

# CITY OF HARTFORD

## Engineering Design Standards



# City of Hartford Engineering Design Standards for Public Improvements

**Preface:** The Design Standards presented in this document modify the City of Sioux Falls Engineering and Design Standards for Public Improvements. Consequently, it is acknowledged that all tables and figures were prepared by and reference City of Sioux Falls but apply to the City of Hartford as if prepared specifically for the City of Hartford. Copies of the City of Sioux Falls Engineering Design Standards can be downloaded online at [www.sioxfall.org](http://www.sioxfall.org). The following supplemental standards take precedence over the items that may conflict.

## Supplemental standards to the City of Sioux Falls Engineering and Design Standards for Public Improvements.

Refer to the following modifications and supplement as instructed hereinafter.

### Chapter 1 General Provisions:

- Delete Section 1.4 in its entirety and replace with the following:

#### 1.4 Engineer's Authority

These design standards represent minimum regulations for the design of public infrastructure. If deemed necessary by the City Engineer, more stringent or a higher degree of standard may be required to further protect the health and safety of the general public.

**Chapter 2 ~~Submittal Procedures:~~ Reserved:** Delete section in its entirety. Procedures for submitting engineering documents are included in Chapter 13.

**Chapter 3 Permit Procedures and Requirements:** No modifications

### Chapter 4 Utility Locations and City Utility Easements:

- Delete Section 4.5 in its entirety and replace with the following:

#### 4.5 Easements

- 4.5.1 General: Permanent easements shall be provided for all facilities located outside of public right of way that require access or

maintenance by public entities. Easements shall be wide enough to ensure proper access for maintenance equipment. A description of different types of easements and design constraints are provided in the paragraphs that follow.

- 4.5.2 **Underground Utilities:** Easements for underground utilities shall be centered on the alignment of the underground pipe. Table 4.1 lists the minimum easement widths for utilities with a pipe diameter of 30-inches or less. Easements for utilities larger than 30-inches shall be evaluated and approved by the City Engineer. Easements widths may be required to be wider depending upon specific site conditions.

**Table 4.1**

**Minimum Required Easement Widths for Underground Utilities**

| Depth of Pipe<br>(feet) | Minimum<br>Width<br>Required<br>(feet) |
|-------------------------|--|
| 4                       | 15                                     |
| 6                       | 15                                     |
| 8                       | 20                                     |
| 9                       | 20                                     |
| 10                      | 20                                     |
| 11                      | 22                                     |
| 12                      | 24                                     |
| 13                      | 28                                     |
| 14                      | 30                                     |
| 15                      | 34                                     |
| 16                      | 36                                     |
| 17                      | 40                                     |
| 18                      | 42                                     |
| 19                      | 46                                     |
| 20                      | 48                                     |
| 21                      | 52                                     |
| 22                      | 54                                     |
| 23                      | 58                                     |
| 24                      | 60                                     |
| 25                      | 64                                     |
| 26                      | 66                                     |
| 27                      | 70                                     |
| 28                      | 72                                     |
| 29                      | 76                                     |
| 30                      | 78                                     |

4.5.3 Drainage Easements: Drainage easements shall be required along all drainage ways that convey storm water discharged from upstream properties. Drainage easements shall be a minimum of 20 feet wide and shall encompass the anticipated spread as calculated by the major storm event. Drainage facilities and appurtenances such as earthen

berms, swales, open channels, detention ponds or structures that are required to establish or direct drainage shall be included within an easement.

- 4.5.4 Access Easements: Access easements shall be provided to allow the public access across private property and shall address the type of access granted. Widths of access easements shall be dependent upon the expected use and approved by the City Engineer. Minimum widths for pedestrian access shall be 20 feet.

**Chapter 5 Street Access and Parking Lot Criteria:**

- Modify Table 5.1 as follows: The maximum driveway width for residential lots along local or collector streets shall be 36-Feet.

**Chapter 6 Geotechnical Exploration and Report:** No modifications

**Chapter 7 Grading:** No modifications

**Chapter 8 Street Design and Pavement Thickness:**

- Modify paragraph 8.2.3.7-H as follows: Right of way is ~~60 feet~~ **66 feet or less**
- Delete Table 8.1 in its entirety and replace with the following Table 8.1:

