public improvements. The project engineer should design using this criteria and sound engineering judgement. Situations do arise that require special considerations. Therefore, to eliminate hardships or problems, the jurisdiction may evaluate and grant design exceptions on a case-by-case basis.

These design standards are intended primarily for new improvements, and may not be attainable for retrofit and rehabilitation projects. These projects must be considered individually to determine if the criteria herein may apply.

The Design Standards Manual and the Cedar Rapids Metropolitan Area Standard Specifications for Public Improvements should be used in the preparation of all improvement plans submitted for review. The Jurisdiction will review submittals for general compliance with the Design Standards Manual. Acceptance by the Jurisdiction does not relieve the project engineer from the responsibility of insuring that calculations, designs and plans are accurate and in compliance with this Manual and reasonable professional standards of care.

Any criteria not specifically addressed in this document should follow the individual Jurisdiction's policy.

### **1.2 Jurisdiction**

These Design Standards shall apply to the local governments of Cedar Rapids, Marion, and Hiawatha.

### **1.3 Revisions to the Design Standards**

The Design Standards may be amended as dictated by experience. The Jurisdiction engineers shall monitor the effectiveness of the Design Standards and will recommend revisions as needed.

### **1.4 Enforcement Responsibility**

It shall be the responsibility of each Jurisdiction to enforce the provisions of these Design Standards.

1.5 Interpretation

The interpretation and application of the Design Standards shall be made by the Jurisdiction.

**Section 2 – Definitions**

The following definitions are related to the general policy. All work defined shall be constructed according to the Cedar Rapids Metropolitan Area Standard Specifications and Details

2.1 Jurisdictional Engineer

The local Jurisdictions' representative who will enforce the provisions of the Design Standards Manual.

2.2 Project Engineer

The person or firm responsible for the design and/or administration of the project.

2.3 Inspector

The representative of the Jurisdiction or Owner of the project assigned to observe construction and materials thereof.

2.4 Building Sanitary Sewer Service - Private

Conveys wastewater from a single building to a public or private sanitary lateral or trunk sewer. Service is to be privately owned and maintained from the building to the public sewer.

The building sanitary sewer stub is the portion of building sanitary sewer within the public right-of-way or a point beyond the right-of-way line as specified by the Jurisdictional Engineer. Construction must be according to the Jurisdiction plumbing code. A plumbing permit is as required by the local Jurisdiction.

2.5 Sanitary Sewer Lateral - Private

A sewer constructed on private property to convey wastewater from one or more building sanitary sewers to a public sanitary sewer. This sewer is limited to providing service to one owner or association. This sewer is to be privately owned and maintained with respective easements by the owner or association. A maintenance agreement and/or permit are as required by the local Jurisdiction.

2.6 Sanitary Sewer Lateral - Public

Conveys wastewater from one or more building sanitary sewers to another lateral or trunk sanitary sewer. This sewer shall be owned and maintained by the Jurisdiction

and shall be constructed on public property or on private property with an easement held by the Jurisdiction. An Iowa Department of Natural Resources or Jurisdiction Permit is required.

2.7 Sanitary Sewer Trunk - Public

Receives and conveys wastewater from an area of 160 acres or more to another trunk sewer or interceptor sewer. This sewer shall be owned and maintained by the Jurisdiction and shall be constructed on public property or on private property with an easement held by the Jurisdiction. An IDNR Permit is required.

2.8 Sanitary Lift Station - Private

Receives and conveys wastewater from one or more sanitary lateral sewers which cannot be conveyed by gravity flow to the public sewer system. This facility shall be located on private property and shall be maintained by the property owner or association. This facility shall not receive wastewater from sanitary sewers that are owned and maintained by parties other than the lift station owner. A maintenance agreement and/or permit are as required by the local Jurisdiction.

