

**ADMINISTRATIVE ORDER NO. 58-23-42**  
**of the**  
**City Engineer**  
**City of Eugene, Oregon**

**AMENDING THE PUBLIC IMPROVEMENT DESIGN STANDARDS  
MANUAL ADOPTED BY ADMINISTRATIVE ORDER NO. 58-16-01.**

**The City Engineer of the City of Eugene finds that:**

**A.** Provisions in Chapters 6, 7 and 9 of the Eugene Code, 1971, impose requirements and restrictions with respect to the design, location, and construction of public improvements. Section 7.085 of the Code explicitly directs me, as City Engineer, to prepare design standards and standard specifications for construction of public improvements.

**B.** Consistent with the above authority, on March 2, 2016, Administrative Order No. 58-16-01 was issued adopting an updated version of the Public Improvement Design Standards Manual ("the PIDS Manual").

**C.** The PIDS Manual adopted in 2016 included, as the standard for accessible pedestrian facilities, the (then) 2011 Proposed Guidelines for Pedestrian Facilities in the Public Right of Way as had been published by the Architectural and Transportation Barriers Compliance Board ("U.S. Access Board"). On August 8, 2023, the U.S. Access Board issued its final rule providing minimum guidelines for accessibility of pedestrian facilities in the public right-of-way (36 CFR Part 1190) which became effective on October 7, 2023. In the absence of legally required standards adopted by the US Department of Justice, the City Engineer continues to consider those federal guidelines to be the best practices for new construction and alteration of facilities within the public right of way to comply with accessibility requirements and is, therefore, updating the PIDS Manual to reference the final "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 2023 at 36 CFR Part 1190.

**Now, Therefore,**

**THE CITY ENGINEER OF THE CITY OF EUGENE ORDERS AND DIRECTS  
THAT:**

**Section 1.** The lead-in text of Section 2.02 of the PIDS Manual is revised as follows:

**2.02 SHARED USE PATHS**

Shared use paths shall be designed in accordance with *the City's Design Standards and Guidelines for Streets, Sidewalks, Bikeways, and Accessways* (provided in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)), the Standard Specifications and Drawings, and the ~~2011 Proposed Guidelines for Pedestrian Facilities in the Public Right of Way as published by the United States Access Board (located on the internet at [www.access-board.gov](http://www.access-board.gov))~~ ["Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-](#)

Way” as published in 36 CFR Part 1190. Shared use paths shall also be designed to comply with the following:

\*\*\*

**Section 2.** The following paragraphs under Section 2.03, subsections A and E, of the PIDS Manual are revised as follows:

## 2.03 SIDEWALKS

\*\*\*

### A. Access Ramps

Each access ramp and its associated wings, landing and other appurtenances shall be included in the plans and shall comply with the ~~2011 Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way as published by the United States Access Board (located on the internet at [www.access-board.gov](http://www.access-board.gov))~~ “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190. All clear width measurements shall be exclusive of the curb.

\*\*\*

All new access ramps shall provide a minimum continuous clear width of 5 feet. A clear width of 4 feet may be used in retrofit situations where existing infrastructure, topography, or natural features warrant a reduced clear width. All new landings shall provide a minimum 5-foot by 5-foot unobstructed area for turning space. A 4-foot by 4-foot landing may be used in retrofit situations where existing infrastructure, topography, or natural features warrant a reduced area. Landings at corners or areas with pedestrian signal push buttons shall be located to provide access to the push buttons per the ~~2011 Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way as published by the United States Access Board (located on the internet at [www.access-board.gov](http://www.access-board.gov))~~ “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190.

\*\*\*

### E. Locations

\*\*\*

The design of the sidewalks shall ensure safe and accessible routes to bus stop locations. The location of the bus stop shall be coordinated with the Lane Transit district. Sidewalk design shall provide an accessible path of travel through the bus stop locations. All bus stops shall be design in accordance with the ~~2011 Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way as published by the United States Access Board (located on the internet at [Administrative Order - Page 2 of 5](http://www.access-</a></del></p></div><div data-bbox=)~~

~~board.gov)~~ [“Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way”](#) as published in 36 CFR Part 1190.

\*\*\*

**Section 3.** Section 2.05 of the PIDS Manual is revised as follows:

## 2.05 STREETS AND ACCESSWAYS

Streets and accessways are required to comply with the City’s *Design Standards and Guidelines for Eugene Streets, Sidewalks, Bikeways, and Accessways* (available in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)). The information below provides greater detail regarding the standards for construction design review. The following are links to other transportation publications referenced below:

- American Association of State Highway and Transportation Officials (AASHTO) publications are available at <https://bookstore.transportation.org>.
- The Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) is available at <http://mutcd.fhwa.dot.gov>.
- Oregon Department of Transportation (ODOT) publications are available at [www.oregon.gov/ODOT/HWY](http://www.oregon.gov/ODOT/HWY).
- ~~United States Access Board—2011 Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way are available at [www.access-board.gov](http://www.access-board.gov)~~ The [“Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way”](#) as published in 36 CFR Part 1190 are available at <https://www.ecfr.gov/current/title-36/chapter-XI/part-1190>.

\*\*\*

**Section 4.** Section 2.07, subsections D.5 and E, of the PIDS Manual are revised as follows:

## 2.07 TRAFFIC CONTROL DEVICES

\*\*\*

### D. Signals/Electrical Traffic Control Devices

\*\*\*

5. All new or modified actuated traffic signals shall include Audible Pedestrian Devices (APD) and Countdown Pedestrian Signals. Pedestrian signals shall be designed using the Standard Specifications and Drawings and the ~~2011 Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way as published by the United States Access Board~~ [“Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way”](#) as published in 36 CFR Part 1190.

\*\*\*

## E. Temporary Traffic Control

Appropriate temporary traffic control is essential for the protection of workers and the public utilizing the public rights-of-way during construction. Temporary traffic control devices are required to be in place prior to construction activities on or near the public way. These devices are required to be shown on a Traffic Control Plan consistent with the latest editions of the MUTCD, ODOT's Oregon Temporary Traffic Control Handbook and Standard Specifications, [and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190](#), subject to City review and approval.

**Section 5.** Section 3.05 of the PIDS Manual is revised as follows:

### 3.05 TEMPORARY TRAFFIC CONTROL PLAN (TCP)

A. Temporary traffic control devices required during construction shall be shown on a plan separate from the construction drawings. Temporary traffic control devices shall conform to the current edition of the MUTCD, ODOT's Oregon Temporary Traffic Control Handbook and Standard Specifications, [and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190](#).

B. [The temporary TCP shall include a temporary pedestrian access route \(TPAR\) plan for construction that requires the closure or detour of pedestrian routes. The TPAR shall comply with the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190 in addition to the publications referenced in section A. \(above\) for temporary control. To the extent a provision of any publication listed in section A. conflicts with the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way," the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" shall control.](#)

**Section 6.** Section 4.13 of the PIDS Manual is revised as follows:

### 4.13 TRAFFIC CONTROL PLAN (TCP)

A. The Project Engineer or Contractor shall submit a ~~traffic control plan~~-TCP showing temporary traffic control devices to be used during construction for City approval prior to the PEPI permit being issued. Temporary traffic control devices and signing shall comply with the current edition of Manual of Uniform Traffic Control Devices (MUTCD), ODOT's Temporary Traffic Control Handbook and ~~the~~ Standard Specifications, [and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190](#).

B. [The TCP shall include a temporary pedestrian access route \(TPAR\) plan for construction that requires the closure or detour of pedestrian routes. The TPAR shall](#)

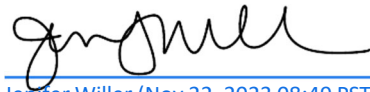
comply with the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190 in addition to the publications referenced in section A. (above) for temporary traffic control. To the extent a provision of any publication listed in section A. conflicts with the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way”, the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” shall control.

C. Existing traffic controls shall not be visually obstructed, damaged, or tampered with in any manner unless approved as part of the traffic control plan.

**Section 7.** To the extent any provision in the PIDS Manual that pertains to pedestrian routes conflicts with a provision from the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190, the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” shall control.

**Section 8.** The Appendices and unamended sections of the PIDS Manual remain in effect as specified by Administrative Order No. 58-16-01 and, as of the effective date of this Order, the PIDS Manual (not including its appendices) is as appears in Exhibit A to this Order.

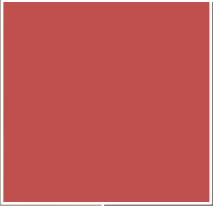
**Dated and effective this** 22<sup>nd</sup> **day of November, 2023.**



Jenifer Willer (Nov 22, 2023 08:49 PST)

---

**Jenifer Willer, City Engineer  
City of Eugene Public Works Department**



2023

# Public Improvement Design Standards Manual (PIDS)

Standards for public improvements and  
procedures for privately engineered projects



*{This page left blank intentionally}*

# Table of Contents

## **SECTION 1 - GENERAL REQUIREMENTS .....1-1**

<b>1.00</b>	<b>INTRODUCTION</b> .....	<b>1-1</b>
<b>1.01</b>	<b>DEFINITIONS</b> .....	<b>1-1</b>
<b>1.02</b>	<b>PURPOSE</b> .....	<b>1-3</b>
<b>1.03</b>	<b>PROFESSIONAL ENGINEER LICENSE REQUIRED - VERIFICATION</b> .....	<b>1-3</b>
<b>1.04</b>	<b>DESIGN EXCEPTIONS AND DEVIATIONS</b> .....	<b>1-3</b>
<b>1.05</b>	<b>DESIGN CALCULATIONS</b> .....	<b>1-4</b>
<b>1.06</b>	<b>ERRORS AND OMISSIONS</b> .....	<b>1-4</b>
<b>1.07</b>	<b>CONSTRUCTION STANDARDS</b> .....	<b>1-5</b>

## **SECTION 2 – DESIGN STANDARDS .....2-1**

<b>2.00</b>	<b>INTRODUCTION</b> .....	<b>2-1</b>
<b>2.01</b>	<b>GENERAL</b> .....	<b>2-1</b>
A.	Construction Site Management.....	2-1
B.	Erosion Prevention .....	2-1
C.	Floodplain Development .....	2-1
D.	Geological and Geotechnical Analysis .....	2-2
E.	Property Owner Notification .....	2-2
2-F.	Public Infrastructure Placement (Right-of-Way / Easements).....	2-2
G.	Street Cutting Prohibitions .....	2-3
H.	Tree Regulations .....	2-3
<b>2.02</b>	<b>SHARED USE PATHS</b> .....	<b>2-3</b>
A.	Bollards .....	2-3
B.	Clearance .....	2-4
C.	Cross-Slope.....	2-4
D.	Grade .....	2-4
E.	Intersections .....	2-4
F.	Lighting .....	2-4
G.	Markings and Signage .....	2-5
H.	Pavement .....	2-5
<b>2.03</b>	<b>SIDEWALKS</b> .....	<b>2-6</b>
A.	Access Ramps .....	2-6
B.	Clearance .....	2-8
C.	Grading Type .....	2-8
D.	Lighting .....	2-9
E.	Locations .....	2-9
F.	Sidewalk Bicycle Parking .....	2-9
<b>2.04</b>	<b>STORMWATER</b> .....	<b>2-10</b>
A.	Analysis (Stormwater Study) .....	2-10



B.	Basin Boundaries.....	2-11
C.	Hydraulic Grade Line (HGL) .....	2-11
D.	Manholes .....	2-12
E.	Off-Site Flows .....	2-13
F.	Pipes.....	2-13
G.	Underground Injection Control (UIC) Facilities .....	2-14
H.	Service Laterals .....	2-15
<b>2.05</b>	<b>STREETS AND ACCESSWAYS .....</b>	<b>2-15</b>
A.	Access Management / Access Connections.....	2-16
B.	Bridges .....	2-16
C.	Bus Routes .....	2-17
D.	Centerline.....	2-17
E.	Crosswalks.....	2-18
F.	Curbs.....	2-19
G.	Curves, Horizontal and Vertical.....	2-20
H.	Design Parameters: Speeds, Rates of Vertical Curvature, and Safe Stopping Sight Distances.....	2-20
I.	Future Street Extensions .....	2-21
J.	Grades.....	2-21
K.	Gutter Flow .....	2-22
L.	Intersections .....	2-22
M.	Intersection/Road Safety Analysis.....	2-23
N.	Lighting .....	2-23
O.	Medians .....	2-28
P.	Parking Bays .....	2-29
Q.	Bike Corrals .....	2-29
R.	Partial -Street Construction.....	2-30
S.	Pavement Design .....	2-30
T.	Planting Strips .....	2-38
U.	Private Streets.....	2-38
V.	Superelevation .....	2-38
W.	Taper Lengths.....	2-38
X.	Valley Gutters.....	2-39
Y.	Vertical Clearance .....	2-39
<b>2.06</b>	<b>TRAFFIC CALMING PRACTICES.....</b>	<b>2-39</b>
<b>2.07</b>	<b>TRAFFIC CONTROL DEVICES .....</b>	<b>2-39</b>
A.	Barricades .....	2-39
B.	Pavement Markings .....	2-40
C.	Signs.....	2-41
D.	Signals / Electrical Traffic Control Devices.....	2-42
E.	Temporary Traffic Control .....	2-44
<b>2.08</b>	<b>WASTEWATER.....</b>	<b>2-44</b>
A.	Analysis (Wastewater Study).....	2-44
B.	Design Approach .....	2-45
C.	Manholes .....	2-45
D.	Off-Site Flows .....	2-47
E.	Pipes.....	2-47
F.	Pump and Lift Station Design .....	2-48
G.	Service Lines.....	2-49

## **SECTION 3 – CONSTRUCTION DRAWINGS / DRAFTING STANDARDS .....3-1**

<b>3.00</b>	<b>INTRODUCTION.....</b>	<b>3-1</b>
<b>3.01</b>	<b>ALL PAGES.....</b>	<b>3-1</b>
<b>3.02</b>	<b>COVER SHEET .....</b>	<b>3-2</b>
<b>3.03</b>	<b>PLAN VIEW.....</b>	<b>3-3</b>
<b>3.04</b>	<b>PROFILE VIEW .....</b>	<b>3-6</b>
<b>3.05</b>	<b>TEMPORARY TRAFFIC CONTROL PLAN (TCP) .....</b>	<b>3-7</b>
<b>3.06</b>	<b>TRAFFIC CONTROL DEVICES AND STREET LIGHTING PLAN (TCSLP).....</b>	<b>3-7</b>
<b>3.07</b>	<b>CONSTRUCTION SITE MANAGEMENT PLAN (CSMP) .....</b>	<b>3-8</b>
A.	Plan Boundary .....	3-8
B.	Erosion Prevention .....	3-9
C.	Natural Resources .....	3-9
<b>3.08</b>	<b>LAND USE PERFORMANCE AGREEMENTS AND SITE PLANS .....</b>	<b>3-10</b>

## **SECTION 4 - PRIVATE ENGINEERING AND CONSTRUCTION PROCESS .....4-1**

<b>4.00</b>	<b>INTRODUCTION.....</b>	<b>4-1</b>
<b>4.01</b>	<b>PRE-APPLICATION CONSIDERATIONS.....</b>	<b>4-1</b>
A.	Staff Consultation.....	4-1
B.	Facility Coordination .....	4-1
<b>4.02</b>	<b>APPLICATION REQUIREMENTS .....</b>	<b>4-2</b>
A.	Engineering and Construction Agreement .....	4-2
B.	Supporting Analyses.....	4-2
C.	Construction Plans .....	4-3
<b>4.03</b>	<b>PLAN REVIEW AND APPROVAL.....</b>	<b>4-4</b>
A.	Objectives .....	4-4
B.	Process.....	4-4
C.	Approval Criteria .....	4-4
<b>4.04</b>	<b>CONSTRUCTION PERMIT CONDITIONS.....</b>	<b>4-5</b>
A.	Application for Public Improvement .....	4-5
B.	PEPI Plans Approved and Copied .....	4-6
C.	Land Use Applications Resolved.....	4-6
D.	Public Dedications .....	4-6
E.	Maintenance Agreements.....	4-6
<b>4.05</b>	<b>CITY ENGINEERING SERVICES .....</b>	<b>4-7</b>
<b>4.06</b>	<b>PRIVATE ENGINEERING SERVICES.....</b>	<b>4-7</b>
<b>4.07</b>	<b>CONCURRENT PLANNING APPLICATIONS.....</b>	<b>4-7</b>
<b>4.08</b>	<b>CONCURRENCES.....</b>	<b>4-8</b>
A.	City Staff.....	4-8
B.	Utility Companies .....	4-8
<b>4.09</b>	<b>PUBLIC NOTIFICATION REQUIREMENTS.....</b>	<b>4-9</b>

<b>4.10</b>	<b>FINANCIAL RESPONSIBILITIES .....</b>	<b>4-10</b>
A.	Project Billing .....	4-10
B.	Other Fees.....	4-10
C.	Performance and Warranty Financial Guarantee.....	4-10
<b>4.11</b>	<b>OTHER PERMITS .....</b>	<b>4-12</b>
A.	Erosion Prevention Permit .....	4-12
B.	Floodplain Development Permit .....	4-12
C.	Wetland Permit.....	4-12
D.	Railroad Permit .....	4-13
E.	Fill Permit.....	4-13
F.	Tree Removal Permit.....	4-13
G.	Electric Permit.....	4-13
<b>4.12</b>	<b>CONTRACTOR AND CONSTRUCTION SCHEDULE .....</b>	<b>4-13</b>
<b>4.13</b>	<b>TRAFFIC CONTROL.....</b>	<b>4-14</b>
<b>4.14</b>	<b>CONSTRUCTION REQUIREMENTS .....</b>	<b>4-14</b>
A.	Pre-Construction Meeting.....	4-14
B.	Inspection.....	4-14
C.	Design Changes .....	4-15
D.	Construction Staking .....	4-15
<b>4.15</b>	<b>POST-CONSTRUCTION REQUIREMENTS .....</b>	<b>4-15</b>
A.	Centerline Monumentation .....	4-15
B.	As-Constructs .....	4-16
C.	Project Completion Notice (Beginning of Warranty Period).....	4-16
D.	Project Acceptance (Release Performance Financial Surety) .....	4-16
<b>4.16</b>	<b>FAILURE TO COMPLY WITH CITY STANDARDS AND PROCEDURES .....</b>	<b>4-17</b>

***SECTION 5 – AS-CONSTRUCTS .....*** **5-1**

<b>5.00</b>	<b>INTRODUCTION.....</b>	<b>5-1</b>
<b>5.01</b>	<b>SUBMITTAL REQUIREMENTS.....</b>	<b>5-1</b>
A.	Paper Copy.....	5-1
B.	Electronic Copy.....	5-1
<b>5.02</b>	<b>REVISIONS .....</b>	<b>5-2</b>
A.	Strikethrough Requirement .....	5-2
B.	Record Requirements.....	5-2
<b>5.03</b>	<b>TITLE BLOCK ADDITIONS .....</b>	<b>5-2</b>
A.	Inspector .....	5-2
B.	As-Constructor .....	5-3
C.	Engineer .....	5-3
D.	Contract Number .....	5-3
<b>5.04</b>	<b>STREET VERIFICATIONS.....</b>	<b>5-3</b>
A.	Stationing .....	5-3
B.	Excavation Type .....	5-3
C.	Pavement Type .....	5-3

D.	Paving Width .....	5-3
E.	Sidewalk Location .....	5-3
F.	Curb Radius .....	5-3
G.	Curb Location .....	5-3
H.	Curb Elevations .....	5-4
<b>5.05</b>	<b>WASTEWATER VERIFICATIONS .....</b>	<b>5-4</b>
A.	Structure Numbers.....	5-4
B.	Main Lines .....	5-4
C.	Service Lines.....	5-4
<b>5.06</b>	<b>STORMWATER VERIFICATIONS .....</b>	<b>5-5</b>
A.	Structure Numbers.....	5-5
B.	Main Lines .....	5-5
<b>5.07</b>	<b>STREET LIGHTS .....</b>	<b>5-5</b>
A.	Pole Numbers.....	5-5
B.	Pole Location.....	5-6
C.	Junction Boxes and Conduit .....	5-6
<b>5.08</b>	<b>TRAFFIC CONTROL DEVICES .....</b>	<b>5-6</b>
A.	Revisions .....	5-6
B.	Notes.....	5-6

## **APPENDICES**

- A     EROSION PREVENTION**
- B     FLOODPLAIN DEVELOPMENT**
- C     GEOLOGICAL & GEOTECHNICAL ANALYSIS**
- D     TREE REGULATIONS**
- E     STREET DESIGN STANDARDS: STREETS, SIDEWALKS, BIKEWAYS, AND ACCESSWAYS**
- F     PAVEMENT DESIGN**
- G     STREET LIGHT DETAILS**
- H     TRAFFIC CONTROL**
- I     PIPES**
- J     STORMWATER**
- K     DRAFTING STANDARDS**
- L     PRIVATELY ENGINEERED PUBLIC IMPROVEMENT PERMIT PROCESS**
- M     CONSTRUCTION**

## SECTION 1 - GENERAL REQUIREMENTS

### 1.00 INTRODUCTION

This manual contains the information needed to design public improvement projects for the City of Eugene. [Section 4](#) of this manual provides specific permitting details related to privately-engineered public improvement (PEPI) projects.

### 1.01 DEFINITIONS

The following definitions are not intended to be a comprehensive list of terms associated with the development of public improvements. Additional definitions may be found in the City Code and the Standard Specifications and Drawings.

**AASHTO:** American Association of State Highway and Transportation Officials.

**Access Ramp:** The sloped area and landing immediately adjacent to the public way that allows access to the public way by individuals with disabilities under the Americans with Disabilities Act (ADA). Note: When the terms “access ramp” or “ramp” are used in this manual it shall be understood to include the curb cut to the access ramp.

**Agreement:** Engineering and Construction Agreement between the City of Eugene and a private entity defining the scope of work and that the public improvements shall be privately engineered, constructed and financed.

