RESOLUTION NO. 5204

A RESOLUTION RATIFYING PUBLIC IMPROVEMENT DESIGN SPECIFICATIONS.

WHEREAS, AMC 15.06.050 delegates to the City Engineer the authority to develop design and construction standards as well as testing procedures for proposed public improvements; and

WHEREAS, the City Engineer has, pursuant to this authority, developed new design standards.

NOW, THEREFORE, BE IT RESOLVED that the design standards developed by the City Engineer and attached hereto as Exhibit "A" are ratified and approved by the City Council; and

BE IT FURTHER RESOLVED that the City Engineer is authorized and directed to amend the design standards, from time to time, as s/he deems appropriate to promote lasting, efficient, and affordable public improvements within the city of Albany; and

BE IT FURTHER RESOLVED that the City Engineer may, but is not required to, periodically submit revisions to the design specifications to the Council for subsequent ratification.

BE IT FURTHER RESOLVED that this resolution shall take effect immediately upon passage by the Council and approval by the Mayor.

DATED AND EFFECTIVE THIS 9TH DAY OF NOVEMBER 2005.

~~Mayor~~
Council President

ATTEST:

City Clerk

CITY OF ALBANY

DEPARTMENT OF PUBLIC WORKS

DIVISION A
GENERAL AND DRAFTING DESIGN STANDARDS

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PUBLIC WORKS DEPARTMENT

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November 2005

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A 1.00 - INTRODUCTION

A 1.01 PURPOSE & ORGANIZATION

The purpose of these Design Standards documents is to provide a consistent policy for implementing design of public improvements and related facilities. The elements contained herein are Public Works oriented and are related to public improvements.

These Design Standards cannot provide for all situations. They are intended to assist, but not to substitute for competent work by design professionals by providing basic information. Engineers are expected to bring the best of their skills and judgment from their respective disciplines to each project.

These Design Standards are also not intended to limit unreasonably any innovative or creative effort, which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged, however, on the likelihood that such variance will produce a long-term compensating or comparable result, in every way adequate for the user and resident.

A 1.02 APPLICABILITY AND AUTHORITY

This Design Standards document shall govern all design and upgrading of all public improvements and related facilities within the City of Albany. This document will be routinely referred to as the Design Standards. These standards are developed under the authority of the Public Works Director (Director) or the Director's designee. Modifications of or variations from these Design Standards shall be approved by the Director or the Director's designee.

Appeals to these Design Standards for specific project application shall be in writing. The appeal shall identify the standard section for which the appeal is being made, reasons for the appeal, and for which specific project/application the appeal is being made. The appeal shall be handled at the lowest level possible. Therefore, appeals shall be forwarded to the City in the following order:

A. The staff person reviewing the project plans and specifications.

B. Public Works Permitting/Development Engineer

C. City Engineer

D. City Council

An appeals fee of $250 will be charged for each appeal made beyond the Public Works Permitting/Development Engineer.

A 1.03 ENGINEERING POLICY

The City of Albany requires strict compliance with Oregon Revised Statute 672 for professional engineers. All engineering plans, reports, or documents shall be prepared by a registered professional Civil Engineer or by a subordinate employee under his/her direction, and shall be signed by him/her and stamped with his/her seal to indicate responsibility for them. It shall be the project engineer's responsibility to review any proposed infrastructure extension, and/or existing system change with the City, prior to engineering or proposed design work, to determine any special requirements or whether the proposal is permissible. An approval stamp of the City, on the plans, or other documents, for any job, does not in any way relieve the project engineer of his/her responsibility to meet all requirements of the City or obligation to protect the life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined the full requirements of the City have not been met.

A 1.04 REFERENCES

These Design Standards are intended to be consistent with the most current provisions of the documents and requirements as listed below. Periodic revisions to these Design Standards will be made as necessary to maintain consistency in that regard. Nevertheless, all projects are expected to be consistent with the:

A. *Albany Municipal Code*

B. *Albany Development Code*

C. Albany *Standard Construction Specifications*

D. State regulations

E. Federal regulations

Proper design of public improvements must follow and incorporate the City's *Standard Construction Specifications.*

A 2.00 - EASEMENTS

A 2.01 GENERAL REQUIREMENTS

Where an easement is needed to construct the public improvement, the following guidelines and requirements will govern the requirements for and the use of public easements:

A. Easements will only be permitted when it has been shown to be impractical or unfeasible to locate the needed public improvement within the public right-of-way. Utilities in the right-of-way shall be located as shown on figure A 3.1.

B. All public utilities located on private property shall be located at the center of a permanent easement. The easement for a single line shall be 15 feet in width for water lines and 20 feet in width for sewer and storm drain lines. If two or more lines are located within the same easement, the easement width shall be increased. Easement widths and configuration shall conform to figure A 3.2.

C. If a utility is deeper than 10 feet or has a diameter greater than 24 inches, a wider easement may be required. In such cases, a slope of one horizontal to one vertical will be used to determine the width of the easement, after taking into account the width of the pipe trench itself.

D. At the terminus of all public lines, the easement shall be extended a minimum of 10 feet past the end of the line, manhole, or cleanout.

E. All easements shall be granted to the City on a standard approved format provided by the City. All private easements shall consist of two separate 8.5 by 11-inch exhibits. Exhibit A shall provide the easement's legal description, as prepared by a registered Oregon professional land surveyor. Exhibit B shall provide a site and vicinity survey drawing of the final easement configuration, also prepared by a registered Oregon professional land surveyor.

F. Any variation in easement widths shall vary in 5-foot increments.

G. All easements shall be shown on the City-approved project engineering drawings.

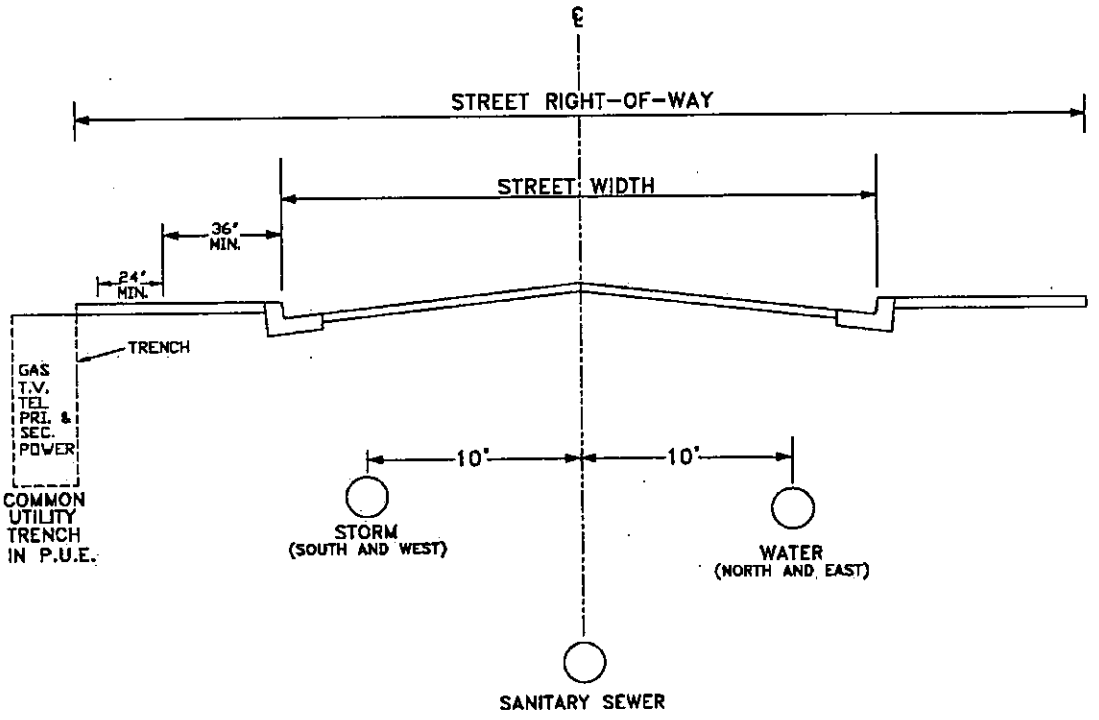
H. Public easements within Planned Developments, manufactured home parks, apartment complexes, or commercial/industrial developments shall be located in parking lots, private drives, or similar open areas that permit unobstructed vehicle access for maintenance and inspection purposes.

I. Easements along property lines shall be centered on the property line. For these locations, place the utility 18 inches off the property line.

J. No building, permanent structure, or overhanging structure of any kind shall be placed within easements. The easement shall provide exclusive unrestricted, unencumbered use and access to the improvement(s) at all times.

K. The City shall have the right to enter all portions of the easement at reasonable times for inspection or construction supervision purposes. The property owner will be expected to cooperate in that regard. Special immediate access may be required under emergency conditions.

L. Easements shall be in effect prior to construction. All easements must be furnished to the City for review and approval prior to recording.



NOTES:

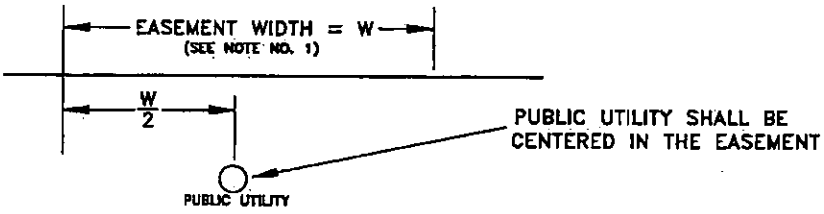
1. PRIVATE FRANCHISE UTILITIES SHALL BE LOCATED OUTSIDE OF THE STREET RIGHT OF WAY IN A PUBLIC UTILITY EASEMENT (P.U.E.).

FOR PROJECTS ON EXISTING STREETS WHERE ADDITIONAL RIGHT-OF-WAY OR EASEMENTS CAN NOT BE ACQUIRED:

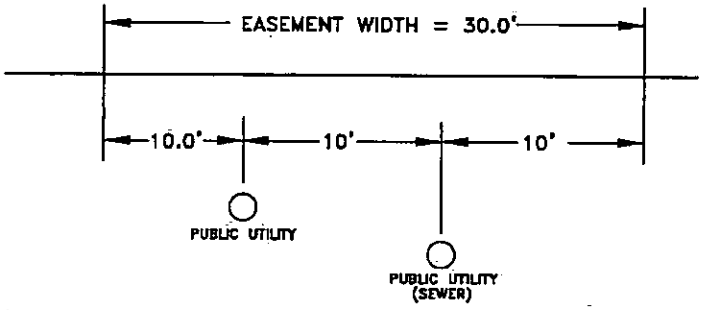
2. ALL PRIVATE AND FRANCHISE UTILITIES TO BE LOCATED A MINIMUM OF 3' BEHIND THE CURB.
3. MINIMUM COVER FOR PRIVATE UTILITIES IS 30".
4. CONTACT RESPECTIVE PRIVATE UTILITY COMPANY FOR SPACING REQUIREMENTS WITH OTHER PRIVATE UTILITIES.
5. MAINTAIN A MINIMUM LATERAL CLEARANCE OF 7.5' BETWEEN WATER AND POWER.
6. AN INCREASE IN UTILITY SEPARATION MAY BE REQUIRED IF ANY UTILITY IS OVER 10' DEEP OR OVER 24" IN DIAMETER.
7. ANY VARIATIONS FROM THIS DESIGN MUST BE APPROVED BY THE CITY ENGINEER.