2.9 Sanitary Lift Station - Public

Conveys wastewater from one or more sanitary sewers which cannot be conveyed by gravity flow to the public sewer system. This facility shall be publicly owned and maintained. Telemetry may be required to communicate with designated locations such as the Cedar Rapids Water Pollution Control Facility. This facility shall

be constructed on public property or private property with an easement held by the Jurisdiction. An IDNR or Jurisdiction permit is required.

2.10 Building Water Service - Private

The water service line includes the piping and fittings including the corporation, installed from the public or private water main to the meter connection of the building served. The service shall be privately owned and maintained from the building to the public main. Construction must be according to the Jurisdiction plumbing code. A permit is as required by the Jurisdiction.

The building water service stub is the portion of building water service line within the public right of way or designated point beyond the right-of-way as specified by the Jurisdictional Engineer.

2.11 Water Main - Private

Distributes water to one owner or association. This privately owned and maintained water main shall be constructed on private property. A maintenance agreement and/or permit are as required by the Jurisdiction.

2.12 Water Main - Public

A water main to distribute water for domestic, industrial and fire fighting purposes. The main shall be owned by the Jurisdiction, water works or an approved public/private water utility corporation or association. An IDNR or Jurisdiction permit is required.

2.13 Building Storm Sewer - Private

Conveys storm water or ground water from a single building to a public or private storm sewer or other open channel. This sewer shall be privately owned and maintained from the building to the public storm sewer main. The building storm sewer stub is the portion of building storm sewer within the public right-of-way.

2.14 Storm Sewer - Private

Conveys storm water to a public storm sewer, other open channel, or outlet. Easements shall be obtained when crossing other private property. Drainage areas for private storm sewers on large sites will be reviewed on a case by case basis by the Jurisdiction. This sewer shall be located on private property and privately owned and maintained. Jurisdiction plumbing permit may be required.

2.15 Storm Sewer - Public

Conveys storm water to an outlet. This sewer shall be publicly owned and maintained and shall be constructed on public property or on private property with an easement held by the Jurisdiction.

2.16 Footing Drain - Private

Conveys ground water to a storm sewer, subdrain, or ditch. This sewer is generally located on private property. An easement is required if the sewer serves more than one property. The sewer shall be privately owned and maintained. The sewer shall be constructed according to Jurisdiction building and plumbing codes.

2.17 Subdrain - Public

Conveys ground water from private footing drain sewers or pavement subbase to a public storm sewer or open channel. Subdrain shall be owned and maintained by the Jurisdiction and shall be constructed on public property or on private property with an easement held by the Jurisdiction.

2.18 Ditch - Private

A drainageway or channel to convey storm drainage. Private ditches shall only be allowed in basins up to 160 acres where the existing facilities upstream are private with the exception of facilities located in the public right of way. The channel shall be designed to accommodate the overall drainage area needs with adequate

easements, and shall be privately maintained.

2.19 Ditch - Public

A natural drainageway or constructed channel required by the Jurisdiction as a component of a planned drainage system to convey storm drainage across public property or public easement. Public ditches shall be designed to accommodate the overall Jurisdiction's drainage system's need. Public ditches may include low flow drains. Public ditches shall be owned by the Jurisdiction or shall be located within an easement held by the Jurisdiction.

2.20 Stormwater Detention - Private

A basin, parking lot and/or rooftop area used for on-site runoff storage measures to provide off-site protection. The detention facility shall be in conformance with the Jurisdiction's overall stormwater management requirements.

2.21 Stormwater Detention - Public

A basin, park and/or other public area used for runoff storage. These facilities shall be designed for flood storage and water quality as required by the Jurisdiction. This detention shall be located on public or private property (with easements) and shall be maintained by the Jurisdiction.

2.22 Entrance - Private

Access to an agricultural area, a private residence, a commercial establishment, or an industrial establishment shall be the responsibility of the property owner. Any change in existing property use that requires a modification to the entrances will be the responsibility of the owner to obtain an entrance permit.

2.23 Street - Private

A street restricted for use by one owner or association and is available for use by emergency vehicles. This street shall be located on private property and shall be privately owned and maintained.