**City:** The City of Eugene.

**City’s project manager:** City staff assigned to review and approve construction drawings for the public improvements.

**Code or City Code:** The Eugene Code, 1971.

**Contractor:** Any individual or legal entity that has entered into a contract with the owner/developer to construct the public improvements.

**Critical root zone (CRZ):** That area surrounding a tree that:

- A. Has a radius of 18 inches times the diameter breast height expressed in inches of the tree trunk or trunks; or

- B. Encompasses an area determined for an individual tree to be the necessary root area for the tree's continued normal growth as demonstrated in a written report by a certified arborist and based on documented field investigation and non-destructive physical testing, including, but not limited to non-destructive excavation to delineate the root system to a minimum depth of 24 inches below grade, and no more than 48 inches below grade.

**Diameter breast height (dbh):** The diameter of a tree trunk or trunks measured at 4.5 feet above mean ground level at the base of the trunk or trunks.

**Owner/Developer:** Any individual or legal entity that has entered into an agreement with the City for the purpose of constructing public improvements.

**Plans:** Construction drawings that show the location, type, dimensions, and details of the work to be performed under the agreement.

**Project:** The work to be performed under the agreement.

**Project Engineer:** An Oregon Registered Professional Engineer (per ORS 672.002 to 672.325) responsible for the engineering design of the public improvements.

**Project Manager:** An individual tasked with the initiation, planning, coordination, execution, delivery and closeout of a project. The Project Manager serves as the primary point of contact for all project related issues.

**Shared Use Path:** A paved, off-street travel way designed to serve non-motorized travelers and maintenance vehicles.

**Standard Specifications and Drawings (aka Standard Specifications and/or Standard Drawings):** The Oregon Standard Specifications for Construction Volumes 1 and 2, and the Oregon Standard Drawings, both as revised by the City Amendments adopted by memorandum of the City Engineer in effect.

**Street Grades:** Synonymous with curb grade, as the vertical profile of roadways is defined by the top of curb alignment.

**Work:** The furnishing of labor, materials, equipment, and other incidentals required to survey and design public improvements proposed for construction.

## **1.02 PURPOSE**

The purpose of this manual is to satisfy the directive in Eugene Code 7.085 by providing design standards for construction, reconstruction or repair of public improvements to be constructed within areas under the City's jurisdiction. This manual includes information for the design, plan preparation, and related construction requirements for both publicly- and privately-initiated work. To further facilitate consistency, the bulk of this manual is its appendices, which consist of related resources and regulations. Naturally, these standards neither address all situations nor absolve professional competency. As provided in [Section 1.03](#), the City may approve systems not included in this manual for special conditions and/or environmental constraints.

## **1.03 PROFESSIONAL ENGINEER LICENSE REQUIRED - VERIFICATION**

An Oregon Registered Professional Engineer shall place their seal on all documents in accordance with ORS 672.020, OAR 820-010-0620, and OAR 820-010-0621. Licensed professionals in other disciplines may apply their seal to documents in accordance with OAR 820-010-0623 provided the work is within their education, training, expertise and licensure as defined by Oregon law. The seal of another professional in no way absolves the Project Engineer's responsibility to manage the project in its entirety.

In January of each year, the Computer Aided Drafting (CAD) leads for the City's project teams will check the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) database to determine if the professional engineering licenses for the engineers on their teams are active prior to the first time the engineer's stamps are used. For those licenses scheduled to expire in June, the CAD leads will check the OSBEELS database again at the end of July to determine whether those mid-year licenses have been renewed and continue to be active. If licenses are found to be inactive, the CAD leads will immediately notify the engineers whose license are inactive and the principal engineers. Expiration dates for the stamps will not be updated in CAD until the OSBEELS database has been checked to confirm the licenses are active. At no time will expired stamps be placed on review plans, final plans or as-built sheets.

The City's PEPI Manager or designee shall check OSBEELS database to determine if the professional engineering licensees for engineers on PEPI projects are active prior to PEPI plan approval. PEPI plans must be approved with the seal of an active Professional Engineer.

## **1.04 DESIGN EXCEPTIONS AND DEVIATIONS**

These standards are not intended to limit innovation or creativity, particularly when such efforts result in higher quality and/or lower costs. Departure from the required standards



shall be determined by the City, as well as the Oregon Department of Transportation (ODOT) where ODOT right-of-way is involved and the Federal Highway Administration (FHWA) where federal funding is involved, per the criteria listed below.

A non-standard system may take longer to review, resulting in increased processing costs incurred by the applicant. This information shall be conveyed to an applicant, who, by filing an application for a non-standard system for review, acknowledges and agrees to pay the potentially increased processing costs.

Deviations from any standard in this manual require approval by the City Engineer prior to completion and approval of plans and specifications. To obtain approval, the designer must submit a completed “City of Eugene Design Exception Request” form with a cover memo, which shall include a description of the problem, its proposed solution, and any other information to justify the exception. When ODOT approval is required, use the “City of Eugene’s Oregon Department of Transportation Design Exception Request” form.

The City’s decision to grant, deny, or modify the proposed deviation shall be based upon evidence that the deviation request meets all of the following criteria:

- a. The change will achieve the intended result through a comparable or superior design.
- b. The change will not adversely affect safety and/or operation.
- c. The change will not adversely affect maintainability.

## **1.05 DESIGN CALCULATIONS**

All design calculations and studies for pavement structures, flood control, water quality, and wastewater systems shall be submitted in an organized, legible, and professional form for review. These calculations, bearing the signature and stamp of the Project Engineer, shall also include a thorough list of assumptions used in making the calculations. Any material of unacceptable quality and accuracy will be returned to the applicant for correction and resubmission.

## **1.06 ERRORS AND OMISSIONS**

Any errors or omissions in the approved plans or information used as a basis for the approval may constitute grounds for approval withdrawal and/or stoppage of any or all of the permitted work, as determined by the City. It shall be the responsibility of the Owner/Developer and assigned agents to demonstrate why such work should continue, and to make changes to the plans as may be required by the City before approval of the plans is reinstated.

## **1.07 CONSTRUCTION STANDARDS**

All design and construction of public improvements shall comply with the current edition of the City's Standard Specifications and Drawings. To obtain the current Standard Specifications and Standard Drawings, contact Public Works Engineering, 541-682-5291 or the online Public Works Engineering webpage at: [www.eugene-or.gov](http://www.eugene-or.gov).

*{This page left blank intentionally}*

**SECTION 2 – DESIGN STANDARDS .....2-1**

**2.00 INTRODUCTION .....2-1**

**2.01 GENERAL.....2-1**

- A. Construction Site Management.....2-1
- B. Erosion Prevention .....2-1
- C. Floodplain Development .....2-1
- D. Geological and Geotechnical Analysis .....2-2
- E. Property Owner Notification .....2-2
- F. Public Infrastructure Placement (Right-of-Way / Easements).....2-2
- G. Street Cutting Prohibitions .....2-3
- H. Tree Regulations .....2-3

**2.02 SHARED USE PATHS .....2-3**

- A. Bollards .....2-3
- B. Clearance .....2-4
- C. Cross-Slope.....2-4
- D. Grade .....2-4
- E. Intersections .....2-4
- F. Lighting .....2-4
- G. Markings and Signage .....2-5
- H. Pavement .....2-5

**2.03 SIDEWALKS .....2-6**

- A. Access Ramps .....2-6
- B. Clearance .....2-8
- C. Grading Type .....2-8
- D. Lighting .....2-9
- E. Locations .....2-9
- F. Sidewalk Bicycle Parking .....2-9

**2.04 STORMWATER .....2-10**

- A. Analysis (Stormwater Study) .....2-10
- B. Basin Boundaries.....2-11
- C. Hydraulic Grade Line (HGL) .....2-11
- D. Manholes .....2-12
  - 1. Pipe Grades and Channel Slope .....2-12
  - 2. Locations .....2-12
  - 3. Shallow/Flat Top Manhole .....2-12
  - 4. Size and Diameter .....2-12
- E. Off-Site Flows .....2-13
- F. Pipes.....2-13
  - 1. Cover .....2-13
  - 2. Diameter .....2-13
  - The minimum pipe diameter shall be 10 inches for all stormwater drainage pipes .....2-13
  - 3. Curves, Horizontal and Vertical .....2-13
  - 4. Flow Depth .....2-14
  - 5. Manning’s Roughness Coefficient (“n” value) .....2-14

6.	Materials .....	14
7.	Skewed Pipe Systems .....	2-14
8.	Velocity.....	2-14
G.	Underground Injection Control (UIC) Facilities.....	2-14
H.	Service Laterals .....	2-15
<b>2.05</b>	<b>STREETS AND ACCESSWAYS .....</b>	<b>2-15</b>
A.	Access Management / Access Connections.....	2-16
1.	Aprons for Driveways .....	2-16
2.	Driveway Adjustments .....	2-16
B.	Bridges .....	2-16
C.	Bus Routes .....	2-17
D.	Centerline.....	2-17
1.	Crown.....	2-17
2.	Location.....	2-18
3.	Radii .....	2-18
E.	Crosswalks.....	2-18
F.	Curbs.....	2-19
1.	Elevation below 100-Year Flood.....	2-19
2.	Height.....	2-19
3.	Return Radii.....	2-19
G.	Curves, Horizontal and Vertical.....	2-20
H.	Design Parameters: Speeds, Rates of Vertical Curvature, and Safe Stopping Sight Distances.....	2-20
I.	Future Street Extensions .....	2-21
J.	Grades.....	2-21
1.	Breaks.....	2-21
2.	Curbs .....	2-21
3.	Gutters .....	2-21
4.	Streets .....	2-22
5.	Valley Gutters.....	2-22
K.	Gutter Flow .....	2-22
L.	Intersections .....	2-22
M.	Intersection/Road Safety Analysis.....	2-23
N.	Lighting .....	2-23
O.	Medians .....	2-28
P.	Parking Bays .....	2-29
Q.	Bike Corrals .....	2-29
R.	Partial -Street Construction.....	2-30
S.	Pavement Design .....	2-30
1.	Asphalt-Concrete (AC) Pavement.....	2-30
	Asphalt Concrete Mix Formulas .....	2-34
2.	Portland Cement Concrete (PCC).....	2-34
T.	Planting Strips .....	2-38
U.	Private Streets.....	2-38
V.	Superelevation .....	2-38
W.	Taper Lengths.....	2-38
X.	Valley Gutters.....	2-39
Y.	Vertical Clearance .....	2-39
<b>2.06</b>	<b>TRAFFIC CALMING PRACTICES.....</b>	<b>2-39</b>

<b>2.07</b>	<b>TRAFFIC CONTROL DEVICES .....</b>	<b>2-39</b>
A.	Barricades .....	2-39
B.	Pavement Markings .....	2-40
C.	Signs.....	2-41
D.	Signals / Electrical Traffic Control Devices.....	2-42
E.	Temporary Traffic Control.....	2-44
<b>2.08</b>	<b>WASTEWATER.....</b>	<b>2-44</b>
A.	Analysis (Wastewater Study).....	2-44
B.	Design Approach .....	2-45
C.	Manholes .....	2-45
1.	Pipe Grades and Channel Slope .....	2-45
2.	Drop Manholes.....	2-46
3.	Locations .....	2-46
4.	Size and Materials .....	2-46
5.	Shallow Manholes .....	2-46
6.	Watertight Manhole Covers .....	2-47
D.	Off-Site Flows .....	2-47
E.	Pipes.....	2-47
1.	Cover .....	2-47
2.	Curves, Horizontal and Vertical .....	2-47
3.	Manning’s Roughness Coefficient (“n” Value).....	2-48
4.	Materials .....	2-48
6.	Buoyant Forces.....	2-48
F.	Pump and Lift Station Design .....	2-48
G.	Service Lines.....	2-49

*{This page left blank intentionally}*

## SECTION 2 – DESIGN STANDARDS

### 2.00 INTRODUCTION

This section provides design standards for public improvements (e.g., transportation, wastewater, and stormwater systems), although it does not supersede or account for all applicable local, state, and federal regulations, which are referenced and provided in the appendices to the greatest extent practicable.

### 2.01 GENERAL

#### A. Construction Site Management

A Construction Site Management Plan (CSMP) is required for all public improvement projects and shall be included with the set of public improvement project plans submitted to the City for approval. The CSMP should describe both long- and short-term methods for preventing a construction activity's impacts to water quality and on-site and adjacent natural resources. The CSMP is a protection plan intended to illustrate measures for shielding and covering specific site features, rather than a construction plan; the CSMP does not authorize construction or impacts to waterways, trees, and other site features. See Appendix A for required CSMP Notes and Plan Requirements.

#### B. Erosion Prevention

An Erosion Prevention Permit is required for all project areas that: (1) disturb one or more acres; or, (2) disturb 500 square feet or more of land and is located in a "sensitive area" as defined by the City Code. See Erosion Prevention and Construction Site Management Practices Administrative Rule R-6.645" attached as Appendix A.

#### C. Floodplain Development

A Floodplain Development Permit is required prior to any development occurring within the Special Flood Hazard Area (SFHA). The SFHA includes Zones A, AE, AO and the Floodway for our community on the adopted Flood Insurance Rate Map (FIRM). The FIRM was created by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program. Development includes any man-made-change (e.g., building, filling, excavating, grading, paving, etc.) within the regulatory floodplain. Floodplain Development Permits can be obtained at the Permit and Information Center.



See Appendix B for permit requirements. Special Flood Hazard Areas must be delineated on the CSMP as noted in [Section 3](#).

#### **D. Geological and Geotechnical Analysis**

A geological and geotechnical analysis is required for the construction of a public street or alley or the construction of public drainage systems or public wastewater sewers. For investigation methods and required report content, see “Standards for Geological and Geotechnical Analysis Administrative Rule R-9.6710” attached as Appendix C.

#### **E. Property Owner Notification**

The Project Engineer must notify private property owners and obtain Permit of Entry letters from those private property owners whenever construction activities are necessary on private properties outside of the public right-of-way.

While Eugene Code 7.350 permits property owners served, or to be served by a utility within a public utility easement, access to the public utility easement to construct, install, maintain, and repair private utility services, the City will not approve construction activities impacting private property or a property owner’s use of their property without proper notification. Persons needing to work on property owned by someone other than the developer must give the affected property owner notice of their intent and submit proof of the notification to the City. The notice shall include a description of the work to be completed, when the work will be done, how long the activity is expected to occur, and that the site will be restored to its current condition.

A Permit of Entry letter signed by the affected private property owner acknowledges that the private property owner has received the notice of intent for construction activities on their property and they acquiesce to entry for construction. A Permit of Entry letter is also required to construct a driveway adjustment outside the right-of-way between a new or reconstructed sidewalk or street section and an existing driveway.

#### **F. Public Infrastructure Placement (Right-of-Way / Easements)**

Public infrastructure must be located in right-of-way or public easements; the appropriate dedication instrument will be determined by the City. In most cases, right-of-way is preferred over easements; the latter may require additional documentation with the affected property owner to further clarify operation rights and maintenance responsibilities.

## **G. Street Cutting Prohibitions**

Excavations shall not be permitted when the pavement is less than five years old unless a street cut prohibition exception has been granted in accordance with the provisions of Eugene Code 7.295(2) and the “Utility and Right-of-Way Permits, Construction Within and use of the Public Way” Manual. To obtain the current Utility Manual, contact Public Works maintenance, 541-682-4800 or the online Public Works Maintenance webpage at: [www.eugene-or.gov](http://www.eugene-or.gov).”

## **H. Tree Regulations**

Trees are identified as either “street trees” or “non-street trees.” Trees are primarily regulated under Chapter 6 and 7 of the Eugene Code. Provisions regarding street trees are administered by the Parks and Open Space Urban Forestry Program. Contact Public Works Maintenance, 541-682-4800 or the online Public Works Maintenance webpage at: [www.eugene-or.gov](http://www.eugene-or.gov). Non-street trees are administered by the Land Use Tree Program. Contact Planning and Development, 541-682-5086 or the online Planning and Development webpage at: [www.eugene-or.gov](http://www.eugene-or.gov). If non-street trees are to be removed as part of land use development, Chapter 9 provisions also apply. Impacts of public improvement projects on trees will be evaluated according to both Chapters 6 and 7 of the City Code. See Appendix D for more information on applicable regulations. Tree protection must be delineated on the CSMP as noted in [Section 3.07](#).

## **2.02 SHARED USE PATHS**

Shared use paths shall be designed in accordance with the City’s *Design Standards and Guidelines for Streets, Sidewalks, Bikeways, and Accessways* (provided in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)), the Standard Specifications and Drawings, and the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190. Shared use paths shall also be designed to comply with the following:

### **A. Bollards**

Bollards are intended to restrict unauthorized use of the off-street path system by motor vehicles or to prevent access to load restricted structures by motor vehicles. The location of and determination to install bollards is subject to City approval. Bollard installations shall not restrict access to people with disabilities and be easily visible, especially in low light and poor weather conditions. When installed, bollards shall provide a minimum 4-foot opening and maximum 5-foot and 6-inch opening. Where multiple bollards are

installed, spacing shall be such that when the center bollard is removed, a 10-foot maintenance or emergency vehicle access width is available. When multiple bollards are used, a central bollard shall always be placed on the centerline of the facility. Bollards shall comply with the Manual on Uniform Traffic Control Devices (MUTCD) guidelines and conform to City Standard Drawing TM820(B) for removable bollards.

#### **B. Clearance**

The minimum vertical clearance from obstructions (structures, signs, trees, etc.) above shared use paths is 9 feet.

#### **C. Cross-Slope**

The cross-slope for shared use paths shall not exceed 2 percent.

#### **D. Grade**

Longitudinal slope of shared use Paths shall not exceed 5 percent. Where compliance is not practical due to existing topography, infrastructure, right-of-way availability, a notable natural feature, or similar existing physical constraints, the Project Engineer may submit an application for a deviation.

Grade breaks may be used when the grade change at a station is 2 percent or less, except grade breaks at driveways and access ramps shall meet the design standards for those facilities. For paths less than 8 feet wide, grade breaks may be up to 5 percent.

#### **E. Intersections**

All shared use path intersections shall be designed to accommodate the maintenance vehicle (type and dimensions to be provided by the City) for all turning movements within the paved surface. The minimum radius for any corner shall be 15 feet. The shall provide documentation demonstrating the design vehicle can navigate all turns within the paved surface using vehicle turning movement modeling software (i.e., Auto-turn or equivalent).

#### **F. Lighting**

All new shared use paths shall include LED lighting. The design shall include a lighting analysis based on an average maintained illuminance level between 0.7 and 1.0 footcandles. The Design Engineer may also layout the luminaries in accordance with the spacing table provided below. The design shall comply with the *Design Standards for Street Lighting Systems* located in Appendix G, the Standard Specifications and Drawings, and the applicable lighting requirements provided in [Section 2.05](#).

<b>Shared use Path Luminaire Spacing</b>				
<b>Luminaire Placement (One Side Only)</b>				
Path Width	Pole Height	Distribution Type	LED Lumens	Maximum Pole Spacing
10-12 Feet	12 Feet	Type 1	4600	220 Feet
10-12 Feet	16 Feet	Type 1	4600	180 Feet
10-12 Feet	20 Feet	Type 1	4600	151 Feet
10-12 Feet	25 Feet	Type 1	4600	130 Feet

Additional Requirements for path lighting:

- Control the use of light by using only enough light to ensure safety for path users and by minimizing illumination of areas outside the path.
- In natural areas, use an International Dark-Sky Association approved fixture featuring long wavelength light with a red or yellow tint to minimize impact to wildlife.

### **G. Markings and Signage**

Markings and signage may also be required to address safety issues on shared use paths or to aid in the navigation of the bicycle and pedestrian network.

### **H. Pavement**

All paths shall be surfaced with Portland Cement Concrete (PCC). PCC pavement structures shall be designed using either the AASHTO-approved rigid pavement or Portland Cement Association (PCA) approved design specifications. Pavement design for shared use paths shall factor in the Contractor's use of the subgrade, base and pavement structure during construction and/or the use of the path by maintenance equipment and emergency vehicles following completion of construction. The pavement design shall consider the use of the path subgrade and base by construction vehicles and equipment and, as needed due to soil conditions or other factors; include design and construction of an aggregate base working platform in order to avoid subgrade damage or failure. Prior to beginning the design analysis the designer shall consult with the City to identify the appropriate post-construction vehicles (e.g., City, utility company, emergency vehicles etc.). A narrative discussion of how the vehicle(s) were accommodated in the design must be included in the analysis report.

The minimum 28-day compressive strength for PCC shall be 3300 psi for shared use paths. No vehicles, including construction equipment, shall be permitted to use the pavement until it has reached its full design strength. No exception will be given to allow use of PCC shared use paths prior to reaching design strength.

The minimum pavement thickness shall be determined by the pavement design analysis but in no case shall be less than 7 inches.

All joints within shared use paths shall be saw cut. Transverse contraction joints shall be spaced at relatively equal spacing between joints and shall be close to the same spacing as the longitudinal joints so that the panels are relatively square. Spacing between transverse joints shall not exceed 15 feet for PCC that is 7 inches or more in thickness. The length to width ratio for any panel shall be at least 0.75 and shall not exceed 1.25. Joint reinforcement is not required for shared use paths except as required by the pavement design.

The minimum aggregate base thickness shall be determined by the pavement design analyses but not less than 2 inches of compacted 3/4 inch-minus crushed rock shall be placed before the concrete pavement is poured.

(See Appendix E for *Shared use Path* Standard Detail)

## **2.03 SIDEWALKS**

Sidewalks shall provide an unobstructed, continuous and safe path for pedestrians and be designed in accordance with the City's *Design Standards and Guidelines for Streets, Sidewalks, Bikeways, and Accessways* (provided in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)), ADA requirements, the Standard Specifications and Drawings, and the following:

### **A. Access Ramps**

Each access ramp and its associated wings, landing and other appurtenances shall be included in the plans and shall comply with the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190. All clear width measurements shall be exclusive of the curb.