FIGURE A3.1
UTILITY LOCATIONS WITHIN STREET RIGHT-OF-WAY

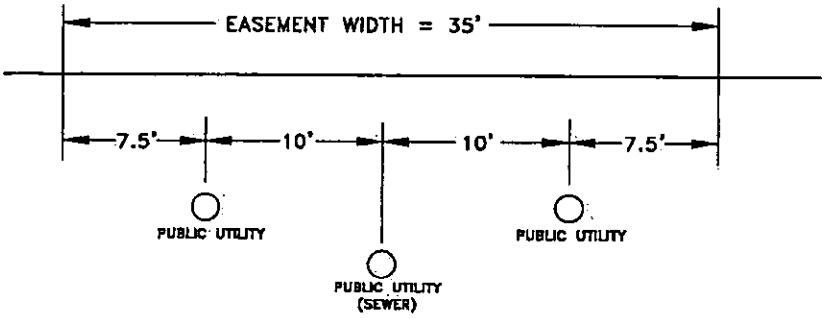
NO SCALE	AUGUST 2005	A3.1



EASEMENT FOR SINGLE PUBLIC UTILITY LINE



EASEMENT FOR TWO PUBLIC UTILITY LINES



EASEMENT FOR THREE PUBLIC UTILITY LINES

NOTES:

1. MINIMUM EASEMENT WIDTHS FOR VARIOUS UTILITIES ARE:

WATER	W = 15FT.
STORM DRAIN	W = 20FT.
SANITARY SEWER	W = 20FT.

2. AN INCREASE IN EASEMENT WIDTH MAY BE REQUIRED FOR ANY PUBLIC UTILITY THAT IS OVER 10' DEEP OR OVER 24" IN DIAMETER.
3. WITH THE EXCEPTION OF UTILITY CROSSINGS, PRIVATE UTILITY LINES MAY NOT BE LOCATED WITHIN THE PUBLIC UTILITY EASEMENT.
4. NO STRUCTURES, INCLUDING DECKS AND OVERHANG AREAS, MAY ENCROACH INTO THE EASEMENT AREA.

FIGURE A3.2
EASEMENT WIDTH REQUIREMENTS

NO SCALE	AUGUST 2005	A3.2

A 3.00 - DRAFTING STANDARDS

A 3.01 PURPOSE OF THESE STANDARDS

These Design Standards have been established to facilitate producing drawings that are consistent in appearance and presentation. These drafting standards are intended to provide consistent drawings and records of the City's infrastructure. Adherence to these Design Standards will aid the City in maintaining accurate and readily readable records. It will also aid in the quick review and turnaround of construction plans.

These Design Standards are to be followed by all consultants and sub-consultants who are involved in producing drawings for City of Albany projects and site improvement (SI) projects. Exceptions will be made only after a request has been submitted and approved by the Director. If any situation occurs that is not specifically addressed, application of good judgment on the part of the engineer is appropriate.

A 3.02 DRAWING CREATION AND LAYOUT

All drawings will be created in AutoCAD. Any AutoCAD drawings submitted to the City digitally shall be compatible with the AutoCAD release being used by the City at that time. Drawings shall be located and oriented within the Oregon State Plain Coordinate System (NAD 83-89).

Drawing sizes shall comply with ANSI-defined standards for page width and height. Review drawings may be submitted in B size (11x17). Bidding and construction documents may also be printed at B size. However, all final as-built drawings must be submitted to scale on D-size (24x36) Mylar. Digital files of the as-built drawing shall also be submitted. Drawings shall be drawn such that reduction of plans from full size (D sized) to half size (B sized) can be done and maintain a true scale on the half-sized plans.

A 3.03 SHEET LAYOUT AND DESIGN INFORMATION

A. Title Sheets. All projects shall include a Title Sheet. This requirement may be waved if the project consists of only one plan sheet. If a title sheet is not used for a single sheet project, a vicinity map must be included on the single sheet. One title sheet may be used when constructing more than one facility (sewer, storm drain, etc.); however, all requirements for the title sheet must be met. The following information shall be included on all Title Sheets:

1. A Site Plan of the entire project, showing street right-of-way and/or subdivision layout to a scale of 1" = 100'. A smaller scale may be used on large projects upon approval of the Director.

   The site plan shall be a composite plan showing all complete properties to be served by the improvements and properties adjacent to and within 100 feet of those served. A North arrow shall be included on the Title Sheet and shall be oriented to the top of the sheet.

2. Index of Sheets
3. Complete legend of symbols used
4. Vicinity Map to a scale of not less than 1" = 800' showing the project location
5. Permanent bench marks including their descriptions
6. General and special notes relating to construction methods.
7. A statement referencing the City of Albany *Standard Construction Specifications*

B. Plan and Profile Sheets. Plan sheets shall be laid out and organized in a fashion that facilitates easy plan reading and interpretation. Proposed utility improvements shall be laid out on individual plan sheets. For example, street, sewer, water, and storm drain plans shall each be on their own designated plan sheet. Do not combine utilities and street plans on the same plan sheet. Storm drain improvements associated directly with street improvements can be combined on the street plan sheets.

1. Plan Sheets: Plan sheets shall show all existing improvements within the boundary of the project and within 250 feet of the terminus of the proposed improvements that can be extended. Items that should be included are:

    a) Natural Features: Base sheets shall include at least 10-foot contour lines to show the existing topographical characteristics of the site and adjacent areas that impact the project or are immediately impacted by the project. Contour lines of 2-foot intervals may be required when grades are flat or additional information is required. Alternative contour intervals may be used with prior approval of the Director. Identify all relevant features, including ditches, swales, channels, streams, and trees.

    b) Transportation Improvements: Show all existing edge of pavement/curbs, bridges, alleys, driveways, and sidewalks that are adjacent to or abutting the project. Include the location of curb cuts and wheel chair ramps. Show all lights, signs, signals, signal loops, boxes, etc. Show all railroad lines and crossings. Show existing slopes and grades of improvements.

    c) Public Utilities: Show all water, sewer, and storm drain lines, including service laterals. Identify manholes, drainage inlets and outlets, valve and meter locations, hydrant locations, and all other appurtenances. Indicate elevations of each feature at match points with the appropriate slope, grade, or direction of flow indicated. Abandoned utilities shall also be shown where known.

    d) Franchise Utilities: Show franchise utilities, including underground and overhead lines, vaults, poles, and all appurtenances, located within or adjacent to the project, or that would be affected by the project.

    e) Private Improvements: Show all property and right-of-way lines, easements, and found survey monuments. Show all relevant existing improvements within or adjacent to the project, such as railroads, private streets and walks, landscaping, fences, walls, trees, buildings or structures, wells, private utility lines and appurtenances, and any other existing feature that would impact or be impacted by the project.

    f) Hydrology. Location of water courses, streams, ditches, and swales that will be impacted or affected by the project. All water course crossings must show the 100-year floodplains.

Special Note: The design engineer shall perform field investigations to determine an accurate picture of existing utilities. This shall be done to assure the project can be built as designed and to prevent conflicts that will significantly alter the construction of the improvements from the approved plans. For utility connection locations, the design engineer shall field locate and verify the alignment, depth, and invert elevations of all existing facilities shown on the plans. All other utilities that will be crossed by proposed facilities that may cause a conflict shall also be field located for the alignment, depth, and invert elevations. City as-built drawings are only to be used as aids to the design engineer when field verifying the existing facilities.

2. Profiles. Profiles for the improvements shall be to the same horizontal scale on the same sheet and drawn immediately below the corresponding plan view, and shall be required in the following instances:

    a) All street, sewer, and storm drain improvements.

    b) On water line projects at railroad and culvert crossings, ditch or stream crossings with elevations of the ditch or stream bed, and the 100-year flood elevation profile and casing details; utility crossings that conflict with the proposed water

line installation; water lines installed in unimproved streets or easements across private property; or as otherwise directed by the City.

C. In addition to the standard information that must be provided on all plans, there are some specific information and guidelines required on plans for each type of improvement.

1. Water Improvements:

a) Type and location of internal restraint where required. Pipe with internal restraint shall be shown as a heavier/different line type than pipe without internal restraint.

b) Type and connection configuration of all proposed fittings, valves, and appurtenances.

c) Detailed drawings shall be included for all water system appurtenances and connections to existing water lines. Where appropriate, references to the City of Albany *Standard Construction Specifications* may be used in-lieu-of details actually shown on the plans.

d) Type of material and class of pipe between fittings.

e) Backfill material of the trench.

f) All water system components not specifically covered by Standard Detail Drawings, as found in the City of Albany *Standard Construction Specifications*, shall be identified on the construction drawings. Components shall be identified as to type and connection configuration, i.e. flange, mechanical joint, etc.

NOTE: All connection and detail information shall be shown on the plan view (not profile view).

2. Sewer Improvements:

a) Type of material and class of pipe between manholes.

b) Backfill material of the trench.

c) Invert elevations, direction, and diameter of all pipes at manholes.

d) Rim elevations of all manholes (and ground elevation if different than rim elevation).

e) Pipe slopes.

f) Pipe full-flow capacity and velocity.

g) All sewer system components not specifically covered by Standard Detail Drawings, as found in the City of Albany *Standard Construction Specifications*, shall be identified on the construction drawings.

3. Storm Drain Improvements:

a) Type of material and class of pipe between manholes and inlets.

b) Backfill material of the trench.

c) Invert elevations, direction, and diameter of all pipes at manholes.

d) Rim elevations of all manholes (and ground elevation if different than rim elevation).

e) Pipe slopes.

f) Pipe full-flow capacity and velocity.

g) All storm drain system components not specifically covered by Standard Detail Drawings, as found in the City of Albany *Standard Construction Specifications*, shall be identified on the construction drawings.

h) Inlet and outlet details, including grate details.

i) Open channel invert and top of bank slopes. High and mean water surface elevations shall also be shown on the plans where appropriate.

j) Cross sections shall be shown for each section of open channel. The cross sections shall have invert, top of bank, high, and mean water surface elevations labeled on them.