2.24 Street - Public

A street owned and maintained by the Jurisdiction and constructed on dedicated street right-of-way. See Chapter 5 Section 2, for a detailed description of each roadway system.

1. Principal Arterial

A continuous route serving the major centers of activity, the highest traffic volume corridors, and the longest trips on a minimum of mileage. Access to a

principal arterial is specifically limited.

2. Minor Arterial

Provides through traffic movement between areas and across the city, and provides limited access to abutting property; subject to control of entrances, exits, and curb use to increase the capacity and improve the safety characteristics of the street.

3. Collector

Provides movement of traffic between arterial routes and local streets, and control of access to abutting property for moderate amounts of medium speed traffic.

4. Local

Serves only as access to abutting property and is planned to be a low speed, low traffic and short trip route.

**Section 3 – Submittal Procedures**

3.1 Improvement Plan Submittal Procedure

1. Adherence to the following procedures will assist in an efficient review of plans and reports. Each Jurisdiction reserves the right to modify certain procedures to fit their unique situation.
2. Preliminary and final plats, private site plans, and public improvements for any subdivision or planned unit development, whether residential, commercial or industrial shall conform to this Manual and Jurisdictional ordinances.
3. JE objective is to complete initial reviews of construction plans and issue comments in ten business days after submittal. The actual time required is a function of the submittal complexity and overall workload of the Jurisdictional Engineer.
4. After the review is completed, the check plans, reports, and comments will be returned to the developer or authorized representative.
5. The project engineer will address all comments and resubmit. Seriously deficient plans may require several reviews prior to acceptance.
6. Revision of Plans and Reports

When submitting revised plans or reports to the JE, the re-submittal must contain:

- A. The revised plans for review
- B. Check plans from previous reviews. Notations should be made after each comment if the correction was made or justification why a comment is not valid.

If all the above are not submitted, the re-submittal may be returned without further action until such time as they are included.

- 7. When plans or reports have been conditionally accepted by the JE, the project engineer shall submit seven copies and an electronic copy of the improvement plans for approval and distribution by the Jurisdiction.
- 8. The length of time needed to review revised improvement plans that were previously submitted will normally be five business days depending on the complexity of the project. This time may be extended depending on workload.

### 3.2 Updates to Previously Accepted Plans

- 1. Engineering documents are approved initially for twelve months. If not constructed during this time period they automatically become void and must be updated to current criteria before any further permits can be issued. The JE may grant a one-year extension provided a) the improvement plans or reports have not substantially changed and b) other conditions affecting the development site have not substantially changed or do not require a modification to approved plans or specifications.
- 2. Whenever updates or revisions to previously accepted engineering documents are necessary, the project engineer will submit updates or revisions through the normal submittal process. After all JE comments and revisions have been incorporated, the plan sheets containing revisions may be submitted for acceptance.
- 3. Requests for extensions will be considered only if there are no revisions to the original improvement plans or reports. The Jurisdiction will review the original submittal for compliance with current standards under normal review procedures (requests for extension will be considered re-submittals), and if found in compliance with current standards, the improvement plans will be extended.

### 3.3 Submittal Checklist

- 1. Improvement Plans for the Metro Area shall include the following document submittal for review and acceptance:
  - A. Street plan and profile.

- B. Storm sewer plan and profile, details for non-standard structures, subdrain shown in plan view.
- C. Stormwater Management Plan and drainage report.
- D. Permanent traffic signing and striping plan (as required).
- E. Pavement design where required with supporting geotechnical report.
- F. Grading and erosion control plan.
- G. Sanitary sewer plan and profile and details for non-standard structures.
- H. Water main plans.
- I. Traffic control plan during construction.

### 3.4 Final Acceptance

Upon completion of construction of the project the Jurisdiction will accept the improvements into the public system upon submittal of the following.

- 1. Final plat, easements, and agreements for installed improvements.
- 2. Maintenance Bonds for improvements.
- 3. Performance Bonds for uncompleted work.