At new intersections, access ramps shall be constructed in the projection of all crosswalks as defined by the Oregon Vehicle Code. Receiving ramps shall be constructed on the opposing side of newly established intersections. A design exception, per Section 1.04, may be authorized in retrofit situation where a crossing is impractical due to

topographical or utility challenges. A design exception may also be authorized in a retrofit situation where an engineering study indicates a crossing is not warranted.

Perpendicular and parallel ramps are allowed as defined by the Proposed Accessibility Guidelines. Perpendicular ramps are preferred and shall be used where conditions allow. Parallel ramps may be used in the presence of curb tight sidewalk or in locations where a perpendicular ramp is impractical due to topographical, right-of-way or utility challenges.

All new access ramps shall provide a minimum continuous clear width of 5 feet. A clear width of 4 feet may be used in retrofit situations where existing infrastructure, topography, or natural features warrant a reduced clear width. All new landings shall provide a minimum 5-foot by 5-foot unobstructed area for turning space. A 4-foot by 4-foot landing may be used in retrofit situations where existing infrastructure, topography, or natural features warrant a reduced area. Landings at corners or areas with pedestrian signal push buttons shall be located to provide access to the push buttons per the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190.

The design of ramps shall utilize winged (flared) returns to the maximum extent practical. The use of curbed returns shall be used in areas of right-of-way limitations or circumstances where vertical curbing is appropriate due to grading or infrastructure conflicts. In no case shall stand-alone linear curb be utilized. Underexposing wings is acceptable in retrofit situations in order to maintain maximum wing slope.

Grade breaks shall be perpendicular to the path of travel. The remaining triangle shaped area between the truncated domes and the gutter line shall be graded to a maximum 5% counter slope provided it is not part of the turning space or landing.

Access ramps shall be designed for directional orientation of the user. The centerline of each ramp shall be oriented to line up and coincide with the centerline of the ramp on the opposite side of the street as closely as practicable. The Design Engineer shall prepare design detail drawings for each corner with ramps, each mid-block crossing, and every other ramp location shall be included in the plans at no greater than a 1 inch = 5 feet scale. Each drawing shall include complete design information such that the improvements may be constructed without further design calculation by the Surveyor, Inspector or Contractor.

Access ramp drawings shall include dimensions for all features of the new improvements, including but not limited to:

1. Lengths and widths between all elevation points along grade breaks and sides of all curb and gutter, ramps, wings, landings and associated concrete walk;
2. Lengths and widths of all sides of the ramps, truncated dome surfacing, landings, and sidewalk leading into the landings, and lengths of curb and gutter that are not included in the first bullet; and
3. All other lengths and widths of associated concrete walk improvements needed to complete the Access ramps as shown on the special detail plans.

Access ramp drawings shall also include design elevations for all features of the new improvements, including but not limited to:

1. Elevations for the flow line of the gutter and the top of curb:
  - a. Where each side (when extended past the depressed curb) of the ramps intersect the gutter;
  - b. At break points for the wings;
  - c. At grade break points in the curb and gutter;
  - d. At match points to existing curb, and at other points as needed for a complete design.
2. Elevations in the ramps, wings and landings:
  - a. At all grade break points;
  - b. At all match points to existing walk, and at other points as needed for a complete design.

Also see [Section 2.05](#) Intersection standards.

## **B. Clearance**

The minimum vertical clearance from obstructions above sidewalks is as follows:

- 7 feet from the bottom of a sign
- 8 feet from building overhangs
- 7 feet from awnings
- 9 feet from overhanging vegetation, such as tree limbs

## **C. Grading Type**

The standard grading type for sidewalks is setback; alternate designs are subject to the standards noted below. (See Appendix E for *Typical Grading Sections Standard Detail*)

Sidewalks adjacent to roadside stormwater facilities shall be designed to accommodate specified maximum facility slopes per the Stormwater Management Manual. Stormwater quality facilities without a barrier curb shall be separated from the sidewalk with a 12-inch shoulder graded at 2% or less.

#### **D. Lighting**

See [Section 2.05](#) for applicable lighting requirements.

#### **E. Locations**

When an exception has been approved allowing sidewalks on only one side of the street, the sidewalks shall be located within the development on the side of the street where on-street parking is permitted. In cases where a single sidewalk is allowed due to physical constraints, such as wetlands or trees, the sidewalk shall be located on the side opposite from the constraints.

The design of the sidewalks shall ensure safe and accessible routes to bus stop locations. The location of the bus stop shall be coordinated with the Lane Transit district. Sidewalk design shall provide an accessible path of travel through the bus stop locations. All bus stops shall be design in accordance with the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190.

#### **F. Sidewalk Bicycle Parking**

Short term bicycle parking should be placed on the sidewalks where a minimum clear distance of 8 feet is provided between the bicycle rack and the back of sidewalk. The inverted “U” rack shall be used for all on street bike parking. Racks installed on the sidewalk or furnishing zone shall be a minimum of the 2 feet from the face of curb. Inverted “U” racks shall be placed a minimum of 4 feet apart when placed horizontally along the curb. Racks installed on the sidewalks shall be a maximum of 50 feet from main building entrances and be highly visible from adjacent bicycle routes and pedestrian traffic.



## 2.04 STORMWATER

Stormwater management facilities required under provisions of Chapter 9 shall be designed in accordance with the Stormwater Management Manual, City's Stormwater Basin Master Plans, Standard Specifications and Drawings, Eugene Code Chapters 6 and 7, and the following standards.

### A. Analysis (Stormwater Study)

A stormwater study shall be submitted for all stormwater systems that carry runoff from more than one acre of land. The study shall include all of the following elements.

1. A hydrology map containing the following:
  - a. The entire drainage basin boundary and 100 feet of area beyond the drainage basin limits.
  - b. All sub-basins shall be delineated with symbols that are labeled and readable when electronically scanned.
  - c. Drainage areas of all sub-basins (in acres).
  - d. Streets important to the study and street names.
  - e. Flow path or direction arrows in streets, pipes, streams, and ditches.
  - f. Contours or spot elevations for verification of direction of overland flow and pipe cover.
  - g. Collection points (nodes) at downstream limits of all sub-basins, with node numbers.
  - h. Existing and proposed storm drain pipes with material type and sizes included.
  - i. Future pipes in the system, complete with proposed sizes, slopes, pipe cover, flow line elevations at manholes.
  - j. City drainage master plan information such as node numbers, basin names, and drainage boundaries.
  - k. Existing and proposed surface water features and drainage systems, including but not limited to: streams, wetlands, drainage channels, and stormwater conveyance/treatment systems.
  - l. Legend details such as north arrow, scale, company name/logo, designer, and date.
2. Hydrologic calculations to establish runoff flow amounts.
3. Hydraulic calculations to establish pipe size, waterway cross-section, flow velocity, and hydraulic grade line (HGL).

4. The report shall include related charts, graphs, calculations, summary tables and supporting narrative.

## **B. Basin Boundaries**

Stormwater systems shall be designed to convey the calculated runoff from the entire upstream drainage area during the applicable design storm event (See Appendix J). Basin boundaries shall be consistent with the City's Stormwater Basin Master Plan, unless otherwise approved by the City based on more current data. Runoff calculations shall be based on the assumption of a full-build-out basin according to the land use designations of the most recent Metropolitan Plan.

## **C. Hydraulic Grade Line (HGL)**

The hydraulic grade line at the outfall (downstream discharge point of the drainage area) shall be based on the most current water surface elevation information identified in the City's Stormwater Basin Master Plan or other data as approved. Hydraulic analysis shall account for energy losses (bend losses, manhole losses, other "minor" losses, friction losses, etc.) and differences in flow characteristics between surcharged systems and open channel systems. Minor losses shall be computed using formulas in the Oregon Department of Transportation hydraulics manual.

Stormwater systems shall include a hydraulic analysis of all existing pipes and waterways downstream to the point of outfall. The water surface elevation from the City's Stormwater Basin Master Plan or a previously-approved storm study may be used as a starting point for the design. If the ultimate plan is for future construction of pipe between an existing pipe downstream and the current project, and if the current condition through this reach is an interim system, the design water surface elevation shall be based on the hydraulics of the future pipe rather than on the interim system, and shall be labeled "future HGL".

The HGL for the design storm event shall not be less than 6 inches below the gutter at any point where water could surcharge into the street (catch basins, manholes, curb inlets).

If the hydraulic analysis of an existing downstream system is not available through the City's Stormwater Basin Master Plan, the engineer may choose to extend the XP-SWMM model using methods and assumptions consistent with the City's modeling work to determine the starting HGL for the system.

## **D. Manholes**

### **1. Pipe Grades and Channel Slope**

Manholes shall be designed to minimize head loss through the structure. The crown of the pipes exiting the manhole shall not be higher than the lowest crown of the pipes entering the manhole, or, 80 percent of the flow depth of the pipe exiting the manhole shall not be higher than the lowest flow depth of the pipes entering the manhole.

The slope of the channel through a manhole shall be the same as the pipe upstream from the manhole; any change of pipe grade shall occur at the manhole outlet.

### **2. Locations**

Manholes shall be installed at each of the following locations:

- End of each main line
- Changes in grade, size or alignment (vertical and horizontal)
- Distances not greater than 400 feet for pipes 24 inches and smaller

Manhole spacing for pipes 30 inches and larger shall be as directed by the City to meet operational considerations at each location. In no case shall the manhole spacing exceed 800 feet for pipes 30 inches and larger.

Blind connections are allowed for catch basins, area drains and curb inlets where structures serve roadway drainage and are located at right angles to the storm mains in the roadway.

Manholes shall be positioned outside normal wheel travel paths (centered in the lane or between lanes) and outside the center of an intersection where the turning path of vehicles may place a wheel path over them.

### **3. Shallow/Flat Top Manhole**

A shallow or flat top manhole shall be used when there is less than 5 feet of cover over a pipe.

### **4. Size and Diameter**

See City Standard Specification for Construction and Standard Drawings for manhole style, size and material properties.

## **E. Off-Site Flows**

Closed or piped drainage systems from lands outside the development site and having flows through the new stormwater systems shall be "public" systems and constructed to one or more of the development boundaries. The system shall be sized and located to accommodate all pre and post development contributing off-site flows in accordance with the City's Stormwater Master Plan. Guidelines for the extension of the public stormwater system can be found in the City's Stormwater Master Plans.

Construction of public roadways or other improvements that alter historic drainage patterns shall include the constriction of conveyance facilities to accommodate historic drainage patterns.

## **F. Pipes**

Pipes shall comply with the following:

### **1. Cover**

A minimum 4 feet of cover shall be provided over the top of the pipe from expected finish grade. Where pipe cover is proposed to be less than 4 feet or more than 10 feet, the Design Engineer shall provide documentation and/or design calculations to show that the pipe is structurally adequate to withstand construction loadings and traffic loading.

Notwithstanding the above guidance, a CLSM cap shall be required where the top pipe is within 2 feet of finished grade.

### **2. Diameter**

The minimum pipe diameter shall be 10 inches for all stormwater drainage pipes.

### **3. Curves, Horizontal and Vertical**

Horizontal and vertical curves are not permitted except in steep terrain, and then only:

- a. One horizontal curve is permitted between any 2 manholes provided there is no vertical curve in that section; or,
- b. A maximum of 2 vertical curves is permitted between any 2 manholes.
- c. Joint deflection shall be no greater than pipe manufactures' recommendations.

#### **4. Flow Depth**

Target for depth of flow in pipes during the flood control design storm shall be 80% of pipe diameter. A particular design may result in a deeper or shallower flow, but pipes shall not be designed to flow surcharged unless outfall conditions or other hydraulic conditions prevent open channel flow.

#### **5. Manning's Roughness Coefficient ("n" value)**

"n" value for PVC pipe shall be 0.010

"n" value for concrete pipe shall be 0.013

"n" value for metal pipe shall be 0.020

#### **6. Materials**

Stormwater pipe may be concrete, ductile iron, PVC or metal. See Appendix I for the Metal Pipe Design Policy.

#### **7. Skewed Pipe Systems**

Pipe networks in streets shall be designed parallel to street centerlines whenever possible; skewed pipe alignments are discouraged.

#### **8. Velocity**

Minimum velocity permitted for design flow is 3 feet-per-second (fps). When design Q causes a pipe to flow surcharged at less than 3 fps, the engineer shall demonstrate that flow in the pipe will exceed 3 fps during normal low-flow, non-surcharged conditions.

#### **9. Buoyant Forces**

The effect of buoyant forces shall be checked for all pipes and manholes used below the normal water table. Buoyant forces shall not be greater than the weight of the pipe, manholes and backfill.

### **G. Underground Injection Control (UIC) Facilities**

New public UIC facilities are prohibited. All existing public drywells are scheduled for decommissioning. Existing drywells were installed as a temporary solution to stormwater management. No additional flows shall be directed to existing drywells. Construction of stormwater conveyance systems in the vicinity of existing drywells

shall include facilities and capacity to accommodate the removal of the drywells.

## H. Service Laterals

The street gutter is the primary stormwater collection and conveyance system for individual lot drainage. Lot drainage shall be served by weepholes in the curb where possible. No new bubbler systems shall be allowed. Bubbler systems may be approved, at the discretion of the City Engineer, where weepholes or piped conveyance are unavailable or unfeasible.

Stormwater service laterals shall be allowed where drainage from private lots cannot be accommodated by weepholes in the curb. Stormwater laterals are allowed where stormwater conveyance requires a pipe diameter of 8 inches in diameter or greater to convey the flood control design storm. Laterals may be connected to the mainline or existing drainage structures (curb inlets and catch basins) provided the Project Engineer demonstrates conveyance capacity through hydraulic analysis.

Manholes are required where stormwater laterals connect to the mainline. A blind connection may be used where the diameter of the mainline is twice the diameter of the lateral or greater. Blind connections shall be perpendicular to the main line. Catch basin or curb inlets may serve as points of connection.

Stormwater laterals may be allowed, at the discretion of the City Engineer, for single family dwellings that cannot be served by weepholes. Laterals may be approved where protection of property and drainage of standing water warrants piped conveyance.

## 2.05 STREETS AND ACCESSWAYS

Streets and accessways are required to comply with the City's *Design Standards and Guidelines for Eugene Streets, Sidewalks, Bikeways, and Accessways* (available in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)). The information below provides greater detail regarding the standards for construction design review. The following are links to other transportation publications referenced below:

- American Association of State Highway and Transportation Officials (AASHTO) publications are available at <https://bookstore.transportation.org>.
- The Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD) is available at <http://mutcd.fhwa.dot.gov>.

- Oregon Department of Transportation (ODOT) publications are available at [www.oregon.gov/ODOT/HWY](http://www.oregon.gov/ODOT/HWY).
- The “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190 are available at <https://www.ecfr.gov/current/title-36/chapter-XI/part-1190>.

## **A. Access Management / Access Connections**

Access connection location and width is regulated by Eugene’s codified access management standards (see Eugene Code Chapters 7 and 9). Additional requirements regarding driveway construction are provided below (see Standard Drawings for details).

### **1. Aprons for Driveways**

Aprons shall extend from the gutter to the back of the concrete walk; if no walk exists, the apron shall be 5 feet deep, measured from the back of the curb (5 feet and 6 inches from gutter). Aprons shall comply with accessibility requirements in the area of the sidewalk unless no sidewalk is present adjacent to the proposed apron and no sidewalk is to be built connecting to the apron at the time of development and the City determines no sidewalk will be built connecting to the apron in the future.

### **2. Driveway Adjustments**

Because grades of existing driveways usually do not match the grade of a newly constructed street, a portion of the existing driveway must often be removed and rebuilt to match the new street. In doing so, the following basic design criteria must be included:

- a) Driveway grades for driveway adjustments shall be designed as provided in the Standard Drawings.
- b) Natural drainage (overland surface flows) shall not be impeded (no ponding).

See the Standard Specifications and Drawings for details.

Permission should be obtained from the adjacent property owner prior to any work outside public right-of-way or easements.

## **B. Bridges**

Design standards for bridge projects in the City of Eugene shall be in compliance with the

standards specified in AASHTO's *Bridge Design Specifications* and *Guide Specifications for Highway Bridges* with related references, as well as the following ODOT manuals: *Bridge Design and Drafting Manual*; *Geotechnical Design Manual*; and *Hydraulics Manual*. The City of Eugene will contract plan review and inspections to a qualified independent engineering firm. The additional cost of plan review and inspection shall be borne by the applicant.

### **C. Bus Routes**

Pavement testing and pavement rehabilitation/strengthening as necessary is required to accommodate new bus routes on a street and/or changes in bus usage of a street prior to the implementation of the new route(s) or change in bus usage. Examples of change in usage and/or new routes include, but are not limited to: adding a new bus route or changing an existing bus route to use streets not previously used for bus routes or not used in the past 5 years for bus routes; removing parking and shifting traffic to allow a bus only lane in the curbside lane or center lane; or, changing a low volume curbside right turn lane into a lane that allows through and right turn traffic in which buses then shift to using the curbside lane.

Prior to a change in usage and/or adding a new route as described above, complete pavement testing and rehabilitation/strengthening design of the existing pavement in accordance with the requirements of [Section 2.05 R.1. and 2.](#) for AC pavement and [2.05 R.3](#) for PCC pavement to determine if strengthening or reconstruction of the street is needed to accommodate the route change/addition. If strengthening or reconstruction of the existing pavement is recommended by the pavement design, complete the strengthening or reconstruction prior to the route change or addition.

In addition to the requirements above, lanes planned for usage as bus rapid transit routes shall be paved with PCC with a 50-year design life prior to establishing a route on the street. The PCC lanes shall also extend through all intersections crossed by the route. All bus rapid transit stops located in public rights of way shall be paved with PCC with a 50-year design life.

### **D. Centerline**

#### **1. Crown**

Streets shall be designed with a 2 percent straight grade from centerline to gutter except when matching existing parabolic streets. The crown on streets extended either laterally or longitudinally shall be the same as that on the existing street.



## 2. Location

The centerline of a proposed street shall be positioned on the center of the pavement width.

## 3. Radii

For all local residential streets, the minimum centerline radius is 100 feet. This standard is set to keep the design speed consistent, as well as to provide safety. Exceptions may be allowed for access lanes and low volume streets in the following situations:

1. To facilitate traffic calming,
2. To connect the proposed street to other developments,
3. To protect natural resources,
4. When there are no alternate property configuration designs available (long or odd-shaped parcels) which would maximize development area by increasing lot frontage or achieving density goals.

For a centerline radius shorter than 100 feet, traffic calming features such as signing, striping, and traffic markers may be required. Parking on curves with less than 100-foot centerline radius is prohibited.

## E. Crosswalks

Crosswalk markings indicate to pedestrians the appropriate routes across traffic, facilitate crossing by the visually impaired, and remind drivers of potential conflicts with pedestrians. Locating crosswalks shall be as follows (see [Section 2.07 Traffic Control Devices](#) and Standard Drawings for marking details):

1. Crosswalks at signalized intersections shall be marked.
2. Crosswalks at un-signalized intersections may be marked under the following conditions:
  - a. At complex intersections to orient pedestrians.
  - b. At offset intersections to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
  - c. At intersections with visibility constraints to position pedestrians where they can best be seen by on-coming traffic.
  - d. At pedestrian crossing islands.
3. Crosswalks on designated school routes shall be the “Continental” type. In

addition to providing “Continental” markings, “Rectangular Rapid Flashing Beacons” may be required to increase the visibility of and call attention to the crossing.

4. Mid-block crossings shall be marked crosswalks. Mid-block crossing shall be marked with “continental” style markings where pedestrian refuge islands are present. In addition to providing crosswalk markings, “Continental” style markings and/or “Rectangular Rapid Flashing Beacons” and/or hybrid pedestrian signals may be required to increase the visibility of and call attention to the crossing provided they are warranted by an engineering study and approved by the City of Eugene Traffic Engineer. Guidelines for implementing a mid-block crossing are found in the *Design Standards and Guidelines for Streets, Sidewalks, Bikeways, and Accessways* (provided in Appendix E and on the internet at [www.eugene-or.gov](http://www.eugene-or.gov)).

## **F. Curbs**

### **1. Elevation below 100-Year Flood**

Top of curb shall be no more than 2 feet below the Federal Emergency Management Agency (FEMA) designated 100-year floodway elevation.

### **2. Height**

The standard required curb reveal is 6 inches.

### **3. Return Radii**

Curb return radii shall be 20 feet for street widths equal to or greater than 28 feet, or 30 feet for street widths less than 28 feet; unless other radii is required to accommodate pedestrians, emergency vehicles, buses, or trucks. Curb return radii shall be designed to accommodate the largest design vehicle, as designated by the City likely to use that facility, without driving over the curb and/or access ramps. If the City grants an exception to this requirement, ramps and sidewalk which could receive vehicle wheel loading shall be constructed with concrete at least 7 inches thick.

The designer shall demonstrate via modeling software (i.e., AutoTURN® or equivalent) that the designated design vehicle can navigate all turns within the curbs on local streets and within the travel lane on arterial and collector streets. The boundaries of the turning path of the design vehicle when making the turn are established by the outer trace of the front overhang and the path of the inner rear wheel. Regardless of the designated design vehicle, the designer shall demonstrate a turning path having

at least a 30-foot inside radius and a 50-foot outside radius for emergency vehicle turning movements between the opposing curbs.

The Owner/Developer shall provide sufficient right-of-way for sidewalk access ramps and sidewalk using the appropriate curb radius within the scope of their project. See Section 2.03 for the design requirements for sidewalks and access ramps.