**Table 8.1**  
**Minimum Street Design Criteria**

| Design Elements               | Local         |                                     | Collector   |          | Arterial         |                       |
|-------------------------------|---------------|-------------------------------------|-------------|----------|------------------|-----------------------|
|                               | Single Family | Commercial, Industrial, Multifamily | Minor       | Major    | Minor            | Regional or Principal |
| 24-hour Volumes (vpd)         | 2000 or less  | 2500 or less                        | <5000       | >5000    | 10,000           | 15,000                |
| Design Speed (mph)            | —             | —                                   | 35          | 40       | 45               | 50                    |
| Driving Lanes                 | —             | 2                                   | 2           | 2-4      | 4                | 4 or more             |
| Right-of-Way (ft.)            | 66            | 66                                  | 66          | 80       | 100 +            | 120 +                 |
| Roadway Width (ft.) (1)       | 37            | 39                                  | 41          | 41 or 49 | 41-53            | 65 or more            |
| Lane Width (ft.)              | —             | 11                                  | 12          | 12       | 12               | 12                    |
| Sidewalk (2)                  | 4' detached   | 5' detached                         | 5' detached |          | 5' detached      |                       |
| Curb & Gutter                 | 6" vertical   | 6" vertical                         | 6" vertical |          | 6" vertical      |                       |
| Min.-Max. Grade (%)           | 0.5-8.0       | 0.5-8.0                             | 0.5-7.0     |          | 0.5-6.0          |                       |
| Curb Return Radii (ft.)       |               |                                     |             |          |                  |                       |
| - intersect local             | 13.5          | 13.5                                | 20          |          | --               |                       |
| - intersect collector         | 20            | 20                                  | 25          |          | 30               |                       |
| - intersect arterial          |               |                                     | 30          |          | 35               |                       |
| Horizontal Curve Radius (ft.) | 150           | 300                                 | —           |          | AASHTO Standards |                       |
| Vertical Alignment Control    |               |                                     |             |          |                  |                       |
| Grade at Intersection (%)     |               |                                     |             |          |                  |                       |
| - intersect local             | 3             | 3                                   | —           |          | —                |                       |
| - intersect collector         | 2             | 2                                   | 2           |          | —                |                       |
| - intersect arterial          |               |                                     | 2           |          | 2                |                       |

(1) All dimensions are measured to back of curb.

(2) Where sidewalk is attached to curb, sidewalk shall be one foot wider.

- Modify section 8.4.1 as follows: Generally, the sidewalks shall be located ~~two (2) feet~~ **one (1) foot** from the property line within the street right-of-way.
- Add-
  - 8.7.9 Spacing of Direct and Indirect Access, Angle of Intersection, and Offsets
    - 8.7.9.1 Four way directional intersections will normally be spaced at least 300 feet apart.
    - 8.7.9.2 Proposed streets and driveways shall intersect one another at 90°
    - 8.7.9.3 At locations of offset or “T” intersections, the minimum offset allowed shall be 150 feet for local streets and 300 feet for all other street types.
- Modify section 8.8.4 as follows: Minimum fall around curb returns shall be ~~one-half of one (0.5)~~ **one (1.0)** percent.
- Add-
  - 8.15 Curb and Gutter
    - 8.15.1 Curb and gutter shall be a standard thirty inches wide with a six inch wide curb top and six inch depth from the top of the curb to the flow line of the gutter. Curb and gutter on roads under the jurisdiction of the SDDOT shall meet the requirements set forth in the SDDOT Standard Specifications.

**Chapter 9 Sanitary Sewers:**

- Add the following to section 9.4.8.7: Access routes shall be benched as necessary to shed water and, at a minimum, include a gravel surface for adequate access.
- Delete section 9.5 in its entirety including table 9.5. All easements for public utilities shall meet the requirements set forth in Chapter 4.

**Chapter 10 Water Mains:**

- Delete paragraph 5 of section 10.1.12 and replace with the following: Private Fire Hydrants: Inspection annually and after each operation; flow test and maintenance annually. The owner shall have hydrants inspected and flushed by a private utility contractor licensed by the State of South Dakota.

- Delete paragraph 10.7.8 in its entirety and replace with the following: Water services 2-inches and smaller extending from the main to the curb stop shall be constructed of polyethylene (PE) pressure pipe or copper. Services larger than 2-inches shall be made of PVC.
- Delete section 10.8 in its entirety. Material specifications are included in the City of Hartford Standard Specifications for Public Improvements.

**Chapter 11 Drainage Improvements:**

- Delete sections 11.1.4, 11.1.5, and 11.1.6 in their entirety. Requirements for plan submittals are included in Chapter 13.
- Delete section 11.2.3-1-b in its entirety. Requirements for easements are included in Chapter 4
- Delete paragraph 11.6.7-1 and replace with the following: Sump pump collection systems or underdrain systems shall be required for all proposed subdivisions.
- Delete section 11.8 in its entirety. Best management practices are not required.