## **Section 4 – Detailed Plans for Construction of Public Improvements**

### 4.1 Public Improvement Plan Sheet Requirements

Detailed plans certified by a Licensed Professional Engineer in the State of Iowa, should be filed with the Jurisdiction for all work involved in Public Improvement Contracts and/or agreements. Detailed plans should conform to the following general requirements.

- 1. Plan Sheet Size  
11"x17" or 22"x 34" sheets.
- 2. Title Sheet

The following information shall be shown when applicable.

- A. Project title name and location (street names, address, limits, etc.)
- B. Jurisdiction name.

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- C. Vicinity map with north arrow showing project location. Provide scale or state not to scale.
- D. Sheet Index
- E. File number/Project number (to be filled in by Jurisdiction).
- F. Engineer's firm name, address, phone number.
- G. Signature line for Jurisdiction authority or leave space for acceptance stamp

SAMPLE:

REVIEWED:

Jurisdiction Authority	Title	Date
	H. Sheet number and total of sheets.	
	I. Engineer's certification, license number and renewal date, and date certified.	
	J. Note that project shall be constructed to the Cedar Rapids Metropolitan Area Standard Specifications for Public Improvements. List design exceptions or state there are none.	
	K. Legend of symbols and line work (may show on another sheet if cover sheet space is limited).	
	L. List of applicable Metro Standard Details (may show on another sheet if cover sheet space is limited)	
	M. Owner/Developer name, address, and phone number.	
	N. Roadway design data, including design speed, functional classification, and estimated ADT.	
	O. List of City, utility, and emergency phone numbers.	
3.	Title Block	
	A title block listing the following information:	
	A. The name of the project.	

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- B. Project Engineer along with sheet title (including address and phone numbers).
  - C. Date
  - D. Sheet number and total number of sheets. AIA numbering system (i.e.: Sheet C1) will not include total number of sheets.
  - E. Space to denote revisions.
  - F. Title block shall go in lower right corner or right edge of each sheet to be read from the bottom or right side.
  - G. Page numbers shall be in the lower right corner of each sheet.
  - H. All persons designing, drafting and checking plans shall legibly place their names or initials in the title block on the title sheet in a space provided for this purpose.
3. Plan Scale - Vertical. scale: 1' = 5'  
Min. horizontal: 1' = 50'

or 1" = 20' or larger if details for sanitary sewer, storm sewer, paving and/or sidewalks are on same plans. Overall utility plans may be shown at a lesser scale.

Changes to above scale to be approved by Jurisdiction. A scale bar is required for each plan view.

4.2 General Information to Be Shown on Construction Plans

The following shall be shown where applicable.

- 1. Beginning (B.O.P.) and ending (E.O.P.) of project.
- 2. Street names.
- 3. Right-of-Way widths and easement locations and dimensions.
- 4. Legend as part of title sheet requirements.
- 5. Adequate witnesses and horizontal and vertical controls so surveyor can lay out project plans. All controls to be shown at actual locations on plans. Bench marks and ties. Horizontal control shall be State Plane Coordinates. Vertical control shall be USGS datum.
- 6. Lot numbers, subdivision names, and project numbers, as applicable.
- 7. Lot dimensions (along right-of-way or easement).

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8. North arrow up to the right when applicable.
9. Existing and proposed utilities: type, size, and location.
10. Proposed improvement locations, dimensions, and stations.
11. Scale Bar.
12. Existing trees, fences, walks, structures, ditches, pavements, buildings, and utilities that could be impacted by the proposed improvements.
13. Easements, both temporary and permanent.
14. Cross-sections. For subdivisions, existing and proposed finished contours should also be used.
15. Special details and special notes when required (when other than standard details and specifications are used).
16. Plan view and profile. Profile shall line up with plan stations whenever possible.
17. Plans for development work shall contain general note that project shall be constructed to Cedar Rapids Metropolitan Area Standard Specifications.
18. Traffic control signs and markings will follow the latest edition of the Manual on Uniform Traffic Control Devices and Metropolitan Area Standard Specifications and Details. When required to maintain traffic during construction, construction staging and traffic control shall be shown on the plans. If required, include signing, street closures and/or detours.
19. Permanent signing.
20. Storm Water Management Plan. Temporary and permanent erosion control measures proposed.
21. Other information deemed necessary for completeness.