### G. Curves, Horizontal and Vertical

Horizontal and Vertical curves shall be of sufficient length to provide safe stopping sight distances (SSD) based on design speeds and rate of vertical curvature (K) as determined by the City Traffic Engineer and AASHTO road design standards (use “rounded for design” values of stopping sight distance). On hillside residential streets, deviations from the horizontal and vertical AASHTO standards may be allowed by the City Traffic Engineer when conformance to AASHTO standards is not attainable due to physical conditions and the Owner/Developer provides and installs MUTCD approved traffic control devices that provide safe and efficient operation of vehicles for the proposed street design. For crest vertical curves, the hill shall be signed with appropriate MUTCD warning signs and speed advisory plates. (See [Section 2.07 Traffic Control Devices](#) for more information.)

### H. Design Parameters: Speeds, Rates of Vertical Curvature, and Safe Stopping Sight Distances

Design parameters for classified streets shall be:

Classification	Design Speed (mph)	Minimum Rate of Vertical Curvature, K (ft/%)		Minimum Safe SSD (ft)
		Crest	Sag	
Access lanes	15	3	10	80
Residential streets with slopes greater than 6%	25	12	26	155
Residential streets	30	19	37	200
Collectors	35	29	49	250
Arterials	45	61	79	360

## **I. Future Street Extensions**

Tentative grade designs for future extensions of curbs and alleys shall be shown on the profiles and shall extend far enough to verify the proposed design (200 feet or through the adjoining intersection).

## **J. Grades**

### **1. Breaks**

With the exception of grade breaks at driveways and access ramps, grade breaks shall be used when the grade change at a station is:

1. 0.6 percent or less for Arterial streets;
2. 0.8 percent or less for Collector streets;
3. 1.0 percent or less for Local streets;
4. 1.25 percent or less for steep hillside streets; and,
5. 3 percent or less for alleys.

Vertical curves meeting AASHTO K values for the design speed shall be used at all other times.

### **2. Curbs**

Curb grades shall be established so that the Hydraulic Grade Line for the design storm event is no less than 6 inches below the gutter at any point where water could surcharge into the street (catch basins, curb inlets, manholes).

Curb grades across the throat of access ramps shall be designed to accommodate sidewalk access ramps and shall not exceed 2 percent. (See Section 2.03 for more information.)

Curb grades along short-radius curves, such as curb returns and cul-de-sac bulbs, shall be 0.5 percent or greater. See Appendix E for *Cul-de-Sacs*, *Hammerheads*, and *Emergency Vehicle Turnaround* Standard Details.

### **3. Gutters**

The minimum gutter grade shall be 0.40 percent. Grades of 0.30 percent may be approved by the City to match existing curb grades.

#### 4. Streets

The maximum street grade permitted in hillside developments is 15 percent, with the following exception: grades in excess of 15 percent, but not more than 20 percent, may be allowed for distances not exceeding 200 feet. Streets grades approaching intersection pedestrian crossings shall transition using standard vertical curves (see Section 2.05.L for pedestrian crossing slopes and Section 4.05.H for vertical curves).

#### 5. Valley Gutters

The minimum grade on valley gutters shall be 0.4 percent.

#### K. Gutter Flow

To limit the width of storm runoff in street gutters to an acceptable value, regardless of street grade, the maximum length of gutter allowed to carry surface flow is 400 feet or one block, whichever is shorter. When the maximum length is reached, at least one curb inlet or catch basin shall be provided to direct gutter flow to an approved stormwater discharge system. The curb inlet or catch basin shall be located in such a manner that the gutter flow is intercepted before crossing a pedestrian ramp.

To propose a greater length of gutter flow, the Project Engineer must submit calculations to substantiate that such a design will achieve the same results. The maximum width of gutter flow shall be 6 feet for streets equal to or greater than 28 feet wide or 4 feet for all other streets. Calculate gutter flows using a 1 year 30 minute storm for computing gutter flow is acceptable. Gutter flow at access ramps shall be a maximum depth of 1 inch. Curb inlets will be required upstream of the ramps to reduce ponding at the ramp. (See [Section 2.03 Access Ramps](#))

#### L. Intersections

Intersection design shall meet AASHTO stopping sight distance requirements (SSD) based on the design speed of the facility. In addition to providing the SSD along each street, corresponding sight triangles on each approach leg for an intersection must be provided based on the type of approved intersection control. Local street intersections serving adjoining residential-related traffic shall be designed to achieve sight triangles for uncontrolled intersections as defined by AASHTO, *i.e.*, intersections not controlled by yield signs, stop signs, or traffic signals, unless otherwise approved by the City Engineer. Traffic control devices shall be installed only when warranted by the *MUTCD* or the *Traffic Manual*. (See [Section 2.07 Traffic Control Devices](#))

Pedestrian access ramps at intersections shall be installed for current and future crossings. If a statutory pedestrian crossing is to be closed deliberately, barriers and MUTCD signage shall be required at signalized intersections, railroad crossings, and other hazardous areas. Where access ramps are required, the access ramp and street crossing area shall meet the requirements of Section 2.03. Intersection pedestrian crossings between ramps shall not exceed 2 percent cross-slope perpendicular to the direction of the pedestrian crossing (except the cross slope of crossings without “stop control”, which shall not exceed 5 percent) for a width of 8 feet, and not exceed 5 percent running slope in the direction of the pedestrian crossing. For mid-block crossings, the cross-slope of the pedestrian crossing may match street grade, but the running slope in the direction of the crossing shall not exceed 5 percent. (See [Section 2.03 Access Ramps](#))

#### **M. Intersection/Road Safety Analysis**

An Intersection/Road Safety Analysis is required for public improvements that include intersections identified as functioning at or near an unsafe level or roadway locations where pedestrian and/or bicyclist safety is a documented concern by the City. The City will review the Intersection/Road Safety Analysis and determine the required street width and mitigation measures to improve pedestrian and/or bicyclist safety. The Intersection/Road Safety Analysis shall include:

- a. Average Daily Trips (ADT) of all legs of the intersection;
- b. Street classifications of all intersecting roadways;
- c. Presence of on-street parking;
- d. Current (within past two years) peak hour (7 to 9 a.m. and 4 to 6 p.m.) turning movement counts on all approaches to the intersection, and if within an industrial area the count must break down vehicle classifications as percentages;
- e. Delay-based level of service calculations using Synchro or HCM capacity analysis methodology;
- f. Crash history of the past three years (obtained from PWM Traffic Operations compilation of DMV records); and,
- g. Document concerns of pedestrian and/or bicyclist safety (obtained from PWM Traffic Operations or PWE Transportation Planning).

#### **N. Lighting**

All new streets and bike paths shall include lighting. The lighting design shall be in accordance with AASHTO, Illuminations Engineering Society of North America (IES) and City of Eugene Standards. Lighting design and construction shall conform to the City adopted requirement of the NEC. The lighting design shall include a lighting analysis and shall comply with the Design Standards for Street Lighting provided in Appendix G, the

Standard Specifications and Drawings, and the following:

1. All new and retrofit luminaires shall be LED. Desired roadway placement is 3 feet into the street beyond the curb.
2. Standards design for residential subdivisions shall utilize gray fiberglass poles anchored in underground sleeves and gray cobra head LED luminaires producing an IES Type II or Type III cutoff pattern.
3. The Design Engineer shall consult with the City to determine which lighting design is appropriate for the roadway under design.
4. Standard design for arterial and collector streets shall include the following:
  - a. Arms and LED luminaires installed on existing utility company poles; or
  - b. Gray fiberglass poles anchored in underground sleeves and gray cobra head LED luminaires producing and IES Type II of Type III cutoff pattern; or
  - c. Steel Hot Dipped galvanized poles with concrete foundations and gray cobra head LED luminaires producing an IES Type II or Type III cutoff pattern.
5. Standard design for “great streets”, mixed use areas and nodal developments as identified and defined in adopted planning documents requiring pedestrian scale lighting shall use the standard predesign scale pole luminaire and concrete foundation per City standards. The design may include a mixture of pedestrian scale lighting and standard street lighting.
6. The lighting design analysis for arterial, collector, commercial and industrial streets shall be in the form of computerized output from an industry-accepted lighting package that includes calculated IES luminance levels, maximum-to-minimum uniformity ratio, average-to-minimum uniformity ration, design fixture, input wattage, light mounting height, light spacing, along with a plan view of the isocandela lighting distribution. Minimum maintained average luminance levels, maximum-to-minimum uniformity ratio, and average-to-minimum uniformity ratio shall be per the following maintained luminance table.

<b>Maintained Luminance Values (L Ave) of Candelas per Square Meter</b>			
<b>Street Classification*</b>	<b>Average Luminance</b>	<b>Ave to Min</b>	<b>Max to Min</b>
Arterial – Commercial	1.2	3 to 1	5 to 1
Arterial – Intermediate	0.9	3 to 1	5 to 1
Arterial – Residential	0.6	3.5 to 1	6 to 1
Collector – Commercial	0.8	3 to 1	5 to 1
Collector – Intermediate	0.6	3.5 to 1	6 to 1
Collector – Residential	0.4	4 to 1	8 to 1
Local – Commercial	0.6	6 to 1	10 to 1
Local – Intermediate	0.5	6 to 1	10 to 1
Local – Residential	0.3	6 to 1	10 to 1

**\*For the purpose of this chart, the following characterizations apply:**

**Commercial:** A densely developed business area that attracts a high volume of nighttime vehicular and pedestrian traffic; and/or an area with many pedestrians during nighttime hours.

**Intermediate:** Areas that are characterized by frequent moderately-heavy nighttime pedestrian activity, such as street block with libraries, community recreation centers, and/or neighborhood retail stores.

**Residential:** Areas with single-family homes, town houses, small apartment buildings and small commercial establishments that have few pedestrians at night.

7. Residential local roads may use the following spacing table to layout light poles and LED fixtures.
  - a. For 20', 21', 27' or 28' wide streets: a Type II distribution LED cobra head luminaire that produces between 2400 and 3000 at no more than 29W.
  - b. For 34' wide streets: a Type II distribution LED cobra head luminaire that produces between 3800 and 4000 lumens at no more than 42W.
  - c. All placement assume the luminaire is placed from directly the curb to 3 feet into the street.

<b>Local Residential Luminaire Spacing</b>				
<b>Preferred - Dual Sided Luminaire Placement (Alternating Sides)</b>				
Road Width	LED Lumens	Distribution Type	Pole Height	Maximum Pole Spacing
20-21 Feet	2400-3000	Type 2	20 Feet	108 Feet
27-28 Feet	2400-3000	Type 2	20 Feet	102 Feet
34 Feet	3800-4000	Type 2	20 Feet	123 Feet
<b>One-Sided Luminaire Placement (One Side only)</b>				
Road Width	LED Lumens	Distribution Type	Pole Height	Maximum Pole Spacing
20-21 Feet	2400-3000	Type 2	20 Feet	113 Feet
27-28 Feet	2400-3000	Type 2	20 Feet	109 Feet
34 Feet	3800-4000	Type 2	25 Feet	122 Feet

8. Arterial streets shall have at least two lights at each intersection. On all other streets at least one light is required at each intersection. Street light poles shall be placed to meet IES lighting requirements or approved spacing table. Poles shall be staggered on each side of the street and located on the inside of curves to the greatest extent practicable.
9. Light poles shall be a minimum of 5 feet horizontal from driveway aprons.



10. Light poles shall be located on lot lines whenever possible, so long as required illumination levels and uniformity ratios can also be achieved.
11. Poles within park lands may be 12 feet in height. Light fixtures in parks shall be KIM Era with swept arm mount. In natural resource areas, as directed by the City, lighting may be limited to bollards on timers.
12. Light poles shall not be located closer to street trees than allowed in AO-58-04-02-F (provided in Appendix D). Pedestrian scale lighting may be allowed upon approval from the Urban Forester.
13. Light pole supports shall be designed pursuant to the criteria on the City of Eugene Standard Drawings with the exception of direct bury fiberglass poles.
14. Direct bury fiberglass poles shall be designed for soil conditions greater than or equal to 1,500 psi bearing capacity and AASHTO 100 mph wind speeds. Any deviations from these standards (including but not limited to: fill areas, steep slopes greater than 1:4, and saturated soils in water quality facilities) are considered non-standard structures and the foundation must be designed using site specific recommendations from a Geotechnical Engineer and the most current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals with all interim revisions. Pole foundations shall meet AASHTO 100 mph wind speeds.
15. The City of Eugene has agreements with the local power companies to provide flat rated street light power. The State of Oregon has provided an interpretation of the National Electric Code (NEC) which allows direct connect street light design in specified circumstances. A single street light owned by a municipality that is directly fed from a utility power source does not require a formal service with breakers. This is one light from one power source with no additional load. It is allowed to have two lights from one power source if they are in separate conduits and they leave the power company box and go different directions. All single supplied street lights shall be controlled by photo-electric cell (PEC). Multiple street lights fed from a lighting circuit shall be controlled by a single master PEC that operates contactors in the service cabinet.
16. Single-feed street lights placed further than 50 feet from utility power source requires a junction box located next to the pole.

17. Lighting systems shall be controlled by dead front-type panel, freestanding or pole mounted service cabinets. Pole mounted panels are only allowed on hot dipped steel galvanized poles.
18. All poles, both single-feed and circuit-feed, shall be fused in the hand-hole with TRON HEB or HEX type fuse holders with 5 amp fuse.
19. Lighting conduits shall be installed a minimum of 30 inches below finish grade. The point of utility service shall be located within the public right-of-way or in a PUE directly adjacent to public right-of-way. A directly adjunct PUE is considered the standard 7-foot to 10-foot roadside easement. The primary location for street light conduit shall be in a joint trench with other utilities or under the sidewalk area. Joint trenching shall be used and street light conduit shall be located outside of the planting strip unless the applicant shows that no other reasonable alternative is available. If the planting strip is approved for street light conduit, the conduit shall be installed directly adjacent to the sidewalk edge, or one foot from the backside of the curb. In no case shall conduit be installed in an area which may conflict with the installation of street trees or stormwater conveyance and treatment facilities.
20. Conduit shall be sized to allow no more than 25 percent fill. No underground conduit shall be less than 1 and 1/2 inches in diameter. Non-metallic conduits shall be Schedule 40 PVC. All conduits in concrete foundations shall be Schedule 40 rigid galvanized steel.
21. All street crossings require a junction box on each side of the crossing.
22. The wiring shall be sized to provide a maximum voltage drop of one (1) percent from the utility service point to the service cabinet, and a maximum voltage drop of two (2) percent from the farthest light to the service cabinet on each circuit. The applicant shall provide the City with voltage drop calculations for all street lighting design that uses a service cabinet.
23. When more than one circuit is connected in a conduit run, each load conductor shall have its own separate neutral. No shared neutrals shall be permitted.
24. Maximum wire size between the service cabinet and luminaires shall be No. 4 AWG.
25. Minimum wire size for conductors carrying current to luminaires shall be No. 10 AWG.

26. The wire size for conductors carrying current to photo-electric control (PEC) shall be TYPE UF multi-conductor No. 14 AWG
27. Wiring for AWG #8 and larger shall be XHHW, copper, stranded, single conductor. Wiring for AWG #10, and wiring where any part of the run is direct buried, shall be Type UF cable.
28. Multi-phase conductors, and multi-circuited in one conduit conductors, shall be factory supplied color-coded wire. Wire color shall be consistent from service connection to last light on circuit. Switching of color code in mid-circuit will not be allowed.
29. Underground splicing shall be kept to a minimum.
30. Where setback sidewalks are required, street light poles shall be placed in the planting strip no less than 36 inches from the center of the pole to the curb face.
31. Where curbside sidewalks are required, street light poles shall be placed adjacent to the back side of the sidewalk.
32. Street light poles shall not be permitted in sidewalk areas unless right-of-way constraints prevent other options and an exception is approved by City staff. If poles are to be installed in a sidewalk area, they must provide a minimum clearance of 4 feet from either the face of the curb to the front edge of the pole, or from the rear edge of the sidewalk to the rear edge of the pole.

(See Appendix G for *Circuit Wiring Diagram* Standard Detail)

## **O. Medians**

Installation of medians is subject to City approval. Medians shall be designed in accordance with the following design standards:

1. Median refuge islands shall be at least 6 feet wide between travel lanes and at least 20 feet long. On priority bicycle routes the median refuge island shall be at least 10 feet wide to accommodate bicycles with trailers and cargo bikes.
2. Median refuge islands shall provide an at-grade passage compliant with ADA regulations through the island rather than using ramps and landings.
3. Vegetated median refuge islands shall not compromise the visibility of pedestrians and bicyclists crossing in crosswalks.
4. Vegetated medians shall be a minimum of 8 feet wide.

5. Maintenance vehicle parking shall be provided within 60 feet of planted medians.
6. A 1-foot wide paved concrete perimeter strip shall be provided between the curb and planted area for maintenance safety.
7. Vegetated medians to be maintained by the City shall be planted with non-invasive, low-maintenance plant species.
8. Vegetated medians shall include an automatic irrigation system.

#### **P. Parking Bays**

Parking bay locations are subject to City approval. The parking bays shall be designed in accordance with the following design standards:

1. Minimum width shall be 7 feet.
2. Utilities shall not be placed within the planter areas.
3. Parking bays shall not reduce street tree or street light requirements.
4. When possible, alternate the parking bays with tree planting strips that are equal in length on the opposite side of the street. Design of parking bays and tree planting strips shall meet the requirements of the “Design Standards and Guidelines for Eugene Streets, Sidewalks, Bikeways and Accessways”.
5. Minimum curb return radii for the reverse curves are 10 feet.
6. Parking bays shall be located and designed to maintain runoff into vegetated stormwater facilities.

#### **Q. Bike Corrals**

Bike corrals are private facilities in the public right-of-way to facilitate large volumes of bicycle parking. Bike corrals shall be privately maintained and implemented through a revocable permit. Bike corrals should be located in on-street parking areas to accommodate bicycle parking needs. Bike corrals shall accommodate a minimum of ten bicycles. Additional spaces should be necessary based upon service needs. Bike corrals shall be located adjacent to the facility or property being served. The preferred locations for bike corrals are adjacent to curb extensions and other physical barriers.

A six-inch barrier curb shall be placed perpendicular to the curb on each of the bike corral. The curb shall be affixed to the road surface and shall provide adequate protection from adjacent vehicular parking spaces. To facilitate drainage and reduce the collection of debris, curbs should not be constructed abutting the gutter. Corrals shall not be located adjacent to drainage structures or in areas where significant stormwater flow is expected.

Tubular markers shall be installed on the outside corners of the corral adjacent to the vehicular travel way. A standard 4-inch thermoplastic line shall be installed the length of the corral adjacent to the vehicular travel way.

## **R. Partial-Street Construction**

When less than full-street improvements are approved by the City, the construction shall provide a minimum 20-foot paving width. The crown of the pavement shall be on the centerline of the future pavement width. Grade from the centerline to gutter of the existing street shall not be flatter than 1 and 1/2 percent or steeper than 4 percent. Cross sections shall be provided at 50-foot intervals where a constant cross slope is not maintained.

## **S. Pavement Design**

### **1. Asphalt-Concrete (AC) Pavement**

New AC pavement and AC reconstructions (both described below as “new pavement” or “new streets”) shall be designed as described herein. The design method for new pavement and for pavement rehabilitation and strengthening of existing streets shall be as described in the 1993 AASHTO *Guide for Design of Pavement Structures* (1993 AASHTO Guide) with the 1998 supplement; with the following exception: the City’s nomographs provided in Appendix F may be used for new and reconstructed streets classified as local streets or neighborhood collector streets. Software to calculate pavement depth using the AASHTO-approved methodology is available online at [www.aashtoware.org](http://www.aashtoware.org). The design requirements below apply to new pavement and pavement rehabilitation/strengthening.

New AC pavement and AC reconstructions may be designed as “full-depth” AC pavements if recommended by a pavement engineering report and supported by soil characteristics testing and soil support testing. Full-depth asphalt concrete pavement is asphalt concrete paved directly on a compacted firm and unyielding subgrade without a base rock layer other than an optional 2-inch to 4-inch leveling course as desired.

Full depth AC design is used to minimize subgrade excavation during construction in areas where AC construction work can be supported by untreated or stabilized subgrade. Full depth AC design may be proposed for AASHTO subgrade soil types A-1 through A-4. Full depth design may also be proposed for AASHTO soil types A-5 through A-6 provided that soil testing and/or falling weight deflectometer (FWD) back calculation data proves that the resilient modulus is at least 7,500 psi, or, in

areas where the subgrade can be improved during construction through either scarification and compaction or soil treatment, a geotechnical report provides recommendations for the scarification-compaction process or the soil amendment process. Full depth AC may also be proposed with aggregate subbase on geotechnical fabric instead of soil treatment.

Full depth design shall assume the full-depth AC paving supports the full traffic loading. Any treated subgrade or aggregate subbase shall be considered a working platform for construction and not a structural element of the pavement structure in the pavement design.

Design parameters for the AASHTO-approved method for flexible pavement ( $SN = a_1D_1 + a_2D_2M_2 + a_nD_nM_n$ ) are reflected below. The pavement section shall be designed using the Layered Design Analysis method described in Section 3.1.5 of Part II of the 1993 AASHTO Guide.

Design traffic, ESAL's, is the expected number of equivalent single axle loads to the pavement over the design period. For all street classifications the design period for new streets, portions of new streets, and rehabilitation of existing streets to fully reconstruct or to remove and replace pavement shall be 30 years, and 20 years for overlays and "mill and fill" street rehabilitation. Design ESAL's shall be calculated per the current ODOT *Pavement Design Guide*. Annual growth rate shall be 1.5 percent. Table 1, ESAL Annual Conversion Factors, shall be replaced with the following:

**Table 1 – ESAL Annual Conversion Factors**

<b>ESAL Annual Conversion Factors</b>				
Number of Axles	Flexible Pavement		Rigid Pavement	
	One Way Traffic Data	Two Way Traffic Data	One Way Traffic Data	Two Way Traffic Data
2	100	50	100	50
3	220	110	270	135
4	320	160	400	200
5	650	325	950	475
6+	650	325	950	475
Standard Bus	930	465	1390	695
Articulated Bus	1550	775	2320	1160

Serviceability (psi) is the ability of the pavement at the time of observation to serve high-speed, high volume vehicular traffic. Use the following factors.