**Chapter 12 Erosion and Sediment Control:** No modifications

**Chapter 13 ~~Construction Plans:~~ Submittals:** Delete section in its entirety and replace with the attached Chapter 13.

**Chapter 14 ~~Acceptance Procedures and Requirements for Private Construction of Public Improvements:~~ Reserved:** Delete section in its entirety. Acceptance procedures for private construction are included in the City's subdivision regulations.

**Chapter 15 ~~Street Lighting:~~ Reserved:** Delete section in its entirety. Street lighting shall be coordinated between the City of Hartford and the area provider for power.

**Chapter 16 Inspection and Testing:** Add the attached Chapter 16

**Appendix**

**Section 100** – Standard Specifications for Sanitary Sewer Construction

**Section 200** – Standard Specifications for Storm Sewer Construction

**Section 300** – Standard Specifications for Water Main Construction

**Section 400** – Reserved

**Section 500** – Standard Specifications for Construction Warranty

## **Chapter 13**

### Submittals

# Chapter 13

## Submittals

| <b>Section</b> | <b>Topic</b>                       | <b>Page</b> |
|----------------|------------------------------------|-------------|
| 13.1           | General.....                       | 1           |
| 13.2           | Concept Plan .....                 | 1           |
| 13.3           | Preliminary Plan .....             | 2           |
| 13.4           | Development Engineering Plans..... | 8           |
| 13.5           | Plats.....                         | 13          |
| 13.6           | Shop Drawings .....                | 13          |
| 13.7           | Record Drawings .....              | 14          |

# Chapter 13

## Submittals

### 13.1 General

Detailed reproducible plans, prepared by or under the direct supervision with the signature, seal, and date of the licensed professional engineer in the State of South Dakota, shall be filed with the City Engineer for all work involved in public improvement contracts or private subdivisions resulting in public right-of-way dedication. Plans shall conform to the city's Engineering Design Standards and to the following requirements.

### 13.2 Concept Plan

The purpose of a Concept Plan is for the developer to receive comments from the Authorized Official for advice regarding general requirements, minimum standards of design and required improvements as set forth in this chapter. This plan will aid the developer in preparing a more readily accepted Preliminary Plan and prevent unnecessary costly revisions in the layout and development of the subdivision. Four (4) copies of a concept plan shall be submitted to the City Administrator's Office to be distributed for review. The information that follows is a list of sections and data that the developer shall include at a minimum within the concept plan. The developer may include other sections and more information as they feel pertinent:

#### 13.2.1 General

1. Any expectations for city reimbursements.

#### 13.2.2 Title Page

1. The proposed name of the subdivision. The name shall not duplicate, be the same in spelling or alike in pronunciation with the name of any other recorded subdivision, unless it is an extension of or adjacent to said subdivision.
2. Names, addresses, and telephone numbers of the owner, developer, engineer and surveyor.
3. Vicinity map showing the general location of the proposed subdivision within the city's limits.
4. Illustrative map to scale, showing the following information:
  - a. Location of the proposed subdivision and other property for at least 660 feet in every direction. Include the names of all adjoining subdivisions. Adjoining unplatted property shall be labeled as such.

- b. Overlay of general layout of subdivision over aerial photograph.
- c. North arrow and scale.

#### 13.2.3 Land Use Plan

1. Illustration of proposed zoning districts and special use facilities such as schools, libraries, fire stations, parks, waterways, churches or other significant uses.

#### 13.2.4 Sanitary Sewer Plan

1. The general layout of the proposed sanitary sewer system including locations of gravity sewers and force mains, lift stations, and connection points to the existing system.

#### 13.2.5 Water Plan

1. The general layout of the proposed water main system including connection points to the existing system.

#### 13.2.6 Drainage Plan

1. General locations of major drainage ways and potential wetlands.
2. The general layout of the proposed storm sewer system including approximate flow paths with drainage arrows, detention ponds, water quality facilities, watershed boundaries and locations of discharged runoff.

#### 13.2.7 Pavement Plan

1. The general layouts of streets and access points to adjacent street systems.
2. The general layout of pedestrian connectivity.

### **13.3 Preliminary Plan**

A preliminary plan shall be submitted to the City Administrator's Office to be distributed for review. Five (5) copies on 11"x17" paper and one electronic PDF file shall be submitted. The preliminary plan shall conform to all chapters of the Engineering Design Standards and shall include at a minimum all of the information from the concept plan as well as the information that follows. The developer may include other sections and more information as they feel pertinent.