4. Street Improvements:

a) Standard cross section with structural sections for each street. Cross sections shall extend a minimum of 25 feet beyond the existing or proposed right-of-way. In steeper areas, cross sections shall be shown to catch points. Cross sections shall be developed for all areas where improvement dimensions are different and for all locations where the adjacent property's topography changes.

b) Dimensions shall be shown on each plan sheet indicating right-of-way width, street width, distance from centerline to face of curb, width of the landscape strip, and sidewalk width.

c) Horizontal Alignment: Show the construction centerline for each street, with stationing labeled at 50-foot intervals, beginning and ending points, centerline-centerline intersections, and changes in horizontal alignment. The future horizontal alignment of dead-end streets shall be shown 250 feet beyond the proposed termination point.

d) Horizontal Curves: For each horizontal curve, show stationing labels for Point of Curvature (PC), Point of Reverse Curvature (PRC), and Point of Tangency (PT). In a table on the plan sheet, show the centerline curve data including the tangent length, curve length, long chord distance, delta angle, and centerline radius distance.

e) Curb and Gutter Alignment: Show face of curb alignment throughout the project, labeling alignment changes with street stationing. The beginning or end of curb returns at intersections shall be labeled with the appropriate street station, with curb return data listed in a table on the plan sheet. The table shall show the total length of the return, delta angle, curb radius distance, and elevations of the beginning, ¼ delta, ½ delta, ¾ delta, and end of the return.

f) Profile Information: The profile information for each street design shall be to the same horizontal scale, on the same plan sheet, and drawn immediately below the corresponding plan view. The profile grid shall clearly show elevations along the left and right sides of the grid and label stations every 50 feet along either the top or bottom of the grid.

g) Vertical Grades: Show the existing ground and finish grade profiles at the top face of curb (or at edge of pavement if curb is not being constructed) and the finish grade profile at centerline. The proposed future vertical alignment of dead-end streets shall be shown 250 feet beyond the proposed termination point, and the vertical alignment of existing side streets shall be shown at least 40 feet beyond the curb return. This is to insure that the street grade is set low enough to enable the adjacent properties to drain to the street. On each plan sheet, the street and curb grades shall be labeled on the profile for each tangent section near grade breaks or vertical transitions.

h) Vertical Curves: For each vertical curve, label the station and elevation for the Vertical Point of Curvature and Vertical Point of Tangency on the profile. At a convenient location on the profile, list the station and elevation for the Vertical Point of Intersection, Turning Point, and length of the vertical curve.

5. Grading Plans:

a) Show contours at a minimum of 2-foot intervals. Indicate whether land is cut or filled.

b) Identify the direction of flow for all ditches and creeks and water surface elevations for lakes.

c) Identify drainage direction and drainage basin boundaries.

d) Provide cross sections or profile plans to show existing and final grading.

A 3.04 DRAWING TITLE BLOCK

Standard title blocks shall be used unless otherwise specified. The preferred location for the title block is vertically on the right-hand side of the drawing.

Upon creation or revision of a drawing, the information/attributes inserted into the title block of the drawing shall be revised. All information relevant to finding the file, plotting the file, and dating the plot shall be listed in the appropriate portion of the title block. Regardless of the title block location and or size, the title block shall contain the following at a minimum:

A. Project Name

B. City Project Number

C. Designer's name

D. Drafter's name

E. Date of last edit

F. Engineer's stamp

G. CADD file name

H. Other plotting codes

A 3.05 PROFESSIONAL STAMPS

Professional stamps shall be included on all drawings submitted for review for the discipline represented by the work. The preferred placement of the stamp is within the title block.

A 3.06 DRAWING SCALES

A. Scales for Maps, Graphics and, Construction Plans. A graphic scale is required on all maps and graphics. The graphic scale shall be two-inches long on ANSI D size sheets and one-inch long on ANSI B size sheets. It shall have a minimum of three labels, with the leftmost label being 0 and the middle and rightmost labels displaying the appropriate distances respectively, as shown in Figure A 3.06-A.

All construction drawings are to have the scale clearly indicated. When the drawing contains only one view, detail, or section, the scale is to be noted prominently on the drawing. When the drawing contains multiple views, and/or details, and/or sections, the scale is to be noted as part of each individual

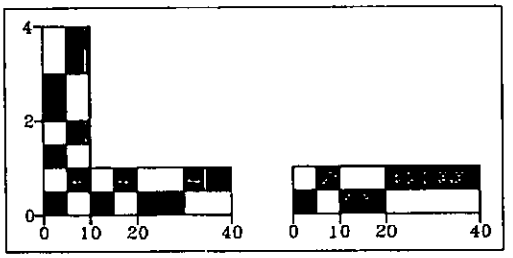


Figure A 3.06-A Drawing Scale

component's title. When all views and/or details and/or sections on a single drawing are the same scale, the scale should be noted in the appropriate space on the drawing.

The preferred scale for plan and profile drawings shall be 1" = 20'. However, scale must be selected with the following requirements in mind:

1. Maintain clarity when notes and dimensions are added to the drawings.
2. Maintain legibility when drawings are reduced to half size.

The use of distorted scales (different horizontal and vertical scales) is acceptable for profile map and graphical drawings. For example, for plan and profile views on map and graphical drawings, the vertical and horizontal scales should have a 1:10 ratio where possible. That is, if the vertical scale is 1 inch = 2 feet, then the horizontal scale should be 1 inch = 20 feet. Similarly, a 1 inch = 10 feet vertical scale would correspond to a 1 inch = 100 feet horizontal scale, and so on. However, distorted scales are not acceptable for mechanical drawings.

A 3.07 DRAWING ORIENTATION

A. North Orientation. General plans such as maps and site plans must always include a north arrow. If possible the north arrow should point to the top on all drawings. However, the north arrow should be oriented to allow project stationing to increase from left to right and from bottom to top of page. However, North should not be oriented to the bottom of the page.

Figure A 3.07-A North Arrow

B. North Arrow Placement. North arrow locations on construction drawings are preferred in the upper right corner. Exceptions may be made, but consistency should be maintained throughout the drawing set.

C. Sizing. For ANSI B-size, the size of the North arrow should be 1.0" from top to bottom. For D-Size drawings, the size of the North arrow should be 2" from top to bottom.

A 3.08 TEXT

A. General. All text on a drawing shall be legible on full- and half-sized plans. Text should be laid out as shown in Figure A 3.08-A unless otherwise specified in this standard. Uppercase lettering shall be used for all text.

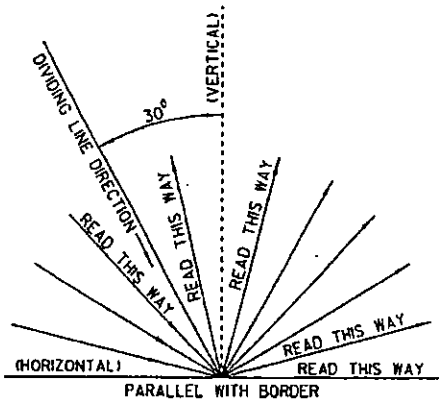


Figure A3.08-A Text

B. Text Over Linework. Whenever text and linework conflict, the text should be relocated if possible. If this is not possible, the linework can be broken at the drafter's discretion.

C. For Mapping Projects. The Design Standards shall be applied wherever possible unless specific presentation needs require the use of special fonts. The use of special fonts should be minimized and font sizes, placement, and location should be consistent throughout the project.

A 3.09 DIMENSIONS

A. General. Dimensions less than 12 inches shall be shown as inches with an inch label i.e., 11". Dimensions 12 inches and larger shall be shown in feet and tenths of feet. Decimal fractions shall be rounded off to the nearest hundredth. Horizontal dimensions shall be shown on plan views only unless used on other views when needed for clarity. Vertical dimensions shall be shown on sections, elevations, and details only unless used on other views when needed for clarity. Dimensional repetition shall be avoided.

Dimensions referring to structure size, wall thickness, wall penetrations, and the like shall be shown on structural drawings only, unless required on other drawings for clarity. Dimensions locating equipment, clearance between equipment, or piping shall be shown on mechanical drawings only. Dimensions shall be set as follows:

1. All dimensions and leader lines shall use arrows 0.125" long (in paper space).
2. All text shall be centered above the dimension.
3. All dimensions shall force interior lines.
4. Text shall be parallel with the dimension line.

A 3.10 LEADER LINES

Avoid leader lines that are:

A. Horizontal or vertical

B. At the same angle as cross-hatching

C. At very small angles to the terminating surface

D. Parallel to extension or dimension lines

E. Curved

F. Crossed

G. Too long

Crossing dimensions and leaders are generally to be avoided. When necessary, the leader lines are to be broken so that the lines will not physically cross on the paper.

A 3.11 PLANS, SECTIONS, AND DETAILS

A. Plans. Plans that do not show entire structure, areas, or the like, shall be titled "Partial Plan." Do not abbreviate "Partial."

Plans shown within a structure shall have the elevation as part of the title. Such a title would read: "PLAN AT ELEVATION 94.00." The elevation indicated shall be the high-point elevations of the bottom slab.

B. Sections. Sections shall be called out alphabetically within a series of drawings, with the section letter used only for one section in that series. When the sections are so numerous that the alphabet is used up, start with AA, AB, AC, etc. The letters I, O, or Q should not be used. Sections shall be titled in accordance with Figure A 3.14-A.

Section cuts and the views they indicate may be shown either on the same drawing or on a different drawing. If a drawing shows only sections, details, and so on, sections take precedence, and are shown in sequential order from the drawings top left corner.

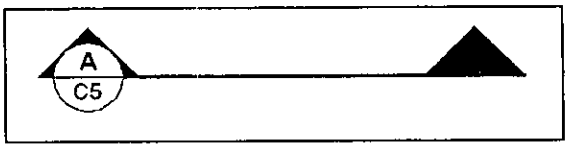


Figure A 3.14-A Section Callout

Show a section cut on the drawing with a cutting-plane line terminating at both ends in 0.625-inch diameter balloons that are horizontally bisected. Where space is limited, use an arrowhead on one end. In the balloon's top half, enter the sequential cutting plane letter for that drawing; in the bottom half, the sheet number where the section drawing appears.

The notation shown on Figure A 3.14-A indicates that (1) this is the first section cut and (2) the section view is shown on drawing C5.

The title for the section view on drawing C5 will be as shown on Figure A 3.14-B.

C. Details. Details shall be called out numerically within a series of drawings, with the detail number used only for one detail in that series. Details shall be titled in accordance with Figure A 3.14-B.

Call out a detail with a sequential number, slash, and drawing reference. Drawing number(s) use the same format as for section balloons, but use sequential number in the top half as shown on Figure A 3.14-C.

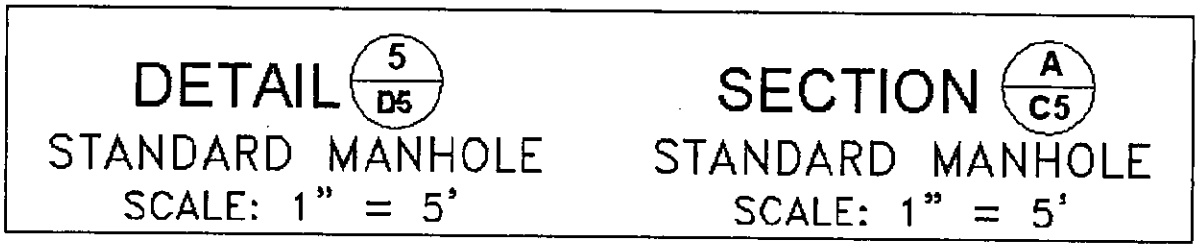
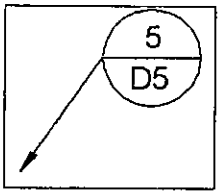


Figure A 3.14-B Detail & Section Description



The notation on Figure A 3.14-C indicates that the detail drawing may be found on the drawing D5. As with section drawings the detail title refers to the original drawing. As with sections, details may be shown on the same drawing or different drawings depending on their size.

Figure A 3.14-C Detail Callout

A 3.12 CONTOURS

Inclusion of contours on drawings shall be included as outlined in A 3.03 B 1. a). Otherwise they shall be omitted to keep the drawing clear and uncluttered.