Initial psi = 4.2

Terminal psi = 2.5

Reliability (R) is the probability that the pavement section designed using the design method will perform satisfactorily for the traffic and environmental conditions that actually occur during the design period. Use the following values:

<b><u>Street Classification</u></b>	<b><u>Design Reliability</u></b>
Arterials	90 Percent
Collectors	90 Percent
Neighborhood Collectors and Local streets	95 Percent

Overall standard deviation (S) accounts for the designer’s ability to estimate the variation in the equivalent axle loads. Use the following value:

$$S = 0.5 \text{ for flexible pavement}$$

Subgrade support ( $M_r$ ) is measured by the soil resilient modulus, the strength of the soil. Follow the 1993 AASHTO Guide for correlations of the  $M_r$  to other soil properties. Soil support values shall be determined from soil tests, however, an “R” value of 5 or a  $M_r$  value of 3775 will be accepted for design purposes without verification by soil testing. Soil support values may also be back calculated from falling weight deflectometer (FWD) tests.

Drainage coefficient,  $m_i$  is the effect of moisture in the layer of material. The following values shall be used:

Crushed rock	1.0
Sand, gravel	0.6

Layer coefficient ( $a_{\#}$ ) is the contribution of the pavement layer to the structural number per inch of thickness. Use the following coefficients for pavement design.

<b>Subbase coefficient (<math>a_3</math>)</b>	
Crushed rock	0.08
Lime-treated soil	0.11
Cement-treated soil	0.11

<b>Base coefficient (<math>a_2</math>)</b>	
Crushed rock	0.10
In-place cement treated base (ICTB)*	0.16
Plant mix cement treated base (CTB)	0.22

Bituminous treated base (BTB) 0.22  
 \*Layer coefficient for ICTB may be used where at least 50 percent, by weight, of the existing material to be treated is granular.

**Surface Course coefficient, all lifts (a<sub>1</sub>)**  
 Plant mix AC 0.42

Minimum Thickness – Should the pavement design result in a thickness less than shown in the table below, the minimum AC pavement thickness required shall be as shown below:

<u>Street Classification</u>	<u>Minimum Thickness</u>
Local or Neighborhood Collector	6 inches
Local or Neighborhood Collector w/bus route	8 inches
Major Collector	8 inches
Arterial	9 inches

Round pavement thickness calculations up to the nearest half-inch (0.5”). The minimum AC thickness for Local and Collector streets listed above may be decreased by up to two inches (as calculated using the layer coefficients above) if ICTB or CTB (place CTB on subgrade fabric) a minimum of 10 inches thick with a 7 day strength of between 300-500 psi is constructed as a base layer for the AC.

Treated subgrade, ICTB, or a layer of aggregate subbase or base material or cement treated base over subgrade geotextile shall be included under the pavement section in the construction plans as a working platform for construction in the following situations:

1. Where soils testing has been performed and one or more of the following conditions apply:
  - a. The report indicates that the soils are weak; and/or
  - b. The report states the soils will not be compactable to Standard Specifications requirements; and/or
  - c. The report states the soils will be prone to pumping during the construction period; and/or
  - d. The subgrade soils do not meet compaction and/or deflection requirements during construction.
2. Where the designer has not performed soils testing and has assumed soil strength R=5 (or M<sub>r</sub> = 3775) for design purposes.



The minimum thickness of the construction working platform layer shall be as shown below, and shall be thicker if necessary to achieve the minimum specified compaction and maximum deflection requirements.

If a treated subgrade, an ICTB or CTB is proposed, a full pavement design shall be performed which also includes a mix design for the treated subgrade, ICTB or CTB to establish the thickness of treatment, the percent cement, the optimum water content, and the maximum density of the treated subgrade, ICTB or CTB. The minimum thickness of the working platform shall be as follows: 12 inches for aggregate sub base or base; 10 inches for an ICTB or CTB; and 12 inches for treated subgrade. The purpose of treatment of the subgrade will be to make the material compactable, so there is no minimum strength requirement, however, the maximum strength shall not exceed 500 psi. The 7 day design strength for ICTB and CTB shall be between 300 psi and 500 psi. Construction of the treated subgrade, ICTB or CTB shall comply with special specifications to be supplied by the City.

**Asphalt Concrete Mix Formulas**

Select the level of AC mix to be specified for construction based on the design ESAL’s for the life of the pavement. If design ESAL’s for the street to be paved exceed 10 million, the mix design and criteria for the mix shall be prepared by a licensed Professional Engineer with specific experience in pavement design.

ESAL’s	Mix Criteria
< 10,000	Level 1
10,000 to 1 million	Level 2
>1 million, <10 million	Level 3

**2. Portland Cement Concrete (PCC)**

PCC pavement structures shall be designed using either the 1998 Supplement to the 1993 AASHTO *Guide for Design of Pavement Structures* (1993 AASHTO Guide) or Portland Cement Association (PCA) approved design specifications. Use the parameters from the 1998 Supplement design method listed in the following table with notes on their suggested values and/or documentation of where the values come from or can be obtained. Design traffic loading shall be calculated as shown above in the AC subsection.

**Design Parameters for 1998 Rigid Pavement Supplement to AASHTO Guide**

Parameter	Design Value	Notes
Design Period ESAL repetitions	Compute using rigid pavement factors in PIDSM Table 1.	1
Design Reliability Level	Same as for flexible pavement	
Initial Serviceability, $P_o$	4.5	2
Terminal Serviceability, $P_t$	Same as for flexible pavement	
Standard Deviation	0.40	3
Minimum 28-day Flexural Strength of PCC ( $S'c$ )	600 psi	4
Modulus of Elasticity of Concrete ( $E_c$ )	3,600,000 psi	5
Modulus of Elasticity of Base Material	20,000 psi	6
Modulus of Subgrade Support (k-value)	50 pci	7
Poisson's Ratio of PCC	0.20	8
Edge Support Adjustment Factor	1.0	9
Friction Coefficient between Slab and Base	1.4	10
Joint Length	Per requirements of PIDSM	
Mean Annual Wind Speed	7.6 mph	11
Mean Annual Temperature	53.3 °F	11
Mean Annual Precipitation	49.4 inches	11
Moisture Gradient & Construction Temperature Differential in Slab	1 °F per inch of slab thickness	12
Mean Annual Freezing Index	31 °F days	13
Annual Temperature Range	46.6 °F	14
Number of Days with Maximum Temperature above 90 °F	15	15

Notes on parameter values:

1. See last paragraph on page III-80 of the AASHTO Guide.
2. See page 21 in 2007 ODOT Design Guide.
3. This is rounded from the value of 0.39 that ODOT uses (see page 22 of the 2007 Design Guide) since the accuracy of estimating the standard deviation doesn't warrant distinction between 0.39 and 0.40.
4. Based on 600 psi flexural strength requirement in Section 02001.33 of the 2008 ODOT Specification for Class 4000 paving concrete.
5. Computed from 600 psi flexural strength using formula:  $E_c = 26454 * S'c^{0.77}$  from formula shown in example on page 45 of the 1998 Supplement.
6. Value shown is for aggregate base per 2007 ODOT Design Guide. Mid-range values from Table 14 of the 1998 Supplement would also be acceptable.
7. Derived from Fig. 40 in AASHTO 1998 Supplement for A-4 to A-7 soils at 95% saturation to approximate the default R value of 5 used for flexible pavement. Exception: If soil testing is performed to determine the actual k-value, the actual k-value may be used. Submit testing reports to the City for review.
8. From AASHTO 1998 Supplement.
9. Assumes no slab edge support. Factor varies from 0.92 to 1.00 depending upon degree of edge support as noted on page 20 of 1998 Supplement.
10. Mean value from Table 14 in 1998 Supplement for aggregate base.
11. Used to compute temperature differential within the slab per Eq 48 of 1998 Supplement for positive differential and Eq 51 for negative temperature differential. Data is from the National

Weather Service Climate Summary for Eugene available at the following link: [http://www.wrh.noaa.gov/pqr/climate/eug\\_clisummary.php](http://www.wrh.noaa.gov/pqr/climate/eug_clisummary.php).

12. Value is middle of range given on page 46 of 1998 Supplement for wet climate. Value is used to compute negative temperature differential for checking tensile stress in top of slab for axle loading near undoweled transverse joints.
13. Value from NOAA 29-yr average for Eugene Airport. Value used in faulting prediction models.
14. Value based on August normal maximum of 81.8 °F and January normal minimum of 35.2 °F. Value is used in the doweled joints faulting prediction model.
15. Value from National Weather Service Climate Summary for Eugene. Value is used in undoweled joints faulting prediction model.

The final step of the design is to estimate the magnitude of joint faulting at the end of the design period using the predicative models in 1998 Supplement for doweled or undoweled joints. Analyze joint faulting for a 30 year period. Adjustment to the design is required if the 30 year predicted faulting magnitude exceeds the critical values given in Table 28 of the 1998 Supplement. Potential adjustments include use of treated base material and use of subdrains to improve drainage conditions.

The design life for PCC pavement shall be a minimum of 40 years for local streets, neighborhood collectors, and major collectors and a minimum of 50 years for arterials. The design shall assume the PCC carries the full traffic loading. If aggregate base or cement treated subgrade is used it shall be considered a working platform. Pavement design for streets shall factor in the Contractor's use of the pavement structure during construction. The pavement design shall consider the use of the subgrade and base by construction vehicles and equipment and include, as needed due to soil conditions or other factors, design and construction of an aggregate base working platform in order to avoid subgrade damage or failure. Prior to beginning the design analysis the designer shall consult with the City to identify the appropriate post-construction design vehicle or vehicles (e.g., City, utility company, emergency vehicles etc.). A narrative discussion of how the design vehicle(s) were accommodated in the design must be included in the analysis report.

The minimum 28 day compressive strength for PCC shall be 4000 psi for all streets, accessways and alleys. No vehicles, including construction equipment, shall be permitted to use the pavement until it has reached its full design strength. If the designer intends for the street or alley pavement to be used prior to achieving its full design strength, the design report shall include verification that the structural design of the pavement will accommodate the proposed uses at the strength specified below without damage to the pavement. In the case of this design verification, the street or alley pavement may be used after it has achieved at least 70 percent of design strength. When design analysis yields a design thickness less than shown in the table below the following minimum

thicknesses shall be used: Round pavement thickness calculations up to the nearest 1/2inch.

<b><u>Classification</u></b>	<b><u>Minimum Thickness</u></b>
Alleys	7 inches
Accessways	7 inches
Local Streets without Bus Route	7 inches
Local Streets with Bus Route	8 inches
Collector Streets	9 inches
Arterial Streets	10 inches

The designer shall provide a jointing plan for PCC paving of streets in the construction drawings showing the transverse and longitudinal joints in the concrete pavement to control cracking. The jointing plan shall be drawn to scale and show at a minimum, manholes, valve boxes, inlets and other structures, curb and gutter, joint layouts, dowels, tie bars and other reinforcement where required. The jointing plan shall also include a title, legend, engineer’s stamp, general notes, joint details and sawing depths. Joint layout shall be designed in accordance with American Concrete Pavement Association (ACPA) recommendations and requirements contained in this section. The designer shall minimize or eliminate joints that intersect another joint at the pavement edge at an acute angle. The designer shall avoid angles of less than 60 degrees. No skewed joints shall be allowed within mainline paving areas. Joints shall be saw cut, except as required by the Standard Specifications. Alley joints may be tooled.

Transverse contraction joints shall be spaced at relatively equal spacing between joints and shall be close to the same spacing as the longitudinal joints so that the panels are relatively square. Spacing between transverse joints shall not exceed 15 feet for PCC 7 inches or more in thickness. The length to width ratio for any panel shall be at least 0.75 and shall not exceed 1.25.

Longitudinal joint spacing shall not exceed two times (2x) the slab thickness in feet up to a maximum of 15 feet, see below for examples:

<b><u>PCC Thickness</u></b>	<b><u>Maximum Joint Spacing</u></b>
7 inches	14 feet
8 inches or thicker	15 feet

PCC street paving shall either be reinforced pavement or shall be “plain” PCC with dowels and tie bars to reinforce the joints. Dowel bars shall be placed across the transverse joints and deformed tie bars shall be placed across longitudinal joints. In intersections, dowel

bars shall be placed in all joints. Panels adjacent to concrete curb and gutter or curb shall be tied to the gutter, or curb in absence of a gutter, with deformed tie bars. Dowel and tie bar sizes and placement shall be as per the Standard Drawings. Joint reinforcement is not required for alleys except as required by the pavement design.

If aggregate base is not required as a working platform per the pavement design a leveling course of a minimum of 2 inches of compacted 3/4 inch-minus crushed rock shall be placed before the concrete pavement is poured.

Requirements, limitations and provisions for a working platform for construction shall be as described above in the AC subsection.

(See Appendix E for *Alley Paving* Standard Detail)

#### **T. Planting Strips**

In situ topsoil shall be preserved and protected in place when possible. A minimum depth of 2 feet of topsoil meeting the requirements of the Standard Specifications shall be placed within the planting strips where compaction, excavation, contamination or disturbance is expected. An 18" depth of topsoil may be allowed at lateral utility crossings. The planting strip is the area between the back of curb and the existing or proposed future sidewalk location. The cross sections shall identify the planting strip areas and provide callouts directing their protection and/or replacement.

#### **U. Private Streets**

Private streets, and related features such as drainage systems and street lighting, shall be privately maintained and identified as such on the construction drawings. As with other private construction, a PEPI permit does not authorize construction of private streets nor its infrastructure. Construction permits for private streets and its infrastructure is through the Permit and Information Center, Atrium Bldg. 99 West 10<sup>th</sup> Avenue.

#### **V. Superelevation**

Superelevation shall be designed in accordance with AASHTO design standards.

#### **W. Taper Lengths**

Standards for streets that provide a transition from a wider to a narrower street (especially for through-streets) are as follows:

1. Taper formula:  $W(S^2)/60$ , where  $W$  = width of taper and  $S$  = speed in miles per

hour (MPH).

2. Taper is preferably placed in a curve.
3. Shorter tapers may be allowed where the taper widens in the direction of traffic flow.
4. A taper is not needed if a transition includes an intersection, as long as the driver has to stop before turning or proceeding from a wider street onto a narrower street.
5. When connecting to an intersection, the taper must end at a point that provides a minimum of 25 feet from the curb return.

#### **X. Valley Gutters**

Valley gutters may be used in the following circumstances:

- Stop controlled intersection where there is no drainage system to tie in to within 200 feet.
- Between a parking bay and the adjacent travel lane.

#### **Y. Vertical Clearance**

For the required vertical clearance for each functional classification of roadway, refer to the appropriate section of AASHTO's *A Policy on Geometric Design of Highways and Streets*. Emergency vehicle access roads must also comply with Fire Code, which includes, but is not limited to, a minimum clearance of 13 feet and 6 inches.

### **2.06 TRAFFIC CALMING PRACTICES**

The City shall review and approve the design and construction of traffic calming measures on a case by case situation. If approved, construction of the device shall be consistent with the Standard Specifications and Drawings.

### **2.07 TRAFFIC CONTROL DEVICES**

All traffic control devices shall comply with the Standard Specifications and Drawings, the current adopted MUTCD with Oregon supplements, the ITE Traffic Control manual, and the following. See Appendix H for Standard Details.

#### **A. Barricades**

All barricades must be designed to meet the current MUTCD with Oregon supplements and the ITE Traffic Control Device manuals. All barricades shall be designed and constructed to comply with the Standard Specifications and Drawings barricades complete with "End" and red warning signs shall be installed at ends of dead-

end streets when hammerhead or cul-de-sac turnarounds are not provided. The standard shall be the type “A” barricade. In locations where a hazard exists (i.e., a pond or lake, an open water way, a drop off, etc.) a type “B” barricade shall be installed. See Standard Drawings for details.

## **B. Pavement Markings**

1. Design of pavement markings shall conform to the current Manual on Uniform Traffic Control Devices (MUTCD) with Oregon amendments.
2. All pavement marking plans must include dimensions to clearly identify the placement and extent of the markings.
3. Pavement marking details and materials shall be in accordance with the Standard Specifications and Standard Drawings and as follows:
  - a. Long line striping shall be Method A, except on PCC pavements, longitudinal lines shall be Method A Methyl Methacrylate or a preformed thermoplastic Type-B bar.
  - b. Transverse legends and Bars shall be Type B-HS.
  - c. Curbs shall be painted.
4. Some new installations and modifications also require the installation of temporary “Traffic Control Changes Ahead” signs.
5. Bike boxes may be required at signalized intersections on designated bicycle routes. Bike boxes are utilized to restrict vehicular right turns or where a bike lane transitions from one side of the roadway to another. A bike box shall be formed by transverse lines 10 feet apart to delineate the queuing or transitions areas.

A standard 12-inch stop bar shall be used to indicate the point at which vehicles are required to stop. A “No Turn on Red” sign (MUTCD R10-11) shall be installed overhead to restrict free right turns. A “Stop Here on Red” sign (MUTCD R10-6) shall be post mounted at the stop line. A bike symbol legend (MUTCD 9C-3A) shall be used and centered between the crosswalks line and the stop line. There shall be one bike symbol legend for each vehicular lane approaching the bike box. A “WAIT HERE” legend may be used in advance of the stop line to supplement the “Stop Here on RED” sign.

Bike boxes and approaching ingress lanes shall be striped green in color.

## C. Signs

1. Signage design shall conform to the current Manual on Uniform Traffic Control Devices (MUTCD) with Oregon amendments and the City of Eugene Sign Manual.
2. Street name signs are required at all intersections including alley intersections and planned regional shared use paths. All street name signs require block numbers, these are obtained from the City. Public streets shall have white on green signs and private streets shall have white on blue signs.
3. Stop signs and Yield signs shall be designed and installed only where they meet warrants by traffic engineering study.
4. Speed signs can only be installed by approval of the City in conjunction with the speed limit being approved by the State Speed Access Board.
5. “No Parking” signs are required where parking is prohibited based on street width, sight restrictions, and safety requirements. In general, parking is prohibited in the following locations: on curves with less than 100 feet centerline radius; at areas with sight restrictions; and at the end of streets and hammerheads, which shall also include fire lane signs. See the adopted Street Design Standards in Appendix E for parking restrictions based on street width and classification. For streets that only allow parking on one side of the street, parking shall be located on the side that has a sidewalk.
6. Utilize City-owned street light poles for sign supports where possible. All other sign supports shall be perforated steel square tube posts in concrete foundations according to the Standard Specifications and Standard Drawings.
7. Pedestrian refuge medians wider than 6 feet shall have in-street pedestrian crossing signs mounted upon the island in each direction of vehicular travel.
8. Bicycle wayfinding signs shall be placed at the intersection of two or more bikeways and should be installed at other decision points along bicycle routes. Installation of wayfinding signs shall follow the MUTCD and Oregon Supplemental standards including the use of Oregon ODB1 series signs. Signs shall be placed in advance of all turns on the near side of the intersection. ODB1 signs shall include destinations, directional arrows and distances. Travel times required to reach each destinations shall be calculated at 10 mph. See the City of Eugene Bicycle Wayfinding Design Guide for a list of destinations.



#### **D. Signals / Electrical Traffic Control Devices**

1. These devices shall meet warrants for installation or have a TIA that indicates that warrants will be met upon installation.
2. All traffic signals and other electric traffic control devices must meet current National Electric Code (NEC) and National Electric Safety Code (NESC) requirements.
3. All traffic signals shall be of mast arm support design unless a specific exemption is granted (e.g., temporary signal installation).
4. All signal poles must be designed within the right-of-way and be placed to keep sidewalks and ramps clear. Signal poles must be designed for optimum ADA usability.
5. All new or modified actuated traffic signals shall include Audible Pedestrian Devices (APD) and Countdown Pedestrian Signals. Pedestrian signals shall be designed using the Standard Specifications and Drawings and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190.
6. All traffic signals shall utilize a 2070E traffic signal controller in a 332 cabinet. It shall utilize the City of Eugene Voyage software package and shall connect to the City's master traffic signal system.
7. Inductive loop design is the preferred method of traffic actuation. Video detection may be considered when design considerations are optimal or when inductive loop detection would not function as well as video detection.
8. Minimum size of conduit shall be 1 and ½ inches except that 1 inch will be allowed to a push button detection post.
9. Maximum conduit fill design shall be 25 percent.
10. Junction box (JB) fill shall not exceed NEC. The maximum number of conduits installed in any one box will be determined by the cumulative diameter of the conduits, subject to the following maximums: JB1, 8 inches; JB2, 16 inches; and JB3, 24 inches.
11. The utility service point shall be located in the public right-of-way or in a PUE directly adjacent to the public right-of-way. A PUE is defined as the standard 7-foot or 10-foot roadside utility easement. Maximum voltage drop from the utility service point to the

service cabinet shall not exceed one (1) percent. Maximum voltage drop from service cabinet to the furthest point of the system shall not exceed two (2) percent.

12. All wiring for the traffic signal shall be IMSA cable for signals, 3M Opticom wiring for emergency vehicle preemption, UF for street light conductors, and XHHW for service wiring.
13. The traffic signal service shall be a 120 volt service with meter socket that includes a blank cover and jumper clips. Street lighting at the intersection shall be 120 volt and include a PEC on each fixture.
14. Interconnect cable shall be 22 Gauge PE39 Cable.
15. New installations and modifications require the installation of temporary "Caution New Intersection Control" signs.
16. Foundations shall be designed pursuant to the criteria on the City of Eugene Standards Drawings and the ODOT Traffic Structures Manual.

The details for the mast arm foundations are shown on ODOT Standard Drawing TM653. The depth of the foundation must be designed using site specific recommendations from a Geotechnical Engineer and the most current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals with all interim revisions.