13.3.1 Title Page

1. Engineer's certificate.
2. Index of Sheets.
3. The legal description and notations stating acreage.

13.3.2 Legend of Symbols

13.3.3 Typical Sections

13.3.4 General Notes

1. Certificates of approval as required in the city's Subdivision Regulations .
2. Note any anticipated supplemental provisions to the Engineering Design Standards and the Standard Specifications for Public Improvements.
3. Expectations for city reimbursements.
4. Note if any neighboring streets to the subdivision are undeveloped. The developer will need to petition for street improvements to neighboring streets that are rural or gravel sections.

13.3.5 Typical Sections

1. Illustrate depth, width and locations of proposed street sections, pedestrian paths and utilities.

13.3.6 Lot Layout Plan

1. Compliance with the city's Subdivision Regulations and Planning and Zoning Regulations.
2. Maximum scale of 1-inch equal to 200 feet (1:200).
3. A systematic lot and block numbering pattern complete with proposed lot dimensions, right of way widths and acreages.
4. Layout of adjoining subdivisions. The plan shall show the name of adjoining subdivisions along with existing access points, right-of-way, lot and block lines and numbers, city limits and any other pertinent information needed for review. Adjoining unplatted property shall be labeled as such.
5. Label proposed and existing street names.

### 13.3.7 Land Use Plan

1. Compliance with the city's Planning and Zoning Regulations.
2. Maximum scale of 1-inch equal to 400 feet (1:400).
3. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
4. Illustrate proposed zoning districts and special use facilities such as schools, libraries, fire stations, parks, waterways, churches or other significant uses. Notate properties to be dedicated for public use.
5. Table of minimum setback requirements.

### 13.3.8 Existing Conditions

1. Maximum scale of 1-inch equal to 400 feet (1:400).
2. Location and size of all significant natural features including tree masses, water ways, and developed properties.
3. Existing grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
4. Identify locations and size of delineated, jurisdictional wetlands. The developer shall provide correspondence from the Corps of Engineers documenting their determination.

### 13.3.9 Grading Plan

1. Maximum scale of 1-inch equal to 400 feet (1:400).
2. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers, street names, culverts, storm sewers and other drainage facilities.
3. Proposed finished grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
4. Identify mitigated wetlands and intentions for mitigation plan. Discuss any restrictive covenants that would prevent the city from performing maintenance activities such as excavating within the wetlands.
5. Drainage arrows.

### 13.3.10 Drainage Plan

1. Compliance with the city's Drainage Facilities Master Plan.
2. Illustration of the historic drainage pattern to include the following:
  - a. Maximum scale of 1-inch equal to 200 feet (1:200).
  - b. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
  - c. Existing grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
  - d. Drainage arrows and watershed boundaries.
  - e. Location and size of existing storm sewers, culverts, open channels, bridges, detention ponds and other drainage appurtenances.
  - f. Identify current 100-year floodplain as governed by FEMA.
  - g. Identify locations of inflow from tributary basins along with calculated peak flow rates for the 5-year and 100-year storm events.
  - h. Identify locations of discharge toward downstream properties with calculated peak flow rates for the 5-year and 100-year storm events.
  - i. Illustrate ponding elevations during the 100-year storm event. Include critical overtopping elevations at intersections, detention ponds, and other sump locations.
3. Illustration of the post-developed drainage pattern to include the following:
  - a. Maximum scale of 1-inch equal to 200 feet (1:200).
  - b. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
  - c. Proposed finished grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
  - d. Drainage arrows and watershed boundaries.
  - e. Location and size of proposed storm sewers, culverts, open channels, bridges, detention ponds, structures and other storm sewer

appurtenances. Inlets and other structures shall be labeled with a systematic numbering system.

- f. Show intended revisions to the 100-year flood plain. The developer shall coordinate with FEMA as necessary and provide documentation to the city of FEMA's conditional acceptance prior to construction.
  - g. Identify locations of inflow from tributary basins along with calculated peak flow rates for the 5-year and 100-year storm events.
  - h. Identify locations of discharge toward downstream properties with calculated peak flow rates for the 5-year and 100-year storm events.
  - i. Illustrate ponding elevations during the 100-year storm event. Include critical overtopping elevations at intersections, detention ponds, and other sump locations.
  - j. Location and widths of proposed and existing easements.
  - k. Indicate areas of subdivision routing storm water to a water quality BMP structure.
  - l. Note if applicant intends to dedicate drainage ways.
  - m. Identify locations and size of proposed detention ponds and best management practices (BMP) facilities. Note whether or not detention ponds or BMP facilities will be dedicated to the city.
4. Hydraulic module analysis: The developer shall provide computer aided, hydraulic analysis of the subdivision's historic and post-developed drainage patterns. The results shall be compiled into a report format to be submitted as part of the preliminary plan. The report shall include the following data:
- a. Watershed areas, boundaries, elevations, and time of concentration.
  - b. Rainfall intensity.
  - c. Runoff coefficients.
  - d. Manning's "n" values.
  - e. Projected land uses and existing physical features of areas contributing runoff.
  - f. Storm duration.
  - g. Historic runoff calculations for the 5-year and 100-year storm events.