A. Recommended Contour Interval:

Contour Interval	Indexed Interval
1'	5'
2'	10'
10'	50'
20'	100'
40'	200'

B. Contour Cross Sections. Contour cross sections are to generally be created with the same vertical and horizontal scale factors. Grid spacing is to be developed such that grid lines appear every 0.25 inch in the horizontal direction with labels every 0.5 inch. Vertical grid spacing may be as often as necessary to convey the needed information.

A 3.13 ABBREVIATIONS

Abbreviations shall be used only when enough room is not available to spell out the word. Any abbreviations used on the drawing shall be defined on the cover sheet of the plans. If there is any question as to the meaning of an abbreviation, spell out the entire word.

Standard abbreviations to be used for different pipe types are as follows:

ABS - Acrylonitryle Butadiene Styrene
AC - Asbestos Cement
ACT - Transite
CIP - Cast Iron
CMP - Corrugated Metal
CON - Concrete
DI - Ductile Iron
GI - Galvanized Iron
HDPE - High Density Polyethylene
NCP - Non-Reinforced Concrete
ODDW - Steel, Outside Diameter, Dipped and Wrapped
PVC - Polyvinyl Chloride
RCP - Reinforced Concrete
STL - Steel
TEC - Techite
TRU - Truss
VCP - Vitrified Clay

A 3.14 SYMBOLS

Each set of plans shall have a symbol index on the cover sheet. The symbol index shall show all symbols used on the plans.

A 3.15 MODEL SPACE / PAPER SPACE

A. Model Space. All drawings shall be created at 1:1 in model space and scaled into paper space for plotting except where unavoidable or the scale of the drawing allows it to be drawn at 1:1 in paper space.

Text, arrowheads, section callouts, north arrows, etc. used in model space shall be appropriately scaled such that they are the standard size in 1:1 paper space.

B. Paper Space. Paper space shall be 1:1 scale. All drawings except 1:1 drawings shall be scaled from model space into paper space by creating viewports and zooming to the appropriate scale factors.

CITY OF ALBANY

DEPARTMENT OF PUBLIC WORKS

DIVISION B
WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS

Prepared By

PUBLIC WORKS DEPARTMENT

ALBANY, OREGON 97321

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November 2005

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DIVISION B - WATER DISTRIBUTION SYSTEM

B 1.00 – GENERAL

B 1.01 PURPOSE

The purpose of these *Water Distribution System Design Standards* is to provide a consistent policy under which certain physical aspects of water distribution design will be implemented. Most of the elements contained in this document are Public Works oriented. The intent is that these Design Standards apply to both City-initiated projects as well as private development of public infrastructure.

These Design Standards cannot provide for all situations. They are intended to assist, but not to serve as a substitute for competent work by design professionals. Engineers are expected to bring the best of skills from their respective disciplines to each project. If the Engineer anticipates challenges in meeting these Design Standards, they should contact the City prior to extensive design efforts.

These Design Standards are not intended to limit any innovative or creative effort that could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged, however, on the likelihood that such variance will produce a long-term compensating or comparable result, in every way adequate for the user and resident.

Note that the presentation, layout, and general configuration of all engineering design drawings will be in conformance with Albany's drafting design criteria as outlined in Division A. Engineer will prepare the project design drawings in conformance with the requirements contained therein.

These Design Standards have the objective of developing a water distribution system that will:

A. Be consistent with the adopted water facility plan

B. Be of materials strong enough to resist all expected loads, both internal and external, and able to preserve the potability of the water supply

C. Provide a water distribution system that is consistent and predictable

D. Be economical and safe to build and maintain

B 1.02 REVISIONS TO THESE DESIGN STANDARDS

Revisions to these Design Standards will likely be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest version to the contemplated work.

B 1.03 SHORTENED DESIGNATION

These City of Albany *Water Distribution System Design Standards* will be referred to in the text as the "Design Standards."

B 1.04 APPLICABILITY

These Design Standards shall govern construction and upgrading of all public water system facilities in the City of Albany including applicable work within its service areas.

B 1.05 REFERENCES

These Design Standards are intended to be consistent with the most currently adopted provisions of:

A. *Albany Municipal Code*

B. *Albany Area Comprehensive Plan*

C. Master Facility Plans

D. *Oregon Administrative Rules* Chapter 333

B 1.06 CITY OF ALBANY *STANDARD CONSTRUCTION SPECIFICATIONS*

Except where the Design Standards provide otherwise, design detail, workmanship, and materials will be in accordance with the current edition of the City of Albany's *Standard Construction Specifications.*

B 1.07 DEFINITIONS AND TERMS

A. Approved Backflow Prevention Assembly: An assembly that has been investigated and approved by the State of Oregon Department of Human Resources Health Division for preventing backflow.

B. City: The City of Albany, Oregon.

C. City Engineer: The City Engineer of the City of Albany or his/her authorized representative.

D. Cross Connection: Any connection or arrangement, physical or otherwise, between a potable water supply system and any plumbing fixture or any tank, receptacle, equipment, or device, through which it may be possible for non-potable water, or other substances, to enter into any part of the potable water system under any condition.

E. Definition of Words: Wherever, in these Design Standards, the words directed, required, permitted, ordered, designated, or words of like importance are used, they will be understood to mean the direction, requirement, permission, or order of designation of the City Engineer. Similarly, the words approved, acceptable, and satisfactory will mean approved by, acceptable to, or satisfactory to the City Engineer.

F. Distribution System: Distribution main pipelines, pumping stations, valves, and associated equipment used to transmit water from the supply source to the service line.

G. Double-check Valve Assembly: An assembly composed of two single, independently acting, internally loaded, check valves, four properly located test cocks and two tightly closing isolation valves.

H. Double Detector Check Valve Assembly: A line-sized approved, double-check valve assembly with a parallel meter and meter-sized approved, double-check valve assembly. The purpose of this assembly is to provide double-check valve protection for the distribution system and at the same time provide partial metering of the fire system showing any system leakage or unauthorized use of water.

I. Dwelling Unit: A facility designed for permanent or semi-permanent occupancy and provided with minimum kitchen, sleeping, and sanitary facilities for one family. This definition is specific to these Design Standards and is not intended to be used as a definition for billing purposes.

J. Easements: Areas along the line of public water mains that are outside of dedicated road or rights-of-way, and shall be prepared on City forms granting rights along the water line to the City.

K. Fire Protection Service: A connection to the public water main intended only for extinguishing fires and for flushing the system as necessary for its proper maintenance.

L. Irrigation Service: A metered connection, with an approved backflow prevention device, intended for seasonal use and delivering water that is not discharged to the sanitary sewer.

M. Multiple Family Dwelling: A building or portion thereof designed for occupancy by two or more families, living independently of each other. This definition is specific to these Design Standards and is not intended to be used as a definition for billing purposes.

N. Potable Water: Water that is satisfactory for drinking, culinary, and domestic purposes and meets the requirements of the health authority having jurisdiction.

O. Private Distribution System: A privately-owned and maintained water distribution system serving an industrial or commercial subdivision or a multi-building development on a single lot served through a master meter and backflow prevention assembly installed at an approved location.

P. Project Engineer: The engineer, including the City's engineer, licensed by the State of Oregon as a Civil Engineer under whose direction plans, profiles, and details for the work are prepared and submitted to the City for review and approval.

Q. Residential User: The owner, lessee, or occupant of a single dwelling unit in one structure.

R. Right-of-Way: Land or interest therein that by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public, within which the City shall have the right to install and maintain water mains.

S. Roadway: That portion of the right-of-way used, or to be used, for vehicle movement, which exists between the curbs or proposed curb lines.

T. Service Line: The public portion of the water service line connecting the City water main to the water meter.

U. Single Family Dwelling: Any residential building designed to house one family. This definition is specific to these Design Standards and is not intended to be used as a definition for billing purposes.

V. Standard Drawings: The drawings of structures or devices commonly used on City work and referred to on the plans. The Standard Drawings are contained within and considered a part of the *Standard Construction Specifications* (see City of Albany *Standard Construction Specifications*).

W. Uniform Plumbing Code: Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition as revised by the State of Oregon, called the *Oregon State Plumbing Specialty Code*.

B 1.08 GENERAL APPLICABILITY

These Design Standards apply to the design of permanent water distribution facilities serving properties (legal lots of record created by a major or minor partitioning or subdivision of land) within the City of Albany.

B 1.09 SPECIAL PROJECTS

The design of the following are considered special projects and are not covered in detail in this Section:

A. Water Distribution Pump Stations

B. Reservoirs

C. Relining of Existing Water Mains

D. Treatment Plants

E. Pressure Regulating Devices

F. Flow Measurement Devices

Review and approval of the above special projects by the City Engineer will be required. When requested by the City, full design calculations will be submitted for review prior to approval. Items A, B, and D also require approval by the Health Division of the Oregon Department of Human Resources.

B 2.00 – SYSTEM DESIGN AND SIZING CRITERIA

B 2.01 GENERAL DESIGN CONSIDERATIONS

Water distribution systems shall be designed to accommodate maximum development of the service area with recognition of possible urban renewal, industrial expansion, etc. Systems shall be designed to provide for future extension with minimal disruption of existing service.

As a condition of water service, developments will be required to provide public water mains of sufficient size for consumption and fire protection to adjacent parcels. This will include the extension of water

mains in easements across the property to adjoining properties and across the street frontages of the property to adjoining properties when the main is located in the street right-of-way. Property with multiple frontages will be required to extend water along all frontages. Service lines or laterals, as required, will be extended to vacant lots if street overlays or reconstruction is contemplated.

Design capacities will meet requirements of the current master plan and will be determined by consideration of the following factors and assumptions:

A. Area to be served, both immediate and adjacent.

B. Current and projected population within the areas to be served.

C. Current and projected land use within the areas to be served.

D. Commercial, industrial, or institutional users to be served.

E. Changes in any of the above factors that are likely to occur within a foreseeable time period.

B 2.02 WATER SYSTEM CAPACITY

The system will have sufficient capacity to maintain 40 PSI at the building side of the meter for one- and two-family dwellings. For other developments a minimum pressure of 35 PSI will be provided at the building side of the meter during periods of maximum day demand, and to provide the required volumes of water at adequate pressures to satisfy the expected maximum daily demand plus fire flows, as defined hereinafter. Normal working pressure in the distribution system should be approximately 60 PSI with a range of 40 PSI to 80 PSI. Any isolated locations with pressure above 80 PSI require a Pressure Reducing Valve (PRV) on the customer side of the meter.

NOTE: A pump will not be used on a service line to provide adequate pressure to a subdivision lot or property located above the pressure level of the supply main.

Head loss will be determined by the Hazen-Williams equation. Table B 2.02-A provides the "C" values that are to be used on various pipe diameters for in-service mains.

Table B 2.02-A

Pipe Diameter	C Value
8 Inches and Less	100
10 to 12 Inches	110
Greater than 12 Inches	120

Velocities and head loss will meet the requirements outlined in Table B 2.02-B.

Table B 2.02-B

Line Type	Max. Velocity (ft./sec)	Max. Head Loss (ft./1000 ft.)
Distribution	10	10
Transmission	5	3

A 20 PSI residual pressure under fire flow conditions will be maintained in the distribution system.