4.3 Detailed Sewer Plans

1. Stationing, location and type of all manholes, intakes, or other structures.
  - A. Structure designation shall be shown on the plans.
  - B. Location shall be shown on plan and referenced to survey line, centerline, or coordinates.
  - C. Type of structure shall be in conformance with the Metropolitan Area

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Standard Specifications and Details.

2. Details shall be shown for all structures that are non-standard.
3. Plan and profiles of all sewer lines and existing ground profile.
4. Subdrain, cleanouts, and stub locations.
5. Size, length, and grade of sewers in profile.
6. Pipe materials and specifications if non-standard.
7. Invert and rim elevations at all intakes, manholes and other structures in profile.
8. Location, size and type of all sewer services. Stub locations shall be referenced to downstream manholes.
9. Estimates shall be included for stubout quantities.
10. Joint details for storm sewer.
11. Manholes shall be identified with numbering system on plan and profile. Structure sizes and casting sizes to be included by schedule or note on the plans.
12. Access easements as necessary for the sewer system.

4.4 Detailed Drainageway Plans

1. Stationing and flow line elevations at beginning and end of channel construction.
2. Plan and profile of channel.
3. Typical sections showing ditch dimensions, backslopes, and invert and slope treatment.
4. Invert elevations at all structures.
5. Cross-sections and contours showing existing and proposed grades.
6. Culvert design data.

4.5 Detailed Paving Plans

1. Minimum 100 ft. station intervals and centerline stationing of all intersecting streets. Profile elevations at minimum 50-foot intervals on tangents and 25-foot intervals along vertical curves.

2. Street profiles and existing ground elevations shall be shown in the profile view. The curb line shall be shown in plan view. The profile shall show top of slab tangent grades, vertical curve data, and grade break data.
3. Pavement width (back to back).
4. All radii at returns (may be specified in general note if all radii are same).
5. Horizontal curve data shall include centerline PC, PT, PI, delta angle, arc length, degree of curve, tangent length and radius.
6. Typical cross-sections showing referenced profile, subgrade treatment, pavement thickness, jointing, sidewalk, foreslopes, back slopes, cross slopes, ROW line, and dimension of the location of the roadway with the ROW line. A Metro Standard Detail may be referenced in lieu of providing a typical section on the plans.
7. Vertical curve data shall include station and elevation of PI, PC, PT, K-value, low point, high point and length of curve.
8. Intersection details showing drainage and special joint patterns.
9. Location and type of pedestrian ramps.
10. Special subgrade or pavement treatment.
11. Tie to existing pavement, including elevation and grades.
12. Station and offset data for roadway tapers, turn lanes, etc.

#### 4.6 Grading and Erosion Control Plans

1. Existing and proposed contours at 1-foot intervals.
2. Stormwater detention facilities.
3. Total grading limits.
4. Stationing as it relates to paving, sewer or drainageway plans.
5. Soils data and soil boring location when applicable. NRCS soil survey or geotechnical report shall be referenced.
6. Type and location of erosion and sediment control measures.
7. Topsoil stockpile and stabilization measures and vegetated areas to be preserved.

8. Temporary and permanent seeding information.
9. Location, height, and details of proposed retaining walls.

#### 4.7 Water Mains

The water main plans shall show all appropriate physical features adjacent to the proposed water mains. Other utilities such as sanitary and storm sewers, manholes, etc. shall be shown on the plans with horizontal and vertical separation distances.

### **Section 5 – Plans of Record**

#### 5.1 General

As built or construction record information shall be added to the original plan. The Project Engineer is responsible for documenting all changes from the approved plan other than field adjustments. As-built documentation shall be submitted to the Jurisdictional Engineer prior to acceptance of the improvements.