- h. Post-developed runoff calculations for the 5-year and 100-year storm events.

#### 13.3.11 Sanitary Sewer Plan

1. Compliance with the city's Wastewater Collection System Master Plan.
2. Maximum scale of 1-inch equal to 200 feet (1:200).
3. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
4. Location and size of proposed gravity sewers, force mains, manholes, lift stations and other sanitary sewer appurtenances. Manholes shall be labeled with a systematic numbering system.
5. Direction of flow and connection points to the existing system.
6. Type and capacity of proposed lift stations.
7. Estimated peak and average daily flows in proposed sewer.
8. Location and widths of proposed and existing easements.
9. Extension of sanitary sewer to the adjacent upstream users.
10. Identify major contributors for individual commercial or industrial occupants. The plan shall include the type of sewage and volume produced.
11. Notes regarding adequacy of receiving sewer system and serviceability to upstream properties.

#### 13.3.12 Water Plan

1. Compliance with the city's Water Distribution System Master Plan.
2. Maximum scale of 1-inch equal to 200 feet (1:200).
3. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
4. Location and size of proposed water mains, valves, fire hydrants and other water main appurtenances.
5. Location and widths of proposed and existing easements.
6. Extension of waterlines to perimeter of the development.

7. Identify major contributors for individual commercial or industrial occupants. The plan shall include the volume of water anticipated.

#### 13.3.13 Pavement Plan

1. Compliance with the city's Transportation System Master Plan. The city has approved a Comprehensive Plan that limits access on Expressways and Arterial Streets. Accesses to these streets will be limited whenever possible.
2. Maximum scale of 1-inch equal to 200 feet (1:200).
3. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines and lot numbers.
4. Illustration of street geometrics including curb and gutter alignments, valley gutters, and fillets.
5. Label proposed and existing street names.
6. Label proposed street widths from back to back of curb including curb radius dimensions at cul-de-sacs.
7. Label street right-of-way widths.
8. Location and widths of proposed and existing access easements.
9. Identify street classifications with conformance to the Engineering Design Standards.
10. Transportation connectivity within the development as well as connectivity with the surrounding properties. This also includes pedestrian connectivity.
11. Note conformance to traffic calming practices shown in the Engineering Designs Standards.
12. Illustrate pedestrian connectivity.

#### 13.3.14 Phasing Plan

1. Proposed phasing for the development with estimated timelines.

### 13.4 Development Engineering Plans

Development Engineering plans shall be submitted to the City Administrator's Office to be distributed for review. Five (5) copies on 11"x17" paper and one electronic PDF file shall be submitted. Plans shall conform to all chapters of the Engineering Design Standards and the Standard Specifications for Public Improvements. Plans shall include at a minimum all of the information that follows. The engineer may

include additional sections and more information as they feel pertinent. Development engineering plans shall comply with conditions and approval requirements of the preliminary plan.

#### 13.4.1 Title Page

1. The proposed name of the subdivision. The name shall not duplicate, be the same in spelling or alike in pronunciation with the name of any other recorded subdivision, unless it is an extension of or adjacent to said subdivision.
2. Names, addresses, and telephone numbers of the owner, developer, engineer and surveyor.
3. Vicinity map showing the general location of the proposed subdivision within the city's limits.
4. Illustrative map to scale, showing the following information:
  - a. Underlay the general layout of the project. Include proposed and existing property lines and street names.
  - b. Location of the proposed project and other property for at least 660 feet in every direction.
  - c. Highlight area of project limits. The project limits shall match that of the final plat.
  - d. North arrow and scale.
5. Engineer's certificate.
6. Index of Sheets.
7. The legal description and notations stating acreage.

#### 13.4.2 Legend of Symbols

#### 13.4.3 Orientation and Data Control

1. Maximum scale of 1-inch equal to 400 feet (1:400).
2. Underlay the general layout of the project. Include proposed and existing property lines and street names.
3. Location and elevations of bench marks and control points.