In the absence of consumption data or other reliable information, the following factors are assumptions that should be used to calculate demands:

A. Peak hour demands are as follows:

Single Family Residence	0.75 gpm
Residential	0.25 gpm per person
Commercial Development:	
Light	4,500 gal/ac/day
General	7,500 gal/ac/day
Central Business District	6,250 gal/ac/day

Industrial Development:

Park	3,000 gal/ac/day
Light	3,250 gal/ac/day
Heavy	6,300 gal/ac/day

B. Demand for unique commercial installations, industrial users, Planned Unit Developments (PUDs), multiple, and institutional facilities will be calculated on an individual basis.

C. Fire flows are to be as follows:

Table B 2.02-B

Land Use	Fire Flows (GPM)	Duration (Hr.)
Industrial	5,000	4
Downtown	3,500	3
Commercial	3,500	3
Multiple Family	3,500	3
Residential	1,500	2
Mixed Use	3,500	3
Schools	5,000	4
Institutional	3,500	3

B 2.03 MAIN CLASSIFICATION

A. Transmission Mains (16-inches and larger). Mains used for transporting water from the source of supply and storage reservoirs to the distribution system and distribution reservoirs. Some transmission lines serve a dual purpose as distribution lines also to avoid the need for multiple lines in one location.

B. Distribution Mains. (12-inches and smaller) Mains that are used for supplying the individual consumer.

B 2.04 SIZE OF PIPE

Standard pipe sizes for distribution and transmission mains will be 8-inch, 12-inch, 16-inch, 20-inch, 24-inch, and 30-inch. Smaller diameter lines may be acceptable in some situations if approved by the City Engineer. For example, a 4-inch or 6-inch line may be approved for dead-end streets that will serve not more than 12 residents and a fire hydrant is not required on the line being installed. Designs requiring pipe sizes larger than 30-inch will be reviewed on a case-by-case basis.

Table B 2.04-A

Minimum Pipe Size	Use
1-inch & 2-inch Copper	For services only. 1-inch is minimum size for domestic services and is used for ¾-inch and 1-inch meters. 2-inch services are minimum size for 1.5-inch and 2-inch meters.
4-inch & 6-inch Ductile Iron	• Dead-end streets • No contemplated extension of the water main • Serving 12 or less residential properties • No requirement for fire hydrants
6-inch Ductile Iron	Fire hydrant lines off of minimum 8-inch distribution lines.
8-inch Ductile Iron	Residential zoning distribution water mains for a grid (looped) system, not to exceed an unsupported length of 600 feet and will not be *permanently* dead-ended. Looping of the distribution grid will be at least every 600 feet.
12-inch Ductile Iron	Commercial, multi-family, and industrial zoning.
16-inch Ductile Iron and larger	As required for specific development demands or transmission mains.

B 3.00 - PHYSICAL DESIGN REQUIREMENTS

B 3.01 MATERIALS

New water main pipe will be ductile iron with push-on joint end configuration. Design details, including pipe specifications, for bridge crossings, stream crossings, pipe installed in casings, and other special situations will be developed on a case-by-case basis.

Bends will be limited to 11.25, 22.5, and 45 degrees. Ninety degree bends are not permitted. Wherever possible, fittings will utilize mechanical joint and flange end configuration.

B 3.02 THRUST RESTRAINT

In applications requiring thrust restrain, new water mains shall be constructed of ductile iron with an internal, push-on joint restraint system. New water mains will not be restrained externally with concrete reaction blocking without specific approval of the City Engineer (see City of Albany *Standard Construction Specifications*).

Calculations for determining restrained lengths of pipe to protect specified bends and other assemblies will be based on the following general parameters: 1) minimum 2:1 safety margin, 2) minimum 150 PSI test pressure, 3) three (3) feet of cover, and 4) marginal trench and backfill conditions.

B 3.03 WATER MAIN CONFIGURATION

The distribution system mains will be looped at all possible locations. The installation of permanent dead-end mains providing fire protection and/or serving large areas will not be permitted.

Developments will be required to extend mains across existing or proposed streets for future extensions by the City or other developments. Property with multiple frontages will be required to extend water along all frontages. Terminations will be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended.

Tie-ins to existing, non-standard water mains (as to size and material) will be configured for future extension with minimal impact on local water service (see City of Albany *Standard Construction Specifications*). Tie-ins to existing water mains not contemplated for replacement will be made with 22.5 or 45 degree bends. Ninety (90) degree bends will not be used.

B 3.04 MINIMUM DEPTH

The minimum cover will be 36 inches as measured from finish surface grade to the top of the water line. However, potential final finish grades for unimproved areas may require the water line to be designed at a greater depth than 36 inches. Consideration also must be given to construction loads that may affect system integrity for projects involving street construction over new and existing water mains.

B 3.05 LOCATION

A. Relation to Other Utilities. Water lines will be separated from other utilities in accordance with OAR 333.

B. Water Mains Within Street Right-of-Way. The standard location for water mains will be within public right-of-way on the north and east sides of streets, ten (10) feet from the street center line (see City of Albany *Standard Construction Specifications)*. Exceptions to these requirements may be made in order to avoid conflicts with other existing underground facilities, and to permit sanitary sewers to be installed on the low sides of streets.

Generally, mains shall not be installed in alleys. Wherever possible, mains will be installed on a particular street at a constant distance from the curb. On curved streets, mains may be laid on a curve concentric with the street centerline with deflections no greater than the manufacturer's specifications, or mains may be laid in straight lines along the tangent between selected angle points to avoid conflicts with other utilities. The angle point and tangent section will not be less than three (3) feet in front of the curb face.

B 3.06 SURFACE WATER CROSSING

Surface water crossings of mains will be in accordance with OAR 333 and the following:

A. Mains crossing streams or drainage channels will be designed to cross as nearly perpendicular to the channel as possible.

B. Surface water crossings will be reviewed on a case-by-case basis. Some crossing may require the installation of a casing.

C. The minimum cover from the bottom of the stream bed or drainage channel to the top of pipe will be thirty-six (36) inches. However, this cover requirement may be increased for surface crossings in which channel erosion is a concern.

D. Specifications for scour pads (scour protection for the stream bed over the pipe) will be site specific and will be determined by the City Engineer.

E. Valves will be installed on either side of the crossing and a service will be installed between the valves to facilitate testing and sampling.

B 3.07 VALVES

A. Sizes. Valves will be the same size as the mains in which they are installed. Gate valves will be used for applications 8-inch and smaller and butterfly valves for 12-inch and larger.

B. Location. Distribution system valves will be located at the tee or cross fitting. There will be a sufficient number of valves located such that not more than four (4) and preferably three (3) valves need to be operated to effect any one particular shutdown. The spacing of valves will be such that the length of any one shutdown does not exceed 500 feet.

Tee-intersection will be valved on the branch and one run, and a cross-intersection will be valved on both branches and one run as a minimum. Transmission water mains will have valves at not more than 2,000-foot spacing. Crossings, such as creek, railroad, and freeway crossings, will be valved on each side. The valves shall be restrained and located far enough away from the casing such that the pipe in the casing can be removed and replaced between the valves.

C. Phased Construction. Water mains installed by phased construction, which will be extended in the future, will terminate with a permanent blowoff assembly.

B 3.08 BACKFLOW PREVENTION

Backflow prevention devices will be installed to meet *Oregon Health Division Standards*.

B 3.09 FIRE HYDRANTS

A. Spacing. Hydrant spacing will be 500 feet or less in residential areas, 300 feet in commercial districts and industrial subdivisions and, in all cases, no further than 250 feet from any dwelling, business, garage, or building. Heavy industrial areas may require closer spacing of hydrants as determined by the Fire Department.

B. Location. Fire hydrant assembly will be installed on mains of eight (8)-inch inside diameter or greater. Hydrants will be located as nearly as possible to the corner of street intersections and at least 200 feet from any cul-de-sac radius point. No hydrant will be installed within five (5) feet of an existing utility pole or guy wire.

B 3.10 AIR/VACUUM RELEASE VALVES

Water lines will be designed to minimize the need for air/vacuum release valves. When required, an air/vacuum release valve will be permanently installed at high points on water mains where air can accumulate (see City of Albany *Standard Construction Specifications*).

B 3.11 SERVICE LINES

A. Sizes. The sizes of service lines that may be used are 1-inch and 2-inch copper, and 4-inch, 6-inch, 8-inch, 10-inch, and 12-inch ductile iron. Service lines will be reviewed for effects on the distribution system and, notwithstanding existing system configuration, will not be greater in size than the distribution main.

Service piping will be equal to or greater than the meter size; however, three (3)-inch meters require a four (4)-inch tap and four (4)-inch minimum piping and fittings.

B. Location:

1. Domestic: The service lines will extend from the main to the property line, with the curb stop, meter, and meter box being located at the termination of the service. In general, individual service lines will be perpendicular to the main and will terminate in front of the property served. Domestic service lines will not be connected to fire protection service lines.

2. Fire Service: The fire service line will extend perpendicular from the main to the property line with the backflow prevention assembly and vault being the termination of the service. Additional valving is required to delineate the public and private portions of the fire service lines.

C. Abandonment. Services and lines to be abandoned will be removed completely back to the line that will remain in service.

B 3.12 METERS

A. Installation:

1. For new water systems in undeveloped areas, the meters will be installed by the City through the water meter permit process as development occurs.

2. For water system reconstruction or replacement, existing meters will be removed and replaced by the contractor as directed by the City.

B. Location:

1. Three-quarter (¾)-inch through 2-inch meters will be located at the termination of the City service line. Meter boxes will be located in the sidewalk. Meters will not be located in the same vault with a backflow prevention device.

2. Three (3)-inch and larger meters will be installed in vaults and will be located in the public right-of-way to allow easy reading and maintenance without entering private property. The vault will be accessible by a crane truck to within ten feet of the installation with a ten-foot vertical clearance over the vault. Provision will be made for a minimum three (3)-foot clear space around the vault to provide ample working space for maintenance. The vault will be located such that storm water will not pond or flow into the installation.

B 3.13 MANUFACTURED HOME PARKS AND PLANNED UNIT DEVELOPMENTS (PUD)

The review of plans and the inspection of mobile home parks and planned unit developments are under the jurisdiction of the City of Albany Building Department. Private distribution systems will be designed in accordance with the Oregon Plumbing Specialty Code.

Public water mains within manufactured home parks and planned unit developments will be in exclusive easements to the City of Albany.

CITY OF ALBANY

DEPARTMENT OF PUBLIC WORKS

DIVISION C
WASTEWATER COLLECTION SYSTEM
DESIGN STANDARDS

Prepared By

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November 2005

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DIVISION C - WASTEWATER COLLECTION SYSTEM

C 1.00 GENERAL

C 1.01 PURPOSE

The purpose of this *Wastewater Collection System Design Standards* document is to provide a consistent policy under which Albany's wastewater collection system will be designed and constructed. The elements contained in this document are for both public improvements as part of City of Albany contracted projects and private projects, which design and construct new public wastewater collection infrastructure as part of private development projects.

The overall goal of the *Wastewater Collection System Design Standards* presented herein shall be as follows:

A. The system shall provide sanitary sewer infrastructure to all legal tax lots of record within the city of Albany.

B. Collection system components shall have the necessary hydraulic capacity to safely convey all design flows.

C. System shall be sufficiently deep to adequately serve the basin for which they are constructed. The use of individual sanitary sewer sump-pump systems for specific properties shall not be used unless approved by the City Engineer.

D. Collection system components shall have adequate structural strength to safely withstand all expected external design loads.