The drilled shaft (or other deep foundation) design must produce a foundation embedment depth equal to or exceeding the embedment depths resulting from the use of the Brom's method as stated in the commentary of Section 13.6.1.1 of the AASHTO Standard Specifications. The under-capacity factor to use is 0.7, the minimum overload factor to use is 2, and a 1.33 stress increase factor may be applied. This results in the working stress reactions, as shown on TM651, to be increased by a minimum safety factor equal to  $[(2/0.7) / 1.33] = 2.15$ . Using the Brom's method to design the depth of signal foundations with the overturning moment and shear will provide adequate resistance for applied torsional loads.

Figures 2-1 through 2-3 in the ODOT Traffic Structures Design Manual provide foundation depths for the standard types of signal pole mast arms as a function of soil type (either cohesionless or cohesive) and soil strength. Figure 2-1 shows foundation depths calculated for a cohesionless soil without any groundwater. Figure 2-2 provides foundation depths for cohesionless soils that are completely under water

(totally saturated condition). Figure 2-3 provides a table of foundation embedment depths calculated for cohesive soils. Those figures may be used in calculating foundation depths for standard types of signal pole mast arms as a function of soil type and soil strength, and as indicated in the ODOT Traffic Structures Design Manual.

#### **E. Temporary Traffic Control**

Appropriate temporary traffic control is essential for the protection of workers and the public utilizing the public rights-of-way during construction. Temporary traffic control devices are required to be in place prior to construction activities on or near the public way. These devices are required to be shown on a Traffic Control Plan consistent with the latest editions of the MUTCD, ODOT's Oregon Temporary Traffic Control Handbook and Standard Specifications, and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190, subject to City review and approval.

### **2.08 WASTEWATER**

Public wastewater systems shall be designed and constructed in accordance with the City's Wastewater Master Plan, Standard Specifications, Eugene Code Chapters 6 and 7, applicable appendices of this manual, and the following standards. It is also noted that vertical and horizontal separation between wastewater lines and water lines shall be maintained in accordance with DEQ regulations (available at [www.deq.state.or.us](http://www.deq.state.or.us)).

#### **A. Analysis (Wastewater Study)**

A wastewater study shall be prepared for all wastewater systems that include pipe sizes greater than 8 inches or where additional properties may be served by an extension of the system. The study shall include, but not be limited to, a study map, wastewater flow calculations, and pipe hydraulic calculations. The wastewater study shall be prepared in accordance with standards of this manual and in a manner such that the information is readable when electronically scanned.

The wastewater study map shall include, at a minimum, the following:

1. Streets and street names.
2. Lot lines.
3. Contours or other form of ground surface elevation information.

4. Proposed and future pipe system, complete with manholes, pipe slopes, manhole flow line elevations, pipe sizes.
5. Ultimate service area boundaries (from Wastewater Master Plan and consultation with the City).
6. Sub-service area boundaries, each individually highlighted in some way.
7. Legend details such as, but not limited to, north arrow and scale.
8. Company name, designer's name, and date.
9. Demonstration that all buildable areas within the development can be served.

## **B. Design Approach**

Wastewater service shall be extended in conformance with the approved waste water basin master plans. Public mains shall be extended at minimum slope unless an engineering study demonstrates the basin can be adequately served by steeper grades or shallower mains. Wastewater mains shall be extended to the limits of the development served for the purpose of future extension unless an engineering study demonstrates service is already available or an alternate service route is more efficient.

The minimum pipe diameter for wastewater mainline is 8 inches. 6-inch pipe may be used on residential mainlines in the most upstream reach, if the length of the reach is less than 250 feet and if no more than 4 single dwellings are served.

The minimum desirable slope for a 6-inch mainline system is 1 percent and for an 8-inch mainline system is 0.40 percent. The minimum desirable cover is 5 feet at the extreme upstream manhole in a service area; additional cover requirements may apply. The maximum desirable design flow depth is 80 percent full. The minimum design velocity is 2 fps.

Notwithstanding minimum design velocity, the City may approve the following adjustment: 8-inch pipe slopes may be flatter than 0.40 percent only if necessary to maintain flow line depths to serve all lots in the service area.

8-inch pipe slopes may be steeper than 0.40 percent where maintaining flow line depth is not a design control. Where the system is not intended to be extended in the future, the slope of the last segments should be between 1 percent and 5 percent to achieve cleansing velocities.

## **C. Manholes**

### **1. Pipe Grades and Channel Slope**

Manholes shall be designed to minimize head loss through the structure. The crown of the pipe existing the manhole shall not be higher than the lowest crown of the pipe entering the manhole or 80 percent of the flow depth of the pipe exiting the manhole shall not be higher than the lowest 80 percent flow depth of the pipes entering the manhole.

A 0.1-foot drop through the manhole shall be provided from upstream inlet and the manhole outlet (2.9 percent slopes). For steep systems where pipe slopes are greater than 3 percent the upstream pipe slope shall be carried through the manhole to the outlet flow line elevation. A maximum drop of 24 inches is allowed through the manhole.

## **2. Drop Manholes**

Elective use of drop manholes is to be minimized and limited only to situations when public wastewater is very deep, in areas of known high groundwater, or if dense rock is encountered. The Project Engineer shall demonstrate the use of a drop manhole shall not limit extension of gravity service to the wastewater basin.

A drop manhole is required where the drop through the manhole channel is proposed to exceed 24 inches. External drop manholes are to be used as first priority. Internal drop manholes may be used in situations where structural, utility or topographical challenges prohibit the use of an external drop manhole.

## **3. Locations**

Manholes shall be installed at the following locations:

- End of each main line,
- At all changes in grade, size or alignment (vertical and horizontal),
- At distances not greater than 400 feet. Greater spacing may be permitted in large diameter wastewater lines as approved by the City.

Manholes shall be positioned outside normal wheel travel paths (centered in the lane or between lanes) and outside the center of an intersection where the turning path of vehicles may place a wheel path over them.

## **4. Size and Materials**

See the Standard Specifications for Construction and Standards Drawings for required manhole type, size and material properties.

## **5. Shallow Manholes**

A flat top of shallow cone shall be used when there is less than 5 feet of cover over a pipe.

## **6. Watertight Manhole Covers**

Watertight manhole covers shall be used when the cover is either below the 100-year flood plain or in a location where overland runoff or gutter flow or other concentrated flows or water from ponding areas could enter the manhole.

### **D. Off-Site Flows**

When land outside a new development will direct flow to wastewater systems in the new development, the systems shall be public and constructed to one or more of the development boundaries. The system shall be sized and located to accommodate all off-site flows. Guidelines for the extension of the public wastewater system can be found in the most current version of the City's Wastewater Master Plan.

### **E. Pipes**

Pipes shall comply with the following:

#### **1. Cover**

4 feet of cover shall be provided over the top of the pipe from expected finish grade. Where pipe cover is proposed to be less than 4 feet or more than 10 feet, the Design Engineer shall provide documentation and/or design calculations to show that the pipe is structurally adequate to withstand construction loadings and traffic loading.

Notwithstanding the above guidance, a CLSM cap shall be required where the top pipe is within 2 feet of finished grade.

#### **2. Curves, Horizontal and Vertical**

Horizontal and vertical curves are not permitted except in steep terrain, and then only:

- a. One horizontal curve is permitted between any two manholes provided there is no vertical curve in that section; or,
- b. A maximum of one (1) vertical curve is permitted between any 2 manholes manhole.

- c. Joint deflections shall not exceed pipe manufacturer's recommendations.

### **3. Manning's Roughness Coefficient ("n" Value)**

"n" value for PVC and HDPE pipe shall be 0.010.

"n" value for concrete pipe shall be 0.013.

"n" value for metal pipe is specified in Appendix I.

### **4. Materials**

Wastewater pipe designed for open channel flow shall be PVC or ductile iron.

Wastewater pipe designed for pressurized flow may be PVC, ductile iron or solid wall HDPE.

Pipe networks in streets shall be designed parallel to street centerlines whenever possible. Skewed pipe alignments are discouraged.

### **5. Buoyant Forces**

The effect of buoyant forces shall be checked for all pipes used below the normal water table. Buoyant forces shall not be greater than the weight of the pipe and backfill.

## **F. Pump and Lift Station Design**

Public pump and lift stations must be identified in the City's Wastewater Master Plan or otherwise deemed appropriate by the City. Pump and lift stations require specialized planning, engineering and specifications not specifically addressed in detail by this manual or the Standards and Specifications. Stations shall meet the specific design and maintenance requirements of the City of Eugene in addition to the basic requirements of the Department of Environmental Quality (DEQ) pump station design regulations available at [www.deq.state.or.us](http://www.deq.state.or.us).

Consultants must be experienced in the design and construction of large (1 MGD +) sewage lift stations. An interdisciplinary team is expected to address the multiple disciplines necessary to design and deliver the station. A pre-design report that outlines the scope of the project from design through construction is required and shall be approved by the City of Eugene. The pre-design report shall include, but not be limited to, the following information:

- A list of the required engineering disciplines
- Basin Study and design flows
- Wet well calculations
- Pump and discharge calculations
- Architectural and structural considerations
- Site plans
- Force main and valving recommendations
- Electrical needs and redundant power sources
- Number, make, type, and sizes of pumps
- Recommendations for controls and level sensing and drives (Fixed or VFD)
- Communications (Telemetry and/or SCADA)
- Odor control recommendations
- Specifications required
- Plans required (civil, structural, electrical mechanical, P&ID's, logic, etc.)

#### **G. Service Lines**

Provide independent connections to the public wastewater system to all lots and parcels. Service lateral pipes within the public rights-of-way shall be a minimum of 6 inches. Private service lateral pipes located in public easements may be a minimum of 4 inches and be constructed and extended to the back of the public utility easement (PUE) with the public construction permit for the public mainline. A 6-inch public service extending from the mainline to the property line is adequate to serve 3 lots. The extension of the public wastewater system shall be required when more than 3 residential lots are to be served by the system.

Service laterals shall:

- Connect into manholes wherever possible.
- Connect directly to the mainline at right angles where blind connections are allowed.
- Connect into a manhole where the lateral approaches the mainline at greater than 30 degrees from perpendicular.
- Connect to the mainline with a manhole where the lateral is 8-inch diameter and greater.

Laterals may:

- Connect to a mainline with a blind connection when the diameter of the lateral is twice the size of greater than the diameter of the mainline.
- Connect into a manhole where the lateral approaches the mainline at greater than 30 degrees from perpendicular.



All service lines 8 inches and larger shall require the construction of a manhole for connections to the mainline. 4-inch and 6-inch blind connections are acceptable. 8-inch and larger blind connections are acceptable where the mainline diameter is twice the diameter of the service lateral or greater.

A cleanout is required, per Standard Drawing RD-310, when two or more services are provided on a 6-inch service line. Each 4-inch service outside of the right-of-way shall have a private easement if crossing an adjoining property. Use of inside drops are to be minimized, limited only to situations when public wastewater is very deep, in areas of known high ground water, or if dense rock is encountered.

Tops of service line pipes shall be 4 feet to 6 feet below finished grade at the property line in accordance with the Standard Drawings.

**SECTION 3 – CONSTRUCTION DRAWINGS / DRAFTING STANDARDS 3-1**

**3.00 INTRODUCTION .....3-1**

**3.01 ALL PAGES.....3-1**

**3.02 COVER SHEET .....3-2**

**3.03 PLAN VIEW.....3-3**

**3.04 PROFILE VIEW .....3-6**

**3.05 TRAFFIC CONTROL PLAN (TCP) .....3-7**

**3.06 TRAFFIC CONTROL DEVICES AND STREET LIGHTING PLAN (TCSLP).....3-7**

**3.07 CONSTRUCTION SITE MANAGEMENT PLAN (CSMP) .....3-8**

**3.08 LAND USE PERFORMANCE AGREEMENTS AND SITE PLANS ..... 3-10**

*{This page left blank intentionally}*

## SECTION 3 – CONSTRUCTION DRAWINGS / DRAFTING STANDARDS

### 3.00 INTRODUCTION

All plans for public improvements shall comply with the following drafting standards and the notes, symbols, line and lettering requirements in Appendix K. Final plans shall also comply with the “As-Construct Requirements” in [Section 5](#).

### 3.01 ALL PAGES

Every page of the plan set shall include the following information:

#### A. Title Block

##### 1. Project Name

- a. For subdivisions, use the subdivision name, followed by the types of improvements (e.g., “Flower Place: Streets, Stormwater, and Wastewater”).
- b. For other projects, use the subject street name or the nearest parallel street, and define the limits of the work between intersecting streets (e.g., “Mill from 5<sup>th</sup> to 8<sup>th</sup> Ave: Wastewater”).

(See *Project Naming Standards* in Appendix K for additional information.)

##### 2. City Project Number

##### 3. Date (month and year that the drawing was made)

##### 4. Designed By (last name of designer)

##### 5. Drawn By (last name of drafter)

##### 6. Checked By (last name of proofreader)

#### B. Professional Stamp and signature by the Professional Engineer licensed in the State of Oregon having responsibility for the design as required by Oregon Law.

#### C. North Arrow (oriented to the top or to the right of the page) **and Scale** (including bar scale horizontal and vertical)

#### D. Street Names

#### E. Right-of-Way and Paving Widths

- F. Easement Types and Dimensions
- G. Existing Infrastructure (in dashed line type)
- H. Proposed Infrastructure (in bold line type)
- I. Page Numbers

### **3.02 COVER SHEET**

The first page of the plan set shall provide an overall view of the project and orient users to the project area by showing the following information. Supplemental cover sheets may be added when format limitations (11"x17" plans) or excess information warrant additional sheets:

- A. Vicinity Map (upper right),
- B. Index to design sheets within the plan with related stationing identified,
- C. Properties significant to the project such as those abutting the work zone, with associated Assessor's Map and Tax Lot numbers and, if applicable, Subdivision Lot or Partition Plat Parcel numbers,
- D. City Limits and Urban Growth Boundary,
- E. Stormwater and Wastewater Symbols,
- F. General Notes for PEPI projects as provided in Appendix L,
- G. Typical Street Section(s) (may be shown on a separate detail sheet),
- H. Contact Information:
  - 1. Owner's name, address, and phone number,
  - 2. Engineer's name, address, and phone number,
  - 3. Contractor's name, address, and phone number (when available – not required for plan review, but is required on as-construct plans),
  - 4. Other design professionals, such as Surveyor and Geotechnical Engineer that may need to be consulted during construction,

### 3.03 PLAN VIEW

Construction drawings shall include a plan-view as follows:

#### A. Drawing Size and Scale

1. Plans shall be prepared on either standard plan/profile paper approximately 24 inches x 36 inches in size or on "half size" drawings approximately 11 inches x 17 inches.
2. Horizontal scale shall be 1 inch = 10 feet, 20 feet, 40 feet, or 50 feet. Design details (access ramps, etc.) may use lesser scale to provide required detail. Design detail scales shall be no less than 1 inch = 3 feet. Paving preservation projects, large pipelines and other projects not requiring standard scale detail may use greater scales. Larger scales shall not exceed 1 inch = 100 feet.
3. Preferred horizontal scales are:
  - a. 1 inch = 20 feet for alleys and reconstruction projects with extensive existing topography;
  - b. 1 inch = 40 feet for new construction.
4. Vertical scale shall be 1 inch = 4 feet, 5 feet, or 10 feet.
5. The same scale shall be used on all plan/profile sheets of a project.

#### B. Plan Format

When both wastewater and stormwater utilities are within proposed street areas, complete design for the street and utilities shall be shown on the same sheet (including plan view, profile view, and construction notes). Submission of separate sheets for wastewater and stormwater utility designs will not be accepted.

Plan and profile of each section of improvement shall be on the same sheet, and shall be aligned vertically by stations on the sheet to the greatest extent possible.

"Match lines" shall be used from sheet to sheet, and duplication of information shall be minimized. Adjacent sheet numbers shall be identified. The following are prohibitions:

1. Match lines shall not be placed within intersection areas.
2. Match lines shall not be located at the same station as manholes, curb inlets, or other structures.
3. Match lines shall not be placed within horizontal curve lengths or transitional tapers. Match lines shall be located such that the entire curve or taper is on the

same sheet. If lengths are greater than one standard sheet width, complete curve information shall be shown on all pertinent sheets.

### **C. Stationing**

Stationing may be either from left to right or from right to left. Profile stationing shall be consistent in direction to that in the plan.

Important stations, such as, but not limited to, beginning of curb return, PC, and PT, shall be included on the plan.

Stationing used for streets shall be as previously established by the City (or County) for the project location.

Stationing or lot line offsets shall be shown for all wastewater service connections and for those storm connections not defined by a manhole or curb inlet.

### **D. Topography**

All pertinent topography shall be shown on the drawing. Station and offset numbers to existing individual features are not required and should only be used when there may be a potential conflict with the construction activity. Utility poles and tree species and their diameters shall be included.

### **E. Structure Referencing and Numbering**

New structures in a right-of-way, such as manholes, shall be referenced by station and offset from the street centerline. Any controlling factor (*i.e.*, dimension from a building or property line) affecting such a location shall also be shown. All horizontal ties shall be to the center of a structure, except that measurements for curb inlets and catch basins shall be referenced to the curb face. Catch basins/curb inlets outside of the plan view “window” shall be noted or referred to by station and offset if they are important to the project.

Structure numbers shall be shown on both plan and profile for all structures, which include, but is not limited to manholes (new and existing), curb inlets, pipe inlets and outlets.

### **F. Horizontal Curves**

Horizontal curve data shall be shown in a table that contains the delta angle, radius, semi-tangent, length and PC and PT stations. Tables shall be referenced to curves using letters inside squares.

### **G. Existing Wastewater and Stormwater Services**

Existing service connections for all buildings along a project shall be plotted.

#### **H. Saved or Protected Features**

Plans shall clearly identify and locate any existing feature to be saved or protected (*e.g.*, landscaping, area drain, property corners, survey monuments), and shall include special construction notes stating the protection requirement(s). Also see CSMP requirements regarding natural resource protection.

#### **I. Private Improvements**

Plans for public improvements shall show proposed private improvements for reference only. If included, they shall be labeled “PRIVATE work to be done by others under separate permit not subject to PEPI review.”

#### **J. Temporary Surfacing within Public Rights-of-Way**

Plans shall clearly identify any temporary surfacing and shall include special construction notes stating the temporary surfaces will not be City-maintained.

#### **K. Curb Return and Access Ramp Data**

Curb return curve data and grades shall be listed in schedules near intersections. Access ramps data shall be listed in schedules or may be shown directly on drawing detail. See Chapter 2 for access ramp data requirements.

#### **L. Non-Concentric Curbs**

When a curb is non-concentric with the centerline, a table shall be used to show curve data and top of curb grades.

#### **M. Access Connections (Driveway Approaches/Aprons)**

The following information shall be shown on the plan for access connections:

1. Apron length - the length of fully-depressed curb, without flares.
2. The type of existing driveway (concrete, asphalt, gravel).
3. The cut-line for access connection adjustment.

#### **N. Utility Line Designators**

“Line A” and “Line B” shall be used for wastewater in easements when the profile design is not directly below the plan view and in projects where there are many utility lines. “Line



X” and “Line Y” shall be used for stormwater.

### **3.04 PROFILE VIEW**

Construction drawings shall include a profile-view if the Project Manager determines the establishment of continuous vertical control is warranted. The profile view shall include the following:

#### **A. Profile Format**

1. Margins of 2.5 inches shall be provided on the left sides of the plan/profile sheets, and at least 1 inch between construction notes and the title block.
2. The vertical scale shall be such that vertical grid subdivisions are 0.1 foot, 0.2 foot, 0.25 foot, 0.50 foot, or 1.0 foot.
3. The horizontal scale shall be such that all 100-foot stations coincide with major vertical grid lines.

#### **B. Utilities**

In addition to showing existing and proposed utilities, as required on all plan and profile pages, with dashed and bold lines, respectively, the profile view shall include the following information:

1. Pipe diameter and slope
2. Top and bottom of the pipe
3. Manhole number, rim elevation, and flowline elevation
4. Pipe hydraulic data (Qd, Qc, d/D, V, and A) shall be placed below each pipe segment for:
  - a. All stormwater mainlines;
  - b. Significant catch basin connector pipes; and,
  - c. For all wastewater lines 10 inches and larger.
5. Vaults and other underground infrastructure

#### **C. Grades**

1. Existing ground profiles shall be shown for right and left right-of-way lines and centerline on greenfield projects. Existing ground profiles shall be shown for right and left curb lines and centerline for street projects in developed public rights of

way. These profiles as well as future curbs shall be shown at least 250 feet beyond the ends of proposed streets and utilities on preliminary plans, and at least 100 feet on final construction plans. For utility easements, only one existing ground profile is required above the pipe centerline. Line types shall be:

- a. Left right-of-way profile = dashed line
  - b. Right right-of-way profile = solid line
  - c. Centerline profile = standard centerline
2. If the design grade of left and right curbs is identical, curb design information shall be shown only once and labeled "Curb Grade Left and Right."
  3. Show the 100-year flood elevation if within a special flood hazard area.
  4. The Hydraulic Grade Line (HGL) shall be shown for all storm drains. The computed HGL elevation shall be included at each manhole.
  5. Note the "K" values for street curves.

#### **D. Class-of-Backfill**

Class of backfill shall be noted in the lower part of the profile.

### **3.05 TEMPORARY TRAFFIC CONTROL PLAN (TCP)**

**A.** Temporary traffic control devices required during construction shall be shown on a plan separate from the construction drawings. Temporary traffic control devices shall conform to the current edition of the MUTCD, ODOT's Oregon Temporary Traffic Control Handbook and Standard Specifications, and the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190.

**B.** The temporary TCP shall include a temporary pedestrian access route (TPAR) plan for construction that requires the closure or detour of pedestrian routes. The TPAR shall comply with the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" as published in 36 CFR Part 1190 in addition to the publications referenced in section A. (above) for temporary control. To the extent a provision of any publication listed in section A. conflicts with the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way", the "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way" shall control.