#### 13.4.4 Typical Sections

1. Illustrate depth, width and locations of proposed street sections, pedestrian paths and utilities.

#### 13.4.5 General Notes

1. Certificates of approval as required in the city's Subdivision Regulations.
2. List all referenced specifications including the order of precedence. Plans shall reference the city's Standard Specifications for Public Improvements as first order of precedence. Supplemental provisions to the city's standards shall be included.
3. The developer shall be responsible for providing record drawings to the City Engineer. Notes regarding record keeping between the contractor and developer shall be included.
4. Provide the following notes:
  - a. The City Engineer shall conduct inspections throughout the construction process. The contractor shall contact the city prior to construction to discuss the schedule.

#### 13.4.6 Grading Plan:

1. Illustration of existing conditions shall include the following:
  - a. Maximum scale of 1-inch equal to 400 feet (1:400).
  - b. Location and size of all significant natural features including tree masses, water ways, and developed properties.
  - c. Existing grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
  - d. Identify locations and size of delineated, jurisdictional wetlands. The developer shall provide correspondence from the Corps of Engineers documenting their determination.
2. Illustration of proposed grading plan shall include the following:
  - a. Maximum scale of 1-inch equal to 100 feet (1:100).
  - b. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers, street names, culverts, storm sewers and other drainage facilities.

- c. Proposed finished grade contours referenced to North American Vertical Datum (NAVD 88) with intervals sufficient to determine the character and topography of the land to be subdivided (1-foot intervals typical).
- d. Identify the size and location of mitigated wetlands. A copy of the mitigation plan as approved by the Corp of Engineers shall be submitted.
- e. Drainage arrows.
- f. All lot corner elevations.

#### 13.4.7 Erosion Control Plan

- 1. Erosion Control Narrative (see Chapter 12 for requirements)
- 2. Maximum scale of 1-inch equal to 100 feet (1:100).
- 3. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers, street names, proposed contours, culverts, storm sewers and other drainage facilities.
- 4. Location and size of proposed inlet protection, sediment basins and traps, vehicle tracking stations, silt fence and other erosion control appurtenances.

#### 13.4.8 Sanitary Sewer Plan

- 1. Maximum scale of 1-inch equal to 40 feet (1:40).
- 2. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
- 3. Plan and Profile sheets illustrating horizontal and vertical data necessary to install utility.
- 4. Location and size of proposed gravity sewers, force mains, manholes, lift stations and other sanitary sewer appurtenances. Manholes shall be labeled with a systematic numbering system.
- 5. Manhole rim and invert elevations, including existing manholes that are being connected into.
- 6. Location and size of sewer services.
- 7. Connections to existing system.
- 8. Specifications for proposed lift stations.

9. Location and widths of proposed and existing easements.

#### 13.4.9 Water Plan

1. Maximum scale of 1-inch equal to 40 feet (1:40).
2. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
3. Plan and Profile sheets illustrating horizontal and vertical data necessary to install utility.
4. Location and size of proposed water mains, valves, fire hydrants and other water main appurtenances.
5. Location and size of water services.
6. Location and widths of proposed and existing easements.

#### 13.4.10 Storm Sewer Plan

1. Maximum scale of 1-inch equal to 40 feet (1:40).
2. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines, lot numbers and street names.
3. Plan and Profile sheets illustrating horizontal and vertical data necessary to install utility.
4. Location and size of proposed storm sewers, structures and other storm sewer appurtenances. Inlets and other structures shall be labeled with a systematic numbering system.
5. Label critical overtopping elevations at intersections, detention ponds, and other sump locations.
6. Rim and invert elevations of proposed and existing storm sewer structures.
7. Connections to existing system.
8. Location and widths of proposed and existing easements.

#### 13.4.11 Pavement Plan

1. Maximum scale of 1-inch equal to 40 feet (1:40).

2. Underlay the general layout of the proposed subdivision. Include proposed and existing property lines and lot numbers.
3. Plan and Profile sheets illustrating horizontal and vertical data necessary to install surfacing.
4. Illustration of street geometrics including curb and gutter alignments, valley gutters, and fillets.
5. Detailed Intersection data complete with spot elevation data and dimension labels.
6. Label proposed and existing street names.
7. Label proposed street widths from back to back of curb including curb radius dimensions at cul-de-sacs.
8. Location and widths of proposed and existing access easements.
9. Pedestrian connectivity:
  - a. Sidewalk layout complete with handicap ramps and warning panel locations.

#### 13.4.12 Standard Plates and Details

1. Standard Plates, as referenced in the city's Standard Specifications, shall be attached to the plans for all pertinent construction. Additional special details shall be attached as deemed necessary by the engineer.