E. System shall be designed and configured to prevent infiltration and inflow of ground and surface waters.

F. System shall be designed to be economical and safe to construct.

G. System shall be designed to minimize maintenance and operational requirements.

It is important to emphasize that this document is not intended to inappropriately restrict or constrain the originality or innovativeness of the Engineer and his or her ability to exercise and apply professional judgement to each situation and project. The City recognizes that all wastewater systems have their unique characteristics and situations. It is expected that the Engineer will bring to each project the best of skills from the Engineer's respective discipline. If the Engineer anticipates challenges in meeting these Design Standards, they should contact the City prior to extensive design efforts. The City shall seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Albany and one that complies with all applicable rules and regulations.

C 1.02 REVISIONS TO THESE DESIGN STANDARDS

Revisions to these Design Standards will likely be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest version to the contemplated work.

C 1.03 SHORTENED DESIGNATION

These City of Albany *Wastewater Collection System Design Standards* shall be referred to in the text as the "*Design Standards.*"

C 1.04 APPLICABILITY

This Design Standards document shall govern all design, construction, or rehabilitation of wastewater collection systems and related facilities, both public and private, within the City of Albany. This document shall be routinely referred to as the Design Standards. Professional engineering services provided to fulfill the requirements of these Design Standards shall be in full compliance with Oregon Revised Statute 672 for professional engineers.

Complete plans and specifications for proposed sanitary sewer projects, including any necessary public dedications and easements, will be submitted to the Department of Public Works for approval. Such plans and specifications must receive City approval prior to construction permit issuance and prior to beginning of construction. Engineering documents will be prepared by a professional engineer registered and licensed in the State of Oregon.

C 1.05 REFERENCES

These Design Standards are intended to be consistent with the most current provisions of the documents and requirements as listed below. Periodic revisions to these Design Standards shall be necessary to maintain consistency in that regard. Nevertheless, all projects are expected to be consistent with the following:

A. All conveyance system components shall use engineering design criteria and concepts consistent with the most recent *Wastewater Facility Plan* adopted by the Albany City Council unless more restrictive criteria are identified herein. Where additional detailed information and background is required for a particular project, the *Wastewater Facility Plan* shall be referred and adhered to, as applicable. The most recent version of the City's sewer model (XP SWMM) shall be used to model improvement requirements.

B. Construction requirements and details shall follow the City of Albany's *Standard Construction Specifications*

C. All conveyance system components will be designed in accordance with the rules and regulations of the Oregon Department of Environmental Quality

D. Projects will adhere to Oregon Administrative Rules, Chapter 340, Division 52

E. Uniform Plumbing Code with Oregon Amendments

F. Albany Municipal Code and Ordinances

G. Projects shall be consistent with:

1. Manual of Practice, FD-5 from the Water Environment Federation
2. Applicable design guidelines published by the American Society of Civil Engineers

C 1.06 DEFINITIONS AND TERMS

The following definitions will be used and apply throughout this document:

A. As-Built Drawings: Final project drawings that have been revised by the Engineer to reflect as-built construction conditions.

B. Building Drain: The building drain is that part of the lowest piping of building's drainage system that receives the wastewater from inside the building and conveys it to the private service, which begins 5 feet outside the building's foundation wall or footing.

C. City: City shall mean the City of Albany, Oregon, and its project engineer or representative, who is authorized to make project engineering and administrative decisions on behalf of the Albany Public Works Engineering Department.

D. City Engineer: City Engineer shall mean the City Engineer of the City of Albany or her/his authorized representative.

E. Commercial User: Any user of the sanitary sewer who is neither a residential nor an industrial user. This definition is specific to these Design Standards and is not intended to be used for billing purposes.

F. Cooling Water: Water other than sewage or industrial waste that is used as a medium for carrying away excess heat and that is not co-mingled with any other liquid waste or solids carrying stream.

G. Domestic Sewage: Liquid and water borne waste derived from residential properties, free of industrial wastes, and of such character that it may be safely discharged to the collection system without the need for special prior treatment.

H. Drainage Basin: One of 11 sanitary sewer drainage basins and service areas for the City of Albany, as defined in the *Wastewater Facility Plan.*

I. Easement: Land upon which the City has obtained the right, from a private property owner or other public entity, to construct, own, and maintain the public sanitary sewer system.

J. Engineer: The Engineer, including the City's Engineer, shall be a professional engineer licensed in the State of Oregon, under whose direction the plans, profiles, details, and specifications for the project work are prepared and submitted for City review and approval.

K. Industrial User: A business establishment that uses water in a variety of chemical, manufacturing, refining, or other material processing operations, which results in wastewater that is significantly altered in strength, composition, and character from that of domestic sewage. This definition is specific to these Design Standards and is not intended to be used for billing purposes.

L. Industrial Wastewater: Wastewater from an industrial user.

M. Interceptor Sewer: Any public sanitary sewer 10-inches in diameter or greater constructed to accommodate more than one collector sanitary sewer.

N. Collector Sanitary Sewer: Any public sanitary sewer to which a private service lateral connects or may connect in the future. Collector sewers shall be 8-inches in diameter or greater.

O. Plans: Engineering design construction drawings, which depict the location, character, dimensions, and details of the collection system to be constructed or rehabilitated.

P. Private Collection System: A privately-owned and maintained sewer system installed to serve multi-unit structures, such as apartments, mobile home parks, or schools, or those private systems that will serve commercial or industrial properties.

Q. Public Sewer: Any sewer in a public right-of-way or easement operated and maintained by the City.

R. Right-of-Way (ROW): All land that by deed and conveyance and process of law is dedicated to the use of the general public for roadway purposes, and within which the City has the right to install and maintain sanitary sewers and related appurtenances.

S. Public Service Lateral: That part of each property's sanitary sewer service line which extends from the public main to the limit of the public ROW. For sanitary sewer mainlines located within easements, the limit of the public service lateral will be the edge of a sanitary sewer easement.

T. Private Service: That part of each property's sanitary sewer service line that is on private property outside of any sewer easements.

U. Sewage: Wastewater derived from human habitation and use of buildings for residential, institutional, or commercial purposes, not including storm water and industrial waste.

V. *Standard Construction Specifications*: The latest edition of the City of Albany's *Standard Construction Specifications,* which contain the construction materials and workmanship specifications and the standard details commonly used on City projects.

W. Wastewater Collection System: The wastewater collection system, also referred to as the conveyance system or the collection system, shall include all interceptors, mainlines, service laterals, force mains, pump stations, manholes, cleanouts, and related facilities, all of which are located within dedicated public ROW or easements and all of which are owned, operated, and maintained by the City of Albany. Overall, that public infrastructure maintained and operated by the City of Albany for collecting, pumping, and conveying sanitary sewage.

C 1.07 SPECIALTY ITEMS

The design of the following items is considered non-standard and unique. They are not covered in this document. Some of these items are covered in other standards-related City documents that can be provided to the Engineer upon request, as indicated below:

A. Sewage Pump Stations

B. Force Mains

C. Energy Dissipaters

D. Regulating Devices

E. Flow Measurement Devices

Whenever these special situations are encountered, the Engineer shall provide appropriate design drawings, details, and calculations for review and approval by the City Engineer.

C 2.00 – SYSTEM DESIGN AND SIZING CRITERIA

C 2.01 GENERAL DESIGN CONSIDERATIONS

Sanitary sewers shall be designed to remove the domestic sewage and industrial wastes from all residences, commercial, or industrial buildings, and all public and private establishments. All sanitary sewers shall be laid at a depth sufficient to drain private services, to protect them against damage by frost or traffic, and to drain basement sewers. Sewer systems shall be designed to accommodate all anticipated future flows from the drainage basin in which they are located. Separate pumping for individual properties shall be avoided wherever possible. Individual pumps for properties shall be under the ownership of and maintenance responsibility of the property owner.

Under no circumstance should stormwater, including street, roof, or footing drainage, be discharged into the sanitary sewer system. Similarly, unpolluted cooling waters shall not be discharged into any sanitary sewer. However, overflow drains and filter backwash lines of swimming pools and "hot tubs" shall be discharged into the sanitary sewer system.

As a condition of sewer service, all developments will be required to provide public sewers to adjacent or upstream parcels in order to provide for an orderly development of the drainage area. This shall include the extension of sewer mains, within the ROW of streets or within easements, as anticipated to meet future development needs. Property with multiple frontages will be required to extend sewer along all frontages. This requirement will include both mainline and interceptor sewers. Interceptor sewers may need to be oversized in order to provide capacity for upstream development.

Note that the presentation, layout, and general configuration of all engineering design drawings will be in conformance with Albany's drafting design criteria as discussed in Division A of these Design Standards. Engineer will prepare the project design drawings in conformance with the requirements contained therein.

C 2.02 SYSTEM SIZING REQUIREMENTS & CRITERIA

All conveyance system components will use and be consistent with the engineering design criteria and concepts presented in the most recent *Wastewater Facility Plan* and updated environmental regulations and/ or monitoring/modeling information the City has. Where additional detailed information and background is required for a particular project, the *Wastewater Facility Plan* shall be referred and adhered to. Each system will be designed to serve its respective drainage basin, as shown in the most current *Wastewater Facility Plan.* The engineer will provide a drawing of the exact area proposed to be served.

In sizing the collection system, the general design criteria to be followed is shown in Table C 2.02-A (refer also to the *Wastewater Facility Plan*). The criteria in Table C 2.02-A may be modified if more current or other relevant information is available to support the change. Population calculations used to forecast service area flows will be consistent with the Albany *Wastewater Facility Plan.* The engineer should also refer to and coordinate with the most recent version of *Albany's Comprehensive Development Plan* and the latest projected

population densities from Albany's Community Development Department, as appropriate for each project. Note that in absence of more specific project design data, the Alternative Peak-Hour Design Flow of 400 gal/cap/day may be used with concurrence of the City Engineer.

In addition to the criteria in Table C 2.02-A, all sewers will normally be designed with reserve capacity to allow for unforeseen increases in flow due to land-use changes. The engineer will be prepared to submit for review pipe sizing design calculations. These calculations will include the maximum and minimum daily flows based upon population estimates, land-use assumptions, and all other assumed factors relative to criteria listed in Table C 2.02-A. For unique or special situations, a separate study may be required to justify a proposed project or development. The study shall provide detailed information on all engineering design aspects and considerations for City review and approval.

Table C 2.02-A
Collection System Sizing Criteria

Persons per Residential Residence	2.46
Residential Average Flow	75 gal/capita/day
Commercial Flow Allowance	1,500 gal/gross-acre/day
Light Industrial Flow Allowance	1,300 gal/gross-acre/day
Heavy Industrial Flow Allowance	6,000 gal/gross-acre/day
Residential Flow Peaking Factor – serving < 500 homes	3.35
Residential Flow Peaking Factor – serving > 1200 homes	3.0
Professional/Commercial Peaking Factor	3.0
Industrial Flow Peaking Factor	Project specific
Initial Minimum Flow Factor	Project specific
Ultimate Minimum Flow Factor	Project specific
Service Area Infiltration/Inflow Allowance	3500 gal/gross-acre/day
Alternative Peak-Hour Design Flow	400 gal/cap/day

Regardless of the size of the area being served, the standard minimum pipeline diameter for all mainline sanitary sewers will be 8 inches. All pipelines will be designed to be self-cleansing with a minimum pipeline velocity of 2.0 ft./sec. when flowing either full or half full. Proposed sewers that are larger than required, but which are solely recommended in order to meet grade requirements, are not allowed. Surcharging will also not be designed into the conveyance system.