### **3.06 TRAFFIC CONTROL DEVICES AND STREET LIGHTING PLAN (TCSLP)**

Permanent traffic control devices and/or street lights shall be shown on a plan, separate from the construction drawings, prepared in plan-view with the following information:

#### **A. General Notes**

- B. Right-of-Way lines and dimensions
- C. Street Centerlines and Stationing
- D. Lot Lines abutting project
- E. Cross Streets enclosing the area
- F. Curb Lines with dimensions from the right-of-way
- G. Conduit locations with dimensions from the curb line
- H. Pavement edges and width dimensions
- I. Access Connections (driveways)
- J. Existing and Proposed Lights
- K. Existing and Proposed Service Cabinets
- L. Proposed Service Points
- M. Wiring and Conduit
- N. Circuit Diagram (see Appendix G for Standard Detail)
- O. Utility Company box/vault number(s)
- P. Existing and Proposed Traffic Control Devices
- Q. All other related work and materials to be installed

The information must be shown using the line type, lettering, symbols and construction notes found in Appendix K. A legend of all mapped data shall be included. Plans shall be drawn to-scale at one of the following engineering intervals (architectural scales will not be accepted): 1 inch = 20 feet, 30 feet, 40 feet, or 50 feet.

### **3.07 CONSTRUCTION SITE MANAGEMENT PLAN (CSMP)**

The CSMP, which is required for all public improvement plans regardless of whether an Erosion Prevention Permit is required, shall demonstrate compliance with the following.

#### **A. Plan Boundary**

To minimize water quality impacts from construction activities and unintended construction impacts to the natural surroundings, such as overhead work conflicting with tree branches and excavation damaging tree roots, the extent of the CSMP shall cover an area larger than the public improvement plans, as follows:

1. The entire development site as delineated by an associated land use or building permit application; or
2. The work zone delineated (i.e., orange construction fencing or other approved equal) as a minimum of 30 feet around the perimeter of the proposed construction and any staging and material storage areas.

#### **B. Erosion Prevention**

1. The plan shall include the CSMP Notes found in Appendix A.
2. The plan shall be designed to incorporate erosion prevention and sediment controls that can be implemented and maintained to prevent adverse impacts to water quality and minimize the transport of construction-related contaminants to waters of the State. Additionally, erosion prevention and sediment controls (e.g., construction site entrances and exits, temporary and permanent stabilization, storm drain protection, etc.) and other Best Management Practices (BMP's) that prevent and control non-stormwater waste such as concrete waste, chemicals, and litter shall be used and shown on the plan as appropriate for the construction activities being proposed. BMP's and other measures shall be identified consistent with the CSMP plan requirements and regulations found in Appendix A.

#### **C. Natural Resources**

1. **Trees:** Indicate the species and diameter at breast height (dbh). Delineate the critical root zone (CRZ) and identify the percentage of impact to each CRZ by the proposed construction. Removal of protection status of each tree shall also be noted. Tree removals, including technical fells based on impacts to CRZ, are governed by the regulations provided in Appendix D. Trees to be protected shall include Standard Drawing LS120. Protective fencing shall be delineated.
2. **Special Flood Hazard Areas:** The floodplain and/or floodway shall be delineated consistent with the applicable FEMA FIRM data. The base flood elevation may also need to be noted. Any watercourse alterations must be shown to support related approval criteria. See Appendix B for Floodplain Development Permit requirements and related information.
3. **Conservation and Preservation Areas: Goal 5 resource areas and any related setbacks, wetlands, waterways, and other protected natural resources shall be shown consistent with applicable regulations.** Protective fencing shall be placed around all delineated natural resource areas not permitted for construction activity.

### **3.08 LAND USE PERFORMANCE AGREEMENTS AND SITE PLANS**

Site Plan drawings approved by Planning and Development staff shall be included with the privately engineered construction drawings for reference purposes.

*{This page left blank intentionally}*

**SECTION 4 - PRIVATE ENGINEERING AND CONSTRUCTION PROCESS 4-1**

**4.00 INTRODUCTION.....4-1**

**4.01 PRE-APPLICATION CONSIDERATIONS.....4-1**

    A. Staff Consultation .....4-1

    B. Facility Coordination.....4-1

**4.02 APPLICATION REQUIREMENTS .....4-2**

    A. Engineering and Construction Agreement.....4-2

    B. Supporting Analyses .....4-2

    C. Construction Plans.....4-3

**4.03 PLAN REVIEW AND APPROVAL.....4-4**

    A. Objectives .....4-4

    B. Process .....4-4

    C. Approval Criteria.....4-4

**4.04 CONSTRUCTION PERMIT CONDITIONS.....4-5**

    A. Application for Public Improvement .....4-5

    B. PEPI Plans Approved and Copied .....4-6

    D. Public Dedications .....4-6

    E. Maintenance Agreements .....4-6

**4.05 CITY ENGINEERING SERVICES .....4-7**

**4.06 PRIVATE ENGINEERING SERVICES.....4-7**

**4.07 CONCURRENT PLANNING APPLICATIONS.....4-7**

**4.08 CONCURRENCES .....4-8**

    A. City Staff .....4-8

    B. Utility Companies .....4-8

**4.09 PUBLIC NOTIFICATION REQUIREMENTS .....4-9**

**4.10 FINANCIAL RESPONSIBILITIES .....4-10**

    A. Project Billing.....4-10

    B. Other Fees .....4-10

    C. Performance and Warranty Financial Guarantee .....4-10

**4.11 OTHER PERMITS .....4-12**

    A. Erosion Prevention Permit.....4-12

    B. Floodplain Development Permit.....4-12

    C. Wetland Permit .....4-12

    D. Railroad Permit.....4-13

    E. Fill Permit.....4-13

    F. Tree Removal Permit .....4-13

    G. Electric Permit .....4-13

**4.12 CONTRACTOR AND CONSTRUCTION SCHEDULE .....4-13**

**4.13 TRAFFIC CONTROL PLAN .....4-14**

<b>4.14</b>	<b>CONSTRUCTION REQUIREMENTS .....</b>	<b>4-14</b>
A.	Pre-Construction Meeting .....	4-14
B.	Inspection .....	4-14
C.	Design Changes.....	4-15
D.	Construction Staking.....	4-15
<b>4.15</b>	<b>POST-CONSTRUCTION REQUIREMENTS .....</b>	<b>4-15</b>
A.	Centerline Monumentation .....	4-15
B.	As-Constructs.....	4-16
C.	Project Completion Notice (Beginning of Warranty Period) .....	4-16
D.	Project Acceptance (Release Performance Financial Surety).....	4-16
<b>4.16</b>	<b>FAILURE TO COMPLY WITH CITY STANDARDS AND PROCEDURES .....</b>	<b>4-17</b>



## SECTION 4 - PRIVATE ENGINEERING AND CONSTRUCTION PROCESS

### 4.00 INTRODUCTION

The City permits public improvements to be privately-engineered and constructed via the “Privately Engineered Public Improvement (PEPI)” permit process. Such improvements are typically development-driven, whereas public improvements designed by the City are usually community-driven. As discussed previously in this manual, design standards for public improvements are to be implemented consistently between the private and public sector; however, there are certain procedures specific to the private process (the PEPI permit), which are outlined in this section. Also refer to Appendix L for standard forms and other resources specific to the PEPI permit process.

### 4.01 PRE-APPLICATION CONSIDERATIONS

Prior to submitting PEPI plans for review and approval, applicants are encouraged to meet with City staff and consult other utility providers to determine potential conflicts in advance of preparing the detailed design drawings.

#### A. Staff Consultation

Engineering staff will meet up to 2 hours with applicants and project engineers to discuss design and project issues. If staff consultation time exceeds 2 hours, an “Engineering and Construction Agreement” (provided in Appendix L) will be required in advance of construction plan submittals to recover staff expenses. See [Section 4.10](#) Financial Responsibilities.

#### B. Facility Coordination

Proposed facilities must be consistent with the City’s master plans and avoid conflicting with existing utility locations. The City will review PEPI plans for conflicts with City-owned street, wastewater, and stormwater infrastructure, and defers to utility companies and the applicant to resolve conflicts with electric, water, telephone, gas, and television utility infrastructure and private facilities. In some cases, subject to approval, the applicant may need to relocate utilities. The cost of relocating utilities shall be borne by the applicant.

As-construct information for City-owned infrastructure is available at the Permit and Information Center, 99 West 10<sup>th</sup> Avenue; wastewater and stormwater hydrologic and hydraulic study information may be available at the City Engineering office, 99 East Broadway, Suite 400; research and copy fees may apply.

Other information should be obtained directly from utility owners (see Appendix L for contact information). The applicant will be required to resolve any conflicts directly with the utility owner; additionally, written concurrence from each utility will be required prior to City approval of the PEPI plans, in accordance with [Section 4.08](#) Concurrences.

## 4.02 APPLICATION REQUIREMENTS

The following information is required for the City to process the PEPI permit.

### A. Engineering and Construction Agreement

The Owner/Developer shall submit a signed "Engineering and Construction Agreement" (see Appendix L). This agreement defines the scope of work and confirms that the public improvements will be privately engineered, constructed and financed. This agreement obligates the Owner/Developer to reimburse the City for costs incurred to complete the project. See [Section 4.05](#) City Engineering Services and [Section 4.10](#) Financial Responsibilities for more information.

### B. Supporting Analyses

1. **Geotechnical Analysis** is required of all PEPI projects; refer to Appendix C for report requirements.
2. **Stormwater Analysis** is required to demonstrate compliance with the standards in Appendix J as noted in [Section 2.04](#) of this manual.
3. **Wastewater Analysis** is required as noted in [Section 2.08](#) of this manual.
4. **Pavement Design Calculations** are required for all new streets as noted in [Section 2.05](#).
5. **Street Light Analysis** is required for all new streets as noted in [Section 2.05](#).
6. **Traffic Signal Warrant Analysis** is required, when applicable, as noted in [Section 2.07](#).
7. **Pipe-Load Calculations** are required as noted in [Section 2.08](#).
8. **Critical Root Zone Impact** analysis is required with tree preservation. See [Section 3](#) regarding natural resource area mapping required on Construction Site Management Plans. For additional information on applicable tree regulations, refer to Appendix D.

9. **“No-Rise” Certification** is required with a Floodplain Development Permit for work within a Floodway. See Appendix B for permit requirements.

### C. Construction Plans

Construction plans shall be prepared consistent with the drafting standards in [Section 3](#). Paper review or electronic plan review is provided by the City of Eugene. For paper review, one paper copy shall be submitted to the City for review along with an electronic version in a PDF format. For electronic plan review, one set of CAD generated PDF's shall be submitted. The Project Engineer shall design and prepare the construction plans for public improvement(s) in accordance with this manual, and include the following plans.

1. **A Construction Site Management Plan (CSMP)** is required of all PEPI projects. The CSMP identifies measures to be implemented during construction to avoid impacts to water quality and natural resources, such as trees, waterways, and other natural features. The CSMP does not authorize construction, fill or removal of features. Other permits may be required, such as: Erosion Prevention Permit, Floodplain Development Permit, tree removal permit, wetland fill permit, or land use applications for impacts to local resources. See Appendix A for applicable regulations and CSMP notes required. Also refer to [Section 3](#) for drafting standards and other required plan information.
2. **Street lights** are required of all new street construction, as noted in [Section 2.05](#). Street light plans shall be submitted consistent with the drafting standards in [Section 3](#). Approval by EWEB is required before the City will issue the permit. See Appendix G for standard details.
3. **Traffic control devices** may be required of street projects, as noted in [Section 2.07](#). Traffic control devices shall be submitted consistent with the drafting standards in [Section 3](#). See Appendix H for standard details. (Traffic control plans for temporary devices used during construction are addressed below at [Section 4.13](#)).
4. **Trees** to be preserved shall be identified on the construction plans and on the CSMP as noted in [Section 3](#). Protection measures shall be in place through the duration of construction, in accordance with adopted City administrative rules and tree protection guidelines. See Appendix D and the Standard Drawing for tree protection.
5. **Access ramp** designs shall be as described in [Section 2](#).

## **4.03 PLAN REVIEW AND APPROVAL**

### **A. Objectives**

In addition to reviewing the applicant's submittal for compliance with applicable standards, the City Engineer's comments and requirements are intended to protect the needs of the following:

1. The Owner/Developer, by requiring good engineering practices and economical designs.
2. The private design team, by providing clear and early direction concerning City requirements.
3. The public, by eliminating unsafe elements of the design.
4. Future owners, by requiring compliance with special flood hazard standards and other applicable development regulations.
5. Adjacent property owners, by ensuring that wastewater service, drainage facilities, and street access are provided through the project area to adjacent properties.
6. Public Works Maintenance and Parks and Open Space divisions, by requiring designs that minimize maintenance costs and provide maintenance access.
7. The City Inspector, by requiring clear, complete, and accurate plans that do not require the Inspector to make field design decisions.

### **B. Process**

Any needed plan edits will be sent to the Project Engineer generally within three weeks following receipt of a complete submittal. After making the requested changes, the Project Engineer will need to resubmit one (1) set of revised plans for a follow-up review. When the plans have met the approval criteria below and are acceptable to the City Engineer, the original drawings will be stamped "Approved" by the City. (See Appendix L for process flow chart.)

### **C. Approval Criteria**

In addition to PEPI plans being prepared in accordance with applicable design and drafting standards of this manual, construction plan approval is contingent upon compliance with the following criteria.

- 1. Land Use Decisions**  
Concurrent planning applications need to be approved as stipulated in [Section 4.08](#) Concurrences.
- 2. Concurrence from Internal and External Utility Owners**  
Although the City will help facilitate plan-review coordination and resolution amongst affected utility owners, the Owner/Developer is ultimately responsible for obtaining concurrence pursuant to [Section 4.08](#).
- 3. First Public Notice**  
Documentation that the first public notice, as required by [Section 4.09](#) Public Notification, has been mailed must be submitted to the City.
- 4. Payment of City Fees**  
Prior to plan approval, all project-related fees up-to-date must be paid. See [Section 4.10](#) Financial Responsibilities.
- 5. Draft Documents**  
Submit draft maintenance agreements, right-of-way and public easement dedications, and all other documents that need to be recorded prior to permit issuance for City review and comment prior to PEPI plan approval.

Approval of the plans is effective for one year. Thereafter, a new Engineering and Construction Agreement and Permit Application must be signed and submitted with updated plans compliant with the Standard Specifications and Drawings.

#### **4.04 CONSTRUCTION PERMIT CONDITIONS**

Approved PEPI plans **do not authorize construction**; construction cannot commence until the City issues a Public Improvement Permit. The following conditions must be met before the City will issue the Public Improvement Permit.

##### **A. Application for Public Improvement**

The Owner/Developer shall submit a completed Application for Public Improvement Permit (see two-sided application form in Appendix L). Construction cannot commence until the City has approved the Public Improvement Permit. No application fee is required; however, any outstanding invoices for City engineering services must be paid before the permit is issued. See [Section 4.10](#) Financial Responsibilities.

**B. PEPI Plans Approved and Copied**

The City will return the approved plans to the applicant. The applicant must generate 5 paper copies of the approved plan set and submit these to the City.

**C. Land Use Applications Resolved**

Approval criteria on all land use applications associated with the public improvements shall be resolved consistent with Section 4.07.

**D. Public Dedications**

Public easements and/or rights-of-way must be dedicated over public facilities proposed for public operations and maintenance. Dedication documents shall be submitted to the City for review and approval prior to signing and recording. If the property is in the process of being divided, the land partition or subdivision plat may serve as the dedicating instrument. If land division is not recorded within a timely manner, separate dedication documents will be required.

**E. Maintenance Agreements**

Agreements regarding operations and maintenance of stormwater facilities may be required. Draft agreements shall be submitted to the City for review and approval prior to signing and recording.

**F. Second Public Notice** consistent with [Section 4.09](#)

**G. Financial Surety** of performance and warranty consistent with [Section 4.10](#)

**H. Contractor and Construction Schedule** consistent with [Section 4.12](#)

**I. Traffic Submittals** (Temporary Traffic Control Plan, Electric, Striping, and Signage) consistent with the Standard Specifications. Refer to [Section 2.07](#) for design standards. Refer to [Section 4.13](#), below, regarding temporary traffic controls.

**J. Engineering Submittals** for all other materials used consistent with the Standard Specifications and Drawings.

**K. Other Applicable Permits Obtained** consistent with [Section 4.11](#).

#### **4.05 CITY ENGINEERING SERVICES**

The City will review all construction plans and project documents for compliance with applicable requirements; provide consultation with, and research for, the applicant, Project Engineer, Owner and/or Developer; permit approved construction plans; inspect all construction and perform acceptance testing; and provide other engineering services necessary to complete the project work defined in the Engineering & Construction Agreement.

The City will invoice the PEPI applicant (Owner/Developer) monthly for all costs incurred by the City to complete the proposed public improvement project.

#### **4.06 PRIVATE ENGINEERING SERVICES**

In order to comply with applicable requirements, the Project Engineer's contract with the Owner/Developer should consider the following services:

1. Surveying sufficient to prepare construction plans, construction staking, and post-construction monumentation;
2. Preparing construction drawings, specifications, and as-constructs with final field measures and elevations in accordance with City standards; and,
3. Serving as the project liaison between the Owner/Developer, Contractor, subcontractors, and the City.

#### **4.07 CONCURRENT PLANNING APPLICATIONS**

If the public improvements are associated with a development that has pending land use application(s), PEPI plan approval and permit issuance are dependent on the following:

- If the land use application is a subdivision or partition, the Engineering and Construction Agreement and improvement plans will not be accepted until the tentative plan has been approved. Until the final plat application is submitted, only one review of the improvement plans will occur. Construction plans will be approved when the construction plans are compliant with the final plat. A copy of the final site plans must be provided and attached for informational purposes to the construction drawings. Signed right-of-way deeds and/or easement deeds may be required by the City in-lieu of the final plat approval to allow construction during the dry season.
- If the land use application is a Site Review or Conditional Use Permit, concurrence from the Planning Division is required prior to construction plan approval. Prior to approving the construction plans, a copy of the approved final site plans must be provided so that

the site plans can be included for informational purposes to the construction drawings.

- If the land use application is a PUD, then final PUD approval is required prior to construction plan approval. An approved site plan drawing must be submitted and included for informational purposes with the approved construction drawings. However, some initial, but limited, site preparation work may proceed if specifically authorized by the Planning Division.

#### **4.08 CONCURRENCES**

Although the City will help facilitate plan-review coordination and resolution amongst affected utility owners and City departments, the PEPI applicant (Owner/Developer) is ultimately responsible for obtaining concurrence from the following:

##### **A. City Staff**

Before approving construction plans, the following City personnel must concur with design and construction plans relevant to their respective regulations.

1. When the project involves a land division, Land Use Review/Survey staff must confirm that the platting process is sufficiently advanced such that no unresolved plat issue could influence the public improvement design.
2. Erosion Prevention staff must review and approve the Construction Site Management Plan. If an Erosion Prevention permit is required, it must be issued prior to the PEPI permit issuance.
3. The Urban Forester must review and approve street tree protection measures and any street tree removals or critical root zone impacts.
4. The Planning Department staff shall confirm that PUD, Site Review, and Conditional Use approvals have been issued, if applicable.
5. The Fire Marshal must review and approve emergency vehicle access.
6. Traffic Operations staff must review and approve street lights, signs, signals, striping, and barricades.

##### **B. Utility Companies**

The Project Engineer shall route a copy of each plan to all utility companies for review, concurrence with the design, and scheduling of utility work. The concurrences must acknowledge review of the PEPI plan set for the following: any conflicts with existing facilities; existing facilities that will be replaced, adjusted, or repaired with the project;



and any new facilities that will be constructed with the project. Copies of the signed concurrences shall be submitted to the City Engineer prior to approving the construction plans. The Project Engineer is responsible for resolving any conflicts and verifying that conditions of concurrence apply to final plans. (See Appendix L for utility contact information.)

#### **4.09 PUBLIC NOTIFICATION REQUIREMENTS**

These standards require two public notices during the PEPI permit process: one before plan approval and another when the permit is issued. The **first public notice** informs adjacent property owners about the project; the **second public notice** alerts owners and occupants within 250 feet of the construction zone of the construction schedule and traffic control measures. Public notification requirements are to be fulfilled by the Project Engineer, subject to review and approval by the City Engineer.

**Both notices** shall include the following information:

1. Project description.
2. Vicinity map.
3. Statement about the public improvement project being privately engineered, funded, and constructed.
4. Project name and number, as assigned by the City.
5. Name and phone numbers of the primary contacts at the City and for the Developer to receive questions or concerns.
6. Mailing envelopes labeled “Construction Information Enclosed”

**The first public notice** shall be mailed to property owners abutting the subject property or the construction zone, whichever is greater. The Project Engineer shall submit to the City a copy of the letter, map, and mailing list with the second review. PEPI plans cannot be approved until evidence of the first public notice has been supplied to the City. If all adjacent lands are under the ownership of the applicant (Owner/Developer), then public notice may be waived. Concurrent land use application notices may be considered as sufficient notification for these purposes, depending on the timing and extent of such notice.

**The second public notice** shall be mailed to property owners and occupants within 250 feet of the construction zone and shall also include the following:

1. Description of the construction activity
2. Copy of the Traffic Control Plan approved by the City
3. Construction schedule
4. Name of the Contractor, along with the name and phone number of the contact person(s) for the construction company

Evidence of this second notification must be submitted to the City at the preconstruction meeting.