### 13.5 Plats

Plats shall be submitted in accordance with the city's Subdivision Regulations.

### 13.6 Shop Drawings

Shop drawings shall be submitted for all materials to be constructed within public right-of-way to the City Engineer. Drawings shall be reviewed and approved by the developer's engineer prior to submittal to the City Engineer. Four (4) complete sets of original drawings plus any number the developer wishes to maintain shall be submitted. One complete set of shop drawings shall include all submittals for the project. Each set shall be bound into a single document with a cover page attached listing the following data:

1. Project Name.
2. Submittal Date.

3. Contact Information for:
  - a. Owner.
  - b. Owner's engineer.
  - c. Contractor.

### **13.7 Record Drawings**

Record drawings shall be submitted for all improvements made within public right-of-way and shall illustrate the project as constructed in the field. On projects where city maintained utilities are to be installed, utility drawings shall be submitted within 30 days of their installation. Once construction is complete, all drawings shall be combined into a final set of record drawings and submitted to the City Engineer's Office for archiving. Five (5) copies on 11"x17" paper, one electronic PDF file and one electronic DWG file shall be submitted no later than 30 days after construction is substantially complete.

In general, record drawings shall document significant changes from the construction plans in the form of revision clouds and strike outs. The Engineer shall coordinate field data with the Contractor as well as City staff to ensure completeness and accuracy. All sheets shall be labeled with a clearly visible record drawing stamp and date of completion. Record drawings shall include all information from the construction plan as well as the following information:

#### **13.7.1 Title Page**

1. Add name, address, and telephone number of the contractor.

#### **13.7.2 Sanitary Sewer Plan**

1. Spatially correct, as-built locations of constructed gravity sewers, force mains, manholes, lift stations, services and other sanitary sewer appurtenances.
2. As-built elevations for manhole rims and inverts.
3. Distance labels for all services from the downstream manhole to the connection point at the main line.
4. Dimension distances between mainline fittings and service fittings.

#### **13.7.3 Water Plan**

1. Spatially correct, as-built locations of constructed valves, fire hydrants, services and other water main appurtenances.

2. Dimension distances between mainline fittings and service fittings.

#### 13.7.4 Storm Sewer Plan

1. Spatially correct, as-built locations of constructed open channels, bridges, culverts, storm sewers, ponding structures and other storm sewer appurtenances.
2. As-built elevations for manhole rims and inverts, flared end sections, ponding structures, and overtopping elevations at critical locations.

#### 13.7.5 Pavement Plan

1. Significant modifications to the street layout or paving plan.
2. Modifications to typical sections. Note locations where geotextile fabric was installed.

#### 13.7.6 Electronic Submittals

1. CAD files composed of line work and symbols used to generate record drawings shall be submitted to the City Engineer. Data provided shall be spatially correct and verified in the field by survey.

**Chapter 16**  
**Inspection and Testing**

# Chapter 16

## Inspection and Testing

| <b>Section</b> | <b>Topic</b>                          | <b>Page</b> |
|----------------|---------------------------------------|-------------|
| 16.1           | General.....                          | 1           |
| 16.2           | Inspection and Testing Schedule ..... | 1           |
| 16.3           | Minimum Testing Requirements .....    | 2           |

# Chapter 16

## Inspection and Testing

### 16.1 General

In order to insure satisfactory completion and conformance with city standards, the city shall conduct inspections and require testing during construction. It is the responsibility of the contractor to abide by the proposed testing and inspection schedules set forth in this section and to notify the City Engineer when work is ready for inspection. In the event that the proposed schedules are not met, construction on the project shall cease until the items that are out of compliance are resolved.

### 16.2 Inspection and Testing Schedule

Listed below is a summary of inspections and testing that shall require written documentation of approval from the City Engineer. The developer shall schedule all inspections with the City Engineer. Geotechnical services shall be contracted through the city with results forwarded to the developer. Tests shall be performed as detailed in the city's Standard Specifications and the current version of the SDDOT Materials Manual or current ASTM Standards.

16.2.1 Sanitary Sewer: Newly constructed sanitary sewer systems shall be tested in accordance with the city's Standard Specifications for Sanitary Sewer Construction.

1. Visual Inspection by Owner
2. Pipe Leakage Inspection
3. Manhole Leakage Inspection
4. Cleaning
5. Pipe Deflection Inspection
6. Television Inspection

16.2.2 Water: Newly constructed water main systems shall be tested in accordance with the city's Standard Specifications for Water Main Construction.