For special situations, a 6-inch diameter sewer may be approved if the total length of the line is less than 200 feet and if it has no possibility of being extended. Public service laterals to individual residential properties will be 4 inches in diameter.

C 2.03 HORIZONTAL ALIGNMENT & CONFIGURATION

A. Location within Public Streets. All sanitary sewer shall be located at the centerline of public streets. If alternative locations or skewed alignments are proposed, these locations and alignments must be approved by the City Engineer. All changes in horizontal alignment of the sanitary sewer will be accomplished through the use of manholes. Between manholes, sewers will be laid on a straight and true alignment without horizontal curves or pipe slope deviations.

B. Proximity to Water Lines and Water Wells. A 10-foot horizontal separation between any sanitary sewer and an adjacent water line shall be provided at all times. This applies regardless of whether the sewer is below or above the adjacent water line. Parallel water and sewer lines in the same trench will not be allowed. Wherever a water line and sanitary sewer must cross, the crossing angle shall be approximately 90 degrees. All requirements of OAR Chapter 333 will be strictly adhered to.

All sewer lines shall also be at least 50 horizontal feet from any potable water source well, unless express approval of the Oregon State Health Division is obtained. Where this requirement is waived, pressure sanitary sewer piping shall be used to protect the potable water source.

The City may require greater than 10 feet of separation between sewer and water lines. This might be the case when the relative depth between the water and sewer line exceeds 10 feet; or if the sewer line has a diameter greater than 2 feet. In these and other similar situations, increased separation between the lines may be needed to protect the water line and insure a stable utility trench if the sewer must be excavated for maintenance needs.

C. Flood Plain Location and Stream Crossings. Manholes shall not be located within established 100-year flood plains without permission of the City Engineer. Sewers located along streams shall be located outside of the streambed and shall be sufficiently removed from the streambed to accommodate possible future stream widening or riparian improvements.

If crossing of streams and watercourses is required, the crossing shall be as nearly perpendicular to the stream as practical. Pipe cover at the crossing shall be a minimum of 36 inches. Appropriate protection will be required over the top of the pipe for protection from water erosion and channel excavation. Trench dams shall be used on either side of the crossing to prevent migration of stream water along trench lines. The entire crossing shall also satisfy the requirements and provisions of a permit issued by the Oregon Division of State Lands and other permitting agencies when applicable.

If an inverted siphon is to be installed, it shall be designed per the most recent Water Environment Federation guidelines. In general, dual pipelines shall be used, based on maintaining a minimum velocity in each line of 3.0 ft/sec. Control manholes are required at each end of the siphons such that either pipeline can be taken out of service under average flow conditions.

D. Railroad Crossings. Wherever a sanitary sewer crosses underneath a railroad, the piping shall be installed within a steel pipe casing per Albany's *Standard Construction Specifications*. The casing shall extend to the limits of the railroad ROW, plus an additional horizontal distance on each end of the casing equal to approximately the casing depth at the ROW limits. Casing design shall be based on all applicable and anticipated dead and live loads, based on the requirements of the railroad involved.

C 2.04 VERTICAL ALIGNMENT AND CONFIGURATION

A. General Requirements. All sewers shall be laid on a consistent and uniform grade. Changes in piping size and grade shall only occur at manholes. The minimum grade for all pipelines will be one that results in a minimum flow velocity of 2.0 ft./sec. when the pipe is flowing full or half-full. This slope shall be based on calculations using the Manning pipe friction formula with a coefficient of n=0.013. In all cases, the minimum slope for all pipelines will be as shown in Table C 2.04-A. The slopes of lines will typically be calculated based on the average depth at the center of each manhole.

Table C 2.04-A
Minimum Collection System Slopes

Pipe Diameter (Inches)	Grade (Feet per 100 Feet)
8	0.40
10	0.28
12	0.22
15 and larger	0.20
18	0.20
21 and larger	0.20

Note that new PVC sewers likely have a manufacturer's "n" value of about 0.009. However, regardless of pipe material, sand, grit, and slime buildup on pipe walls. This results in true "n" values over time of about 0.013. As a consequence, a Manning coefficient of 0.013 shall be used for design

of PVC piping systems. This same value shall also be used for concrete piping. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an "n" value of 0.013, whichever is greater.

B. Maximum Grade. The maximum grade for sanitary sewers shall generally be limited such that pipeline velocities when flowing full do not exceed 15 ft/sec. Outside drop manholes with flatter pipe slopes should be used in steep slope locations.

C. End of Line Segments. For the last piping segment at the upstream-end of collection system areas, the slope of the piping shall be steepened as much as reasonable and practical. The greater pipe slope shall help achieve better cleansing velocities due to the relatively low flow at these locations. Engineer will strive for minimum velocities of 2.5 – 3.0 ft./sec. in these reaches of the collection system.

Conversely, where piping shall be extended in the future, the proposed design may need to use flatter pipeline slopes than those that would only serve the present project. This would be the situation where available elevation must be preserved in order to extend future service to upstream properties. Engineer will review the upstream service areas' elevational needs, and will adjust the sewer grades as necessary to insure future service can be adequately provided and extended as required.

D. Minimum Pipe Depths. At all locations, sewer main lines shall be at a depth of 4.5 feet or greater below the finish grade elevation. Minimum pipe depth shall be measured between the finished surface grade at the center line of the sewer and the top of sewer pipe. Sewers at depths less than this create problems with water line crossings, lateral tee orientation, service to properties with deep lot depths, and proper cover over the pipe per manufacture's recommendations. Fill may be required on development sites to maintain adequate cover over sewer lines.

E. Proximity to Water Lines. At all locations, sewer lines must be at least 18 inches or more below the water line. If less separation is required, ductile iron or AWWA C-900 pressure pipe shall be used, positioned so that a full pipe section is centered under the water line. Any sanitary sewer piping installed under this criteria shall be pressure tested at a minimum of 15 psig for gravity flow, or at higher pressures as required and as applicable for the specific force main involved.

C 2.05 PIPELINE MATERIALS

All piping shall have sufficient structural strength to withstand all external dead and live loads, which can be reasonably anticipated. Piping shall be corrosion and erosion resistant with a minimum life expectancy of 75 years and meet the material requirements in the Albany *Standard Construction Specifications*.

All sanitary sewer piping shall have flexible, watertight gaskets, and piping that is as specified in Albany's *Standard Construction Specifications*. To prevent extraneous infiltration into the collection system, gasketed watertight plugs shall be provided at the ends of all pipelines, at manhole pipe stubs, and at any and all capped lateral fittings.

C 2.06 MANHOLES & ACCESSORIES

A. Locations & Requirements. Manholes shall be provided at all of the following locations and shall meet the requirements indicated:

1. At all changes in horizontal alignment, vertical grade, and pipe sizes.
2. All sanitary sewer-piping connections to manholes shall be made with watertight, flexible manhole/pipe rubber connectors.
3. Spacing between manholes shall not exceed 450 feet. Deviation from this standard will be considered based on whether or not flushing, cleaning, and TV inspection equipment can adequately service the proposed spacing.
4. Manholes shall be placed at the upstream end of each mainline.
5. Manholes shall not be placed in curbs or gutters or behind curbs.

6. Provide two manholes for locations where the horizontal angle between the outgoing sanitary sewer and the incoming line will be less than 75 degrees. This is intended to prevent wastewater from discharging into the oncoming flow of an opposing sewer.

7. All non-standard locations will need to be reviewed and approved by the City on a case-by-case basis.

All manholes shall have a minimum diameter of 48 inches and shall be in compliance with Albany's *Standard Construction Specifications*. For pipelines 36 inches in diameter or less, the manhole opening shall have a nominal 24-inch diameter.

B. Hydraulic Design. Manholes will typically be provided with a 0.1-foot hydraulic drop through the manhole whenever the inlet and outlet piping are in a relatively straight in-out configuration, having about 180 degrees of separation between the lines. Where the inlet and outlet piping form approximately a 90-degree angle, a 0.2-foot drop shall be provided. The maximum hydraulic drop through a manhole will be limited to current DEQ requirements. New piping, which is to be connected to existing manholes, shall generally adhere to these same hydraulic considerations. Existing concrete channels within the manhole shall be modified accordingly.

For incoming and outgoing sewers of different sizes, either the pipe crowns or their respective 0.8-diameter elevations shall be matched. Manhole channels shall meet the requirements of the Albany *Standard Construction Specifications*.

C. Interior and Exterior Drop Manholes. Under normal circumstances, the maximum vertical drop through a manhole will be limited to current DEQ requirements. Appropriate concrete channelization shall be provided in the manhole.

Exterior drop manholes shall be constructed in accordance with Albany's *Standard Construction Specifications* whenever more than 2 feet of vertical separation exists between the inlet and outlet piping. Outside drop assemblies shall only be used for pipelines 12 inches in diameter and smaller. Larger pipelines shall be introduced into the manhole at the manhole invert. Overall, drop manholes will only be allowed in cases of significant elevation differences between incoming and outgoing lines, or when special conditions exist such as a conflict with existing facilities or utilities that cannot be resolved.

D. Manhole Access. For ease of maintenance and inspection, all manholes shall be installed within the ROW of paved public streets. If a manhole must be located outside of the public street ROW, access to the manhole shall be provided by means of an easement having a width consistent with Division A of these Design Standards. The easement shall be complete with an all-weather driveable surface from the adjacent public street to the manhole. The driveable surface shall extend to a point at least 5-feet beyond the manhole for equipment access.

For manholes located in unimproved areas, they shall have their lids positioned approximately one foot above the surrounding grade.

E. Manhole Connections and Future Extensions. For manholes located at the ends of lines and for which future extensions will be required, provisions shall be made to facilitate the future work. If the alignment and grade of the future piping is well established, and the piping is expected to be constructed in the foreseeable future, a 1.5-foot long pipe stub with a removable watertight plug shall be provided consistent with the future alignment. The manhole base shall be channelized accordingly.

If the future connection is not imminent and its alignment is uncertain, then the pipe stub can be omitted.

F. Special Manhole Covers. For all manholes located in backyards, side lots, or are otherwise substantially outside of the traveled ROW, the City may require tamperproof, locking lids. For public lines in easements within parking lots or other similar traveled areas, locking lids will generally not be required. In all areas prone to ponding, flooding, or along stream corridors, and in all areas below the

100-year flood plain, waterproof covers shall be installed. These types of manhole locations should be avoided whenever feasible and practical.

Where internal system overflows may occur and covers are intended to prevent such overflows, the manhole cone and cover shall be provided with vent piping. The manhole and cover shall be designed to resist the resulting hydrostatic forces. Vent piping configuration and cover restraint shall be approved by the City.

G. Cleanouts. Temporary cleanouts on sewer mains may be installed within the public ROW at the end of a stub-street, which is expected to be extended during the next phase of construction or within the foreseeable future, and where the design of the system does not warrant that a manhole be constructed at this location. All cleanout standpipes shall be 8 inches in size. Installation of permanent cleanouts will be considered on a case-by-case basis.