#### **4.10 FINANCIAL RESPONSIBILITIES**

##### **A. Project Billing**

The City will invoice the Owner/Developer monthly for engineering services performed (see [Section 4.05](#) for a listing of City engineering services included in the fee). Professional service fees are established and adjusted annually by an administrative order of the City Manager; contact the Engineering Division at 541-682-5291 for a current administrative order. Billing will continue until the as-construct plans, provided by the Project Engineer, are accepted by the City. Unless other arrangements are made, invoices for engineering services shall be fully paid prior to the following:

1. Approval of the construction plans
2. Issuance of a Permit for Public Improvements (Notice to Proceed)
3. Acceptance of completed work and release of the bond

##### **B. Other Fees**

###### **1. As-construct and Warranty Inspection Fees**

These are flat-fees charged upon issuance of the Public Improvement Permit. These fees recover the costs of reviewing as-construct drawings and performing warranty inspections after construction activities have been completed and the project has been placed on warranty. Refer to the current administrative order for the fee schedule.

###### **2. Equivalent Assessment**

Connection to a public wastewater, stormwater, or street system may require payment of an equivalent assessment if the subject property was not previously assessed, in accordance with Eugene Code Chapter 7.

##### **C. Performance and Warranty Financial Guarantee**

Pursuant to EC 7.145, before commencing construction of any public improvement, a bond or financial guarantee is required, ensuring and guaranteeing to the City all of the following:

1. The improvement shall in all ways comply with the plans and specifications approved by the City Engineer;
2. The improvement will be installed using first-class material and in a first-class professional manner under the direction of the City Engineer;
3. The improvement shall be free from defects or need of repair for a period of at

- least one year from completion of the improvement; and
4. Payment of all fees charged in compliance with EC 7.130 for City engineering and inspection activities (plan review, inspection, and project administration) associated with the project.

The financial surety may be either a bond in the amount equal to the estimated cost of construction or a financial guarantee approved by the City Engineer in the amount equal to 125% of the estimated cost of improvement to secure the construction permit and finance the construction of the improvements. If using a financial guarantee in lieu of a bond, twenty-five percent of the construction cost, or \$25,000, whichever is more, shall be secured by the City prior to establishing the warranty period and retained in place throughout the warranty permit.

The financial surety may be provided by the landowner, Contractor, Owner/Developer, or other interested party; however, if the financial surety is provided by someone other than the Owner/Developer, the surety to submit to the City written confirmation that the surety understands the risks and responsibilities of being the surety, i.e., an acknowledgement that the surety understands that that if the work is not completed, the City may act on the financial guarantee to complete the improvements.

In determining the value of the financial surety, construction cost shall be based on either the Owner/Developer's contract for the work or the official Engineer's Estimate, whichever is larger, and shall include all material and construction costs, traffic control, mobilization, and erosion prevention costs. To facilitate City verification of the construction costs, the Project Engineer shall submit either a copy of the contract between the Owner/Developer and Contractor listing the cost of the public improvements and a description of the associated work by unit price or lump sum by infrastructure type, or a formal Engineer's Estimate in a unit price format.

Construction costs shall be itemized into the following improvement categories: transportation, wastewater, stormwater, and other. Transportation improvements include pavement, sub-grade, concrete walks, street lights, curb and gutter, driveway approach, and related transportation facilities within the right-of-way. Stormwater improvements include manholes, curb inlets, catch basins, pipes, swales, and closed or open conveyance and water quality facilities. Wastewater improvements include pipes, tees, service lines, pump stations and related work. Other costs may include off-street bike paths and street trees.

(See Appendix L for sample/standard Bond/Escrow Agreement forms)

#### 4.11 OTHER PERMITS

The applicant (Owner/Developer) is responsible for obtaining all other permits necessary to complete the survey, design, and construction work. Depending on the type of work to be performed and existing conditions, one or more of the following permits may be required:

##### A. Erosion Prevention Permit

If the Contractor's work will disturb one acre or more of land, or, regardless of the size of the area impacted, if the work is located in a "sensitive area" (as defined by Administrative Rule 6.645 and includes open systems to be constructed), an Erosion Prevention Permit must be approved before PEPI permit issuance. If the work will disturb one or more acres but less than five the construction activity will automatically be covered under a National Pollutant Discharge Elimination System (NPDES) 1200-CN permit. An NPDES 1200-C permit is required for work disturbing an area larger than five acres in size.

##### B. Floodplain Development Permit

A Floodplain Development Permit is required prior to any development occurring within the Special Flood Hazard Area (SFHA). The SFHA includes Zones A, AE, AO and the Floodway for our community on the adopted Flood Insurance Rate Map (FIRM). The FIRM was created by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program. Development includes any man-made-change (e.g., building, filling, excavating, grading, paving, etc.) within the regulatory floodplain. Floodplain Development Permits are obtained at the Permit and Information Center. See Appendix B for permit requirements. SFHA must also be shown on the CSMP as noted in [Section 3](#).

##### C. Wetland Permit

If wetland indicators are present, such as wetland plants, hydric soils or saturated conditions, the applicant shall submit a wetland delineation that has received concurrence from Division of State Lands (DSL). If public improvements are shown within wetlands, a fill permit is required prior to PEPI permit issuance. A Corps of Engineers permit is required for disturbance of any jurisdictional wetland. A joint Corps of Engineers/Division of State Lands #404 permit is required for excavation or embankment of 50 cubic yards or more of material within "waters of the State." (Refer to DSL for definition, regulations, and permit requirements at <http://oregonstatelands.us/DSL/WETLAND>). Wetlands shall be delineated on the CSMP; see [Section 3](#) for plan requirements.

#### **D. Railroad Permit**

Any work crossing (above or below ground) or adjacent to railroad property requires a permit from the affected railroad company.

#### **E. Fill Permit**

A PEPI permit does not authorize grading/fill activity on private property. It is the applicant's responsibility to verify and obtain all necessary grading/fill permits through Building and Permit Services at the Permit Information Center before starting any construction outside of the public-rights of-way and easements.

#### **F. Tree Removal Permit**

A Tree Removal Permit may be required for work near street trees or removal of a tree on private property. Removal of more than 30 percent of the critical root zone of a street tree constitutes a felling and requires a permit. Authorization for planned, unavoidable street tree removal is typically approved through the PEPI permit. Unanticipated technical fellings or removals requires a separate street tree removal permit and/or may be subject to penalties as violations of Chapter 6.300. Replacement of a street tree or payment of its appraised value is required under the PEPI, as determined by the Urban Forester. See Appendix D for applicable regulations. Trees shall be delineated on the CSMP; refer to [Section 3](#) for plan requirements.

#### **G. Electric Permit**

An Electrical Permit is required from Building Permit Services at the Permit and Information Center for all traffic signal and street illumination work. The electrical Contractor is responsible for obtaining the permit after the construction plans are approved.

### **4.12 CONTRACTOR AND CONSTRUCTION SCHEDULE**

**Contractor:** The applicant (Owner/Developer) shall submit a copy of their contract with a qualified Contractor. If the Contractor is not known by the City Engineer pre-qualification screening may be required.

**Construction Schedule** in accordance with the Standard Specifications shall be submitted before the construction permit is issued.

#### **4.13 TRAFFIC CONTROL PLAN (TCP)**

**A.** The Project Engineer or Contractor shall submit a TCP showing temporary traffic control devices to be used during construction for City approval prior to the PEPI permit being issued. Temporary traffic control devices and signing shall comply with the current edition of Manual of Uniform Traffic Control Devices (MUTCD), ODOT’s Temporary Traffic Control Handbook and Standard Specifications, and the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190.

**B.** The TCP shall include a temporary pedestrian access route (TPAR) plan for construction that requires the closure or detour of pedestrian routes. The TPAR shall comply with the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” as published in 36 CFR Part 1190 in addition to the publications referenced in section A. (above) for temporary traffic control. To the extent a provision of any publication listed in section A. conflicts with the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way”, the “Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” shall control.

**C.** Existing traffic controls shall not be visually obstructed, damaged, or tampered with in any manner unless approved as part of the traffic control plan.

#### **4.14 CONSTRUCTION REQUIREMENTS**

##### **A. Pre-Construction Meeting**

Following approval of the plans and issuance of the PEPI permit, the applicant shall schedule a pre-construction meeting with City staff and an on-site inspection with Erosion Prevention staff prior to beginning any construction activities.

##### **B. Inspection**

All work must be inspected by the City. Any work performed on the project without inspection is considered unauthorized and may be subject to removal and/or replacement at the Owner/Developer’s expense. The Public Works Inspector (City Inspector) is the City’s representative on the project during construction of public facilities. The City Inspector is available from 7:00 a.m. until 3:30 p.m., Monday through Friday, except holidays, and may be available at other times with prior arrangement. The Developer or Contractor shall notify the City Engineering Division 24 hours before the services of the City Inspector will be required on the job. If insufficient notice is given, inspection services may not be available and the Contractor or Developer will be required to delay work until an Inspector is available. If the Developer’s Contractor elects to work extended hours, weekends, or holidays, the Contractor must receive approval from the City Inspector in advance. Inspection services are not guaranteed outside of normal weekday work hours. The City will contract for outside inspection services with private or public labs or

consultants to provide inspection services not available by City staff, such as sampling, lab services, and bridge inspection. The Owner/Developer will be charged for all costs associated with inspection, such as outside services and the City Inspector's time, which includes overtime and travel time to and from the job site.

The Owner/Developer's Contractor is responsible for quality control of materials and workmanship per the Standard Specifications. The City Inspector is responsible for verifying that all materials and workmanship comply with the plans and specifications. The City Inspector will normally attempt to notify the Contractor of any deficiencies the same day as the inspection is performed or the next business day, depending on when the information is available, but is not obligated to do so.

The Project Engineer shall provide the Contractor copies of the approved plans and the Contractor's crews shall have copies of the approved plans with them at the project site while they are performing work. It is not the City Inspector's duty to warn or prevent the Contractor from performing incorrect work as a result of the Contractor's crew not possessing copies of the plans at the project site or through their use of plans that are not the approved set.

#### **C. Design Changes**

The Project Engineer will act as the project coordinator and shall submit any design change requests to the City Engineer. The Contractor shall not make any change until written approval is issued by the City Engineer.

#### **D. Construction Staking**

The Project Engineer shall stake the project for construction, including, but not limited to, ADA ramps. Field marking shall include all normal point information, such as cut/fill, offset, station, etc. A copy of cut/fill notes shall be submitted to the City Inspector.

### **4.15 POST-CONSTRUCTION REQUIREMENTS**

#### **A. Centerline Monumentation**

Prior to project final acceptance by the City, the Owner/Developer shall complete street centerline monumentation in accordance with ORS Chapters 92 and 209, unless a post-monumentation deposit was previously accepted by the City as part of a subdivision plat. A summary of minimum requirements are as follows.

1. Monuments must be set by a Licensed Land Surveyor and meet statutory requirements of ORS Chapter 92 Subdivision and Partitions.
2. Monuments placed on street centerlines shall be per ORS 92 and 209.

3. Points required for street centerline monumentation are:
  - a. All street centerline intersections, and
  - b. Curve points:
    - 1) Points of intersection of all tangent lines, where possible (P.I.'s),
    - 2) Beginning points of all curves (P.C.),
    - 3) Ends of all curves (P.T.), and
    - 4) Points on semi-tangents of all curves where crossing street intersections fall within a curve.

When monuments of record have been replaced or reestablished by reference monumentation, a formal survey shall be filed with the Lane County Surveyor and a copy provided to the City Surveyor.

#### **B. As-Constructs**

Within 30 days after receiving the inspection notes from the City Inspector, the Project Engineer shall submit both a reproducible copy and an electronic version of the completed as-construct drawings for the project. Changes noted during construction and field measurements indicated on the inspection notes shall be included. See [Section 5](#) for as-construct requirements. Failure to submit as-construct drawings shall suspend review of other work submitted by the responsible firm for the project until as-construct work is completed.

#### **C. Project Completion Notice (Beginning of Warranty Period)**

When all work shown on the approved plans has been completed and has met the final inspection criteria outlined in the specifications, the City Engineer shall send a letter to the Project Engineer, with a copy to the Contractor and Owner/Developer, confirming completion of public improvements for City maintenance and commencement of the warranty period.

#### **D. Project Acceptance (Release Performance Financial Surety)**

After the City's warranty inspection has been completed, required repairs have been completed by the Contractor, centerline and right-of-way monumentation has been set and accepted, as-construct plans have been submitted to the City and accepted, and all charges have been paid, the City will issue a Final Acceptance Letter. Copies of the Final Acceptance Letter will be distributed to the Contractor, the Project Engineer, the City Finance Division, and the owner/Developer's bonding company. At this time, the City Engineer may authorize release of the financial surety. Service connections will not be permitted until the public system has been accepted by the City.



#### **4.16 FAILURE TO COMPLY WITH CITY STANDARDS AND PROCEDURES**

In the event the Project Engineer fails to adhere to requirements and/or schedules listed herein, the City Engineer may postpone review of other submitted work until the deficiencies are corrected. Failure to complete as-construct work within the time requirements shall postpone review of other work.

**SECTION 5 – AS-CONSTRUCTS 5-1**

**5.00 INTRODUCTION .....5-1**

**5.01 SUBMITTAL REQUIREMENTS .....5-1**

**5.02 REVISIONS .....5-2**

**5.03 TITLE BLOCK ADDITIONS .....5-2**

**5.04 STREET VERIFICATIONS .....5-3**

**5.05 WASTEWATER VERIFICATIONS .....5-4**

**5.06 STORMWATER VERIFICATIONS .....5-5**

**5.07 STREET LIGHTS .....5-5**

**5.08 TRAFFIC CONTROL DEVICES .....5-6**

***{This page left blank intentionally}***

## SECTION 5 – AS-CONSTRUCTS

### 5.00 INTRODUCTION

As-constructs (aka, *as-builts*, *record-drawings*) superimpose the approved design drawings with what was actually constructed; any divergence between the two must be documented as described below. As-constructs are required for all public improvement projects and must adhere to the drafting standards in [Section 3](#) of this manual and the following requirements.

### 5.01 SUBMITTAL REQUIREMENTS

#### A. Paper Copy

One reproducible (high-quality images, text and paper) copy of the as-constructs shall be submitted.

#### B. Electronic Copy

The City requires Privately Engineered Public Improvement (PEPI) contractors to submit electronic Computer-Aided Design (CAD) as-construct files with their final drawings. At a minimum, the electronic CAD drawings must delineate control points, light poles, sewer and storm system and curb lines. The CAD files must be provided in State Plane coordinates, the layer naming convention must conform to those used by the City and the CAD file type must be compatible with the City's software.

The coordinates of the CAD file map features (e.g., storm lines) must be in Oregon State Plane Coordinates 83/91 South Zone measured in international feet. The origin of the coordinates shall be stated. Vertical datum shall be NAVD88 measured in US survey foot. The benchmark used for the basis of elevations shall be stated. The horizontal and vertical map features must be accurate to 0.10 foot.

The layer names in the PEPI CAD files must conform to those used by the City. The DVD provided with the PIDS manual contains an AutoCAD City of Eugene As-Const Template.dwg drawing file. This file contains all the standard layer names and may be used as a template. Listed below are the standard City layer names, in parenthesis, for the minimal delivery.

The electronic as-construct submittals will be on DVD and in AutoCAD DWG format. Contact the City for information on the acceptable releases of AutoCAD. Other formats may be considered if they can be imported into AutoCAD or ArcView. All revisions to the original CAD drawings must be incorporated into the electronic submittal. All CAD files of as-construct drawings must conform to the layering names provided in the drawing template provided in the PIDS manual.

Control points (V-NODE-CTL)  
Pole Points (V-NODE-POLE)  
Pole Symbols (V-NODE-POLES-SYMBOLS)  
Sanitary Lines (V-LINE-WASTEWATER)  
Sanitary Points (V-NODE-WASTEWATER)  
Storm Lines (V-LINE-STORM)  
Storm Points (V-NODE-STORM)  
Building Lines (V-LINE-BUILDING)  
Curb Lines (V-LINE-CURB)

## **5.02 REVISIONS**

All plan data shall be verified for accuracy. Revisions to the approved design drawings, reflecting what was actually constructed, must be mapped accordingly. In some instances, changes will require additional engineering analysis. More detailed instructions specific to infrastructure type are provided below, but general expectations are as follows:

### **A. Strikethrough Requirement**

Cross out original language or design (with a single line so it is still readable) and write in new language. DO NOT ERASE THE OLD/CHANGED INFORMATION.

### **B. Record Requirements**

Record and date all revisions on appropriate sheet(s). List revisions and change orders in the title block, beginning at the bottom line and continue with subsequent entries progressing toward the top line (not from top to bottom.) Letter the revision number in a triangle.

If right-of-way and/or public easement dimensions/locations changed, then verify that the dedication document was revised/replaced accordingly (i.e., new deed, legal description, property owner signature, and recording at Lane County).

## **5.03 TITLE BLOCK ADDITIONS**

Add the following information to the title block:

### **A. Inspector**

Date stamp "INSPECTED BY" followed by the project City Inspector's first initial and last name (e.g., INSPECTED BY M. CAIRO).

**B. As-Constructor**

Date stamp “AS CONSTRUCTED” and letter “FIRST INITIAL” and “LAST NAME” inspector.

**C. Engineer**

ENGINEER’S STAMP: The engineer who stamped the original drawings must also stamp the as-construct drawings. In addition to the engineer’s stamp, all private jobs are required to have been stamped approved by the City’s project manager in charge of privately constructed projects.

**D. Contract Number**

Insert the contract number assigned by the City (e.g., 2014-0501).

**5.04 STREET VERIFICATIONS**

Correct or add data from the inspection notes. Verify the following paving information on the as-construct drawings:

**A. Stationing**

Check beginning and ending paving stations for accuracy.

**B. Excavation Type**

If it changed, cross out old and write in new.

**C. Pavement Type**

If an alternate paving type was bid, cross out the non-applicable paving type.

**D. Paving Width**

If changed, cross out old and write in new.

**E. Sidewalk Location**

If dimensions changed, cross out old and write in new.

**F. Curb Radius**

If it changed from the design, cross out old curb radius value and write in new.

**G. Curb Location**

Check location relative to property line and/or centerline. If curb location changed, cross out old and write in new dimensions.

## **H. Curb Elevations**

If curb elevations differ from design by more than 0.10 foot, cross out old and write in new design data on drawings.

## **5.05 WASTEWATER VERIFICATIONS**

Correct or add data from the inspection notes. Verify the following wastewater information on the as-construct drawings:

### **A. Structure Numbers**

All manholes and “phantoms” (a change in the angle of the pipe) on the plans and in the profiles must be numbered, except for pipes less than eight inches in diameter or 25 feet in length. When a manhole is added on an existing line (segment), two new segments are created. Each segment needs a FROM and TO number. New numbers are provided by the City’s as-construct monitor. Obtain existing numbers from the City’s wastewater index maps. Add or cross out manholes and phantom numbers on the plans per the inspection and final measurements.

### **B. Main Lines**

Show the final measurements of all wastewater lines (from manhole to manhole). When a segment continues from one drawing to the next, show the total length on both drawings. Check against the inspection notes and video report and identify the video report number. If there is more than a five-foot discrepancy, document the reason.

Check and correct the flow lines of all fixtures and ends of pipe in the profile. Cross out old and write in new lines from final measurements. If the flow line from the final measurement differs from the design by more than 0.10 foot or if the pipe size changed, then obtain new wastewater design data from the Design Engineer and cross out old and write in new design data on the drawings.

If pipe size, slope, or type changes, obtain new design data, cross out the old data and write in the new. Show the top of the fixture elevation in the profile.

Revise any pipe hydraulic data as appropriate.

### **C. Service Lines**

Show the tee location per the Inspector’s notes and video report. If they differ by more than 3 feet, document why there is such a discrepancy. If there is no service line to a lot, indicate why on the drawing. Specifically note if the depth of the service line is either shallower than 4 feet or deeper than 6 feet.

Dimension service lines and tees using straight-line progression arrows from the nearest

manhole and show distances. Check and correct the length and/or alignment of service lines on the drawing. Cross out old footage and write in new from inspection notes.

## **5.06 STORMWATER VERIFICATIONS**

Correct or add data from the inspection notes. Verify the following stormwater information on the as-construct drawings:

### **A. Structure Numbers**

All manholes, catch basins, taps, end of pipe segments, and phantoms on the plans and in the profiles must be numbered, except for pipes less than 10 inches in diameter or 25 feet in length. New numbers are provided by the City's as-construct monitor. Obtain existing numbers from the City's stormwater index maps.

Add or cross out manholes, catch basins, taps, end of pipe segments, and phantom numbers on the plans per the inspection and final measurements. When a manhole is added on an existing line (segment), two new segments are created. Each segment needs a FROM and TO number. Use the line break symbol if necessary.

### **B. Main Lines**

Show the final measurements of all stormwater lines (e.g., from manhole to manhole, manhole to catch basin, and catch basin/manhole to end of pipe). When a segment continues from one drawing to the next, show the total length on both drawings. Check against the inspection notes and video report and identify the video report number. If there is more than a five-foot discrepancy, document the reason.

Check and correct flow lines of all fixtures and ends of pipe in the profile. Cross out old and write in new from final measurements. If the flow line from final measurement differs from the design by more than 0.10 foot or if the pipe size changed, then obtain new stormwater design data from the engineer and cross out old and write in new design data on the drawings.

Show the elevation of both the top and the bottom of all stormwater structures in the profile. Check and correct catch basin type (cross out old construction note and write in new, and change drafting symbol). Revise any pipe hydraulic data as appropriate.

## **5.07 STREET LIGHTS**

Correct or add data from the inspection notes. Verify the following street light information on the as-construct drawings:

### **A. Pole Numbers**

All street light poles need to be numbered on the street light plans. Numbers can be



found in the inspection notes.

**B. Pole Location**

If the location of a pole changes, cross out the old location and write in the new location.

**C. Junction Boxes and Conduit**

Show final locations of all junction boxes and conduit.

**5.08 TRAFFIC CONTROL DEVICES**

Correct or add data from the inspection notes. Verify the following traffic control information on the as-construct drawings:

**A. Revisions**

Revise plans with all corrections, including accurate location of supports, markings, and other traffic control devices.

**B. Notes**

Correct or add all notes from the inspection notes.