1. Visual Inspection by Owner
2. Disinfection and Bacteriological Testing
3. Hydrostatic Pressure Inspection

16.2.3 Drainage: Newly constructed storm sewer systems shall be tested in accordance with the city's Standard Specifications for Storm Sewer Construction.

1. Visual Inspection by Owner
2. Cleaning
3. Pipe Deflection Inspection
4. Television Inspection

16.2.4 Streets: Newly constructed street systems shall be tested in accordance with the SDDOT Materials Manual and in compliance with the minimum testing requirements listed under Section 16.3 of this Chapter.

1. Utility Trench Density Test
2. Subgrade Density Test
3. Subgrade Stability Inspection
4. Base Course Gradation and Density Tests
5. Base Course Stability Inspection
6. Concrete Air Slump and Strength Tests
7. Bottom Lift Asphalt Inspection
8. Asphalt Density Tests

### **16.3 Minimum Testing Requirements**

The engineer may at any time order additional testing above and beyond the minimum required. The contractor and supplier are encouraged to perform testing as needed to monitor their own quality control. This testing, however, will not be used in determining acceptance of the installed material. When testing will be destructive to the final product, such as coring asphalt pavement, approval must be obtained from the engineer prior to testing.

#### **16.3.1 Utility Trenches**

1. Density tests on trench backfill shall be performed in accordance with the City's Standard Specifications for Construction. In general, a minimum of one density test and moisture content shall be made for every 500 lineal feet of trench per four (4) feet of depth. A minimum of one (1) standard density and optimum moisture determination shall be made for the project and one (1) additional test for each change in the backfill.

### 16.3.2 Subgrade

1. Soil density and moisture content tests shall be performed on all pavement subgrade and roadway fills a minimum of one (1) per city block or every 600 feet, whichever is less, per four (4) feet of depth. A minimum of one (1) standard density and optimum moisture determination shall be made for the project and one (1) additional test for each change in the soil type.
2. Subgrade Stability: The contractor shall schedule an inspection with the City Engineer to inspect the subgrade stability. The inspection shall be completed once the subgrade has been compacted into place and prior to placing the base course. The contractor will be required to proof roll the subgrade with equipment approved by the engineer. Unstable areas shall be repaired by the contractor.

### 16.3.3 Base Course, Select Granular Backfill, Aggregates, and other Granular Materials

1. A minimum of one (1) gradation shall be run per project per type of material. Density tests shall be run on base course for roadways a minimum of one (1) per city block or every 600 feet, whichever is less. Testing may be waived by the engineer when the total project quantity for each type of material is less than 500 tons.
2. Base Course Stability: The contractor shall schedule an inspection with the City Engineer to inspect the base course stability. The inspection shall be completed once the base course has been compacted into place and prior to placing surfacing. The contractor will be required to proof roll the base course with equipment approved by the Engineer. Unstable areas shall be repaired by the contractor.

### 16.3.4 Sidewalks, Curb & Gutter, Concrete Fillets, Valley Gutters, Inlets, and other Miscellaneous Concrete

1. An air test, slump test and a strength test shall be performed for every 100 cubic yards of pouring. Additional strength tests shall be run when needed to determine when concrete is ready to carry traffic.

### 16.3.5 Asphalt Paving

1. Density tests shall be performed at the frequency of 1 per 900 lane feet per lift. Density tests shall be performed using the cut out (core) or nuclear gauge method. The nuclear gage method shall only be used for acceptance testing if it is calibrated with cores as detailed in the Materials Manual. A standard density (Rice) test shall be performed once per project and when there is a change in the mix. Testing may be waived by the engineer when the total project quantity for asphalt is less than 500 tons.

2. Bottom Lift Asphalt Stability: The contractor shall schedule an inspection with the City Engineer to inspect the stability of the bottom lift of asphalt. The inspection shall be completed prior to placement of the second lift. The Engineer shall visually inspect the bottom lift for any failures or depressions. In areas of failure and excessive depression the existing asphalt shall be removed, the underlying grade stabilized and new asphalt patched back into place. In areas of moderate depression, a leveling course shall be installed prior to placement of the second lift.

#### 16.3.6 PCC Concrete Streets

1. An air content test shall be performed on the first truck before placement begins. An air test, slump test, and at least four concrete cylinders (1 for an early break, 2 for 28 day breaks, and one backup) shall be made for every 150 cubic yards of pouring.

#### 16.3.7 Structural Concrete

1. Air tests, slump tests, and strength tests shall be run at the frequency specified by the current version of the SDDOT Materials Manual in the Minimum Sampling and Testing Requirements section.