C 2.07 SERVICE LATERALS

A. General Requirements. All public service laterals shall extend from the sanitary sewer mainline to the private property line. The entire length of the lateral shall be within the public ROW. Each property shall have its own, separate lateral.

Each property shall have its own private sanitary sewer service lateral from the public ROW or easement to the building being served. This private piping shall be of the same quality as the rest of the public lateral with respect to materials and water-tightness. In addition, service laterals shall conform to the State and local plumbing codes and restrictions. No roof runoff, foundation drain, or stormwater line of any kind shall be connected to service laterals.

Laterals, which serve individual single-family residences or equivalent dwellings, shall be 4 inches in diameter. Multi-family dwellings or commercial buildings shall have 6-inch laterals.

B. Alignment and Grade. All public service laterals within the ROW shall be oriented perpendicularly to the mainline without intermediate horizontal bends between the mainline and the private property. Within cul-de-sacs, or in other areas where irregular tax lot configurations exist, a mainline 60-degree wye connection may be used, with straight piping thereafter to the private property line. In all situations where the public service lateral is not perpendicular to the sewer main, a continuous tracer wire shall be installed from the main to the clean-out of the service lateral at the ROW.

Public service laterals shall be sloped from the main at a slope varying from 2 to 45 percent. At the ROW, service lines shall be sufficiently deep such that they can be extended at a minimum slope of 2 percent to the structure. Depth of public service laterals at the ROW shall be 4 to 6 feet below street gutters. In areas where sewer depth is a challenge, a minimum depth at street gutter line of 3.5 feet will be accepted. For deep sanitary sewers, the riser pipe at the main may be installed at an angle varying from 45 degrees to 80 degrees, with the lateral slope flattened out thereafter in order to meet the overall grade requirements.

No 4-inch or 6-inch service lateral from adjacent private property will be allowed to be connected directly to a manhole.

C. Other Requirements. The following additional requirements apply to public service laterals:

1. For existing homes without sanitary sewer service or for vacant lots, new public service laterals shall be provided as part of new development projects or other street rehabilitation/utility projects.
2. The length of service laterals shall generally be limited to 100 feet. Where one or more service laterals will exceed 100 feet in length in order to serve the adjacent private property, a public main and manhole may be required, located in an easement, as determined by the City.
3. All service laterals shall be provided with a two-way cleanout at the private property line in accordance with Albany's *Standard Construction Specifications*. The cleanout shall be located within the sidewalk.

4. Backwater check valves and isolation gate valves are required for all homes where potential flooding exists if the public sanitary sewer system were to backup. These valves shall be private valves installed as part of the private service piping.

C 2.08 PRIVATE COLLECTION SYSTEMS

Typically, as indicated in Albany's Development Code, sanitary sewer mainlines that are proposed to extend 100 feet or more onto private property, shall be public lines. However, the City may approve these as private collection systems on a case-by-case basis. Systems for manufactured home parks, apartment complexes, or commercial and industrial complexes may qualify. Where approved, private systems shall be designed and constructed in accordance with the same City Standards used for the public system. The minimum size of sanitary sewer lines within a private system shall be 6 inches.

All private systems shall connect to the public system at a standard manhole within the public ROW or easement. Immediately upstream of the connecting manhole at the property line, a separate manhole will typically be required. The manhole shall meet the requirements of the City Engineer.

CITY OF ALBANY

DEPARTMENT OF PUBLIC WORKS

DIVISION D
STREET AND ALLEY
DESIGN STANDARDS

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DIVISION D - STREET AND ALLEY

D 1.00 - GENERAL

D 1.01 PURPOSE

The purpose of these *Street and Alley Design Standards* is to provide a consistent policy under which certain physical aspects of street and alley design will be implemented. Most of the elements contained in this document are Public Works oriented. The intent is that these Design Standards apply to both City-initiated projects as well as private development of public infrastructure.

These Design Standards cannot provide for all situations. They are intended to assist but not to serve as a substitute for competent work by design professionals. Engineers are expected to bring the best of skills from their respective disciplines to each project. If the Engineer anticipates challenges in meeting these Design Standards, they should contact the City prior to extensive design efforts.

These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged, however, on the likelihood that such variance will produce a long-term compensating or comparable result, in every way adequate for the user and resident.

Note that the presentation, layout, and general configuration of all engineering design drawings shall be in conformance with Albany's drafting design criteria as outlined in Division A of these Design Standards. Engineer shall prepare the project design drawings in conformance with the requirements contained therein.

These Design Standards have the objective of developing a street system that will:

A. Be consistent with the *Albany Municipal Code* (AMC), *Albany Development Code*, Albany's *Standard Construction Specifications,* and all applicable state and federal regulations and requirements;

B. Be of adequate design to safely manage the volumes of vehicles anticipated using the improvements;

C. Provide points of connection for streets by adjacent future development;

D. Prevent the capacity of transportation facilities from being exceeded;

E. Provide transportation improvements that meet the long-term needs for quality streets;

F. Maintain or improve overall transportation quality;

G. Be designed in a manner to allow economical future maintenance; and

H. Be designed using materials to insure a minimum practical design life of 20 years.

D 1.02 SHORTENED DESIGNATION

These City of Albany *Street and Alley Design Standards* shall be cited routinely in the text as the "Design Standards."

D 1.03 APPLICABILITY

These Design Standards shall govern all construction and upgrading of all public street and alley improvements in the City of Albany and applicable work within its service areas.

Street improvements shall be provided for all property improvements within the City of Albany per these Design Standards for the following types of development:

A. All partitions and subdivisions.

B. Construction or reconstruction of public roadways and temporary detours.

D 1.04 REFERENCES

The Design Standards are intended to be consistent with the most currently adopted provisions of all street-related guidelines including, but not limited to:

A. Albany's Transportation System Plan

B. *Oregon Statewide Planning Goals and Guidelines*

C. *Albany Municipal Code* (AMC)

D. *Albany Comprehensive Plan*

E. *Albany Development Code* (ADC)

F. Albany's Facility Plans

D 1.05 STANDARD CONSTRUCTION SPECIFICATIONS

Except where the Design Standards provide otherwise, design detail, workmanship and materials shall be in accordance with the current edition of the *Standard Construction Specifications* prepared by the City of Albany.

D 1.06 DEFINITIONS AND TERMS

A. Definition of Words. Wherever in these Design Standards the words directed, required, permitted, ordered, designated, or words of like importance are used, they shall be understood to mean the direction, requirement, permission, or order of designation of the City Engineer. Similarly, the words approved, acceptable, satisfactory, shall mean approved by, acceptable to, or satisfactory to the City Engineer.

B. ODOT. The Oregon Department of Transportation

C. City. The City of Albany, Oregon.

D. City Engineer. This means the City Engineer of the City of Albany or his/her authorized representative.

E. Roadway: That portion of the right-of-way used, or to be used, for vehicle movement, which exists between the curbs or proposed curb lines.

F. MUTCD: The Manual of Uniform Traffic Control Devices as published by the Federal Highway Administration.

G. Owner. Any individual, partnership, firm, or corporation by whom the design engineer has been retained or who, as a property owner, is making arrangements with the City.

H. Plans. Construction plans, including system site plans, storm drain plans and profiles, cross sections, detailed drawings, etc., or reproductions thereof, approved or to be approved by the City Engineer, which show the location, character, dimensions, and details for the work to be done, in which constitute a supplement to these Design Standards.

I. Design Engineer. The developer's consulting engineer, including the City's engineer, licensed by the State of Oregon as a Civil Engineer under whose direction plans, profiles, and details for the work are prepared and submitted to the City for review and approval.

J. Right-of-Way. All land or interest therein that by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public within which the City shall have the right to install and maintain streets and other public infrastructure.

D 1.07 APPROVAL OF ALTERNATE MATERIALS OR METHODS

Any alternate material or method not explicitly approved herein will be considered for approval on the basis of the objectives set forth in D 1.01 PURPOSE. Persons seeking such approvals shall make application in writing. Approval of any major deviation from these Design Standards will (normally) be in written form. Approval of minor matters will be made in writing if requested.

Any alternate must meet or exceed the minimum requirements set in these Design Standards.

The written application is to include, but is not limited to, the manufacturer's specifications and testing results, design drawings, calculations, and other pertinent information.

Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

D 2.00 - NEW STREET DESIGN

D 2.01 GENERAL REQUIREMENTS

All designs shall conform to City of Albany's *Transportation System Plan* (TSP), *Development Code*, Site Plan Review Notice of Decision, Fire Department requirements, *Standard Construction Specifications*, *Manual of Uniform Traffic Control Devices* (MUTCD), and all other applicable laws and regulations.

D 2.02 DESIGN SPEEDS

Design considerations for all street geometrics shall be based on the minimum design speeds shown below for each street classification. Variance from these design speeds may be required based upon topography or other considerations. Variance from these design speeds must be approved by the City Engineer. A consultation with the City may be beneficial before design is initiated.

Local Residential	20 mph
Local Non-Residential	25 mph
Collector	Determined by the City Engineer
Arterial	Determined by the City Engineer

D 2.03 STREET TERMINATION

Streets that will not be extended in the future must terminate with a cul-de-sac or hammerhead. Street terminations shall meet current Development Code requirements.

A. Cul-de-sac: The standard residential cul-de-sac shall have a minimum 36-foot radius to the face of curb.

B. Hammerhead: For "mini subdivisions," the City Engineer may allow the use of a hammerhead turn-around as described in the Development Code. The hammerhead shall consist of two rectangular turnouts directly opposite each other and oriented perpendicular to the street centerline.

A street that will be extended in the future may be terminated with proper signing and installation of Type III barricades as required in the MUTCD. Dead-end streets over 150-feet long are required to end with a temporary cul-de-sac or hammerhead turn-around for emergency vehicles until the street extension occurs. In addition a sign reading "THIS STREET WILL BE EXTENDED IN THE FUTURE" will be mounted at the end of the street.

D 2.04 HORIZONTAL DESIGN

The horizontal design of streets shall produce a safe street network while also considering the need for creating livable neighborhoods. Consideration should be given to minimizing long tangent sections and other elements that might induce high speeds or other problems that might require traffic calming

mitigation in the future. Traffic calming measures shall be considered in the design of new streets and should be incorporated as required by the City Engineer.

Sharp horizontal curvature should not be introduced at or near the top of a pronounced crest vertical curve. Similarly, sharp horizontal curvature shall not be introduced at or near the low point of a pronounced sag vertical curve.

A. Minimum Curb Radii Required at Intersections. The minimum curb radii required at intersections shall be as shown below in Table D 2.04-A.

Table D 2.04-A Minimum Curb Radii Required at Intersections

Intersection	Curb Radius
Residential – Residential	15 feet
Residential – Collector or Arterial	20 feet
Collector – Collector or Arterial	30 feet
Arterial – Arterial	30 feet

B. Taper and Transitions Rates: Use the criteria listed below to determine the **minimum** taper length to increase lane width, create a new lane, or transition traffic lanes laterally. The City Engineer may require a longer taper length. Tapers in chicanes or other traffic calming improvements may be shorter in order to meet traffic calming goals.

Table D 2.04-B Taper Length Criteria

Type of Taper	40 mph or less	45 mph or greater
Merging Taper	$\frac{WS^2}{60}$	WS
Shifting Taper	$\frac{WS^2}{120}$	$\frac{WS}{2}$

W = Width of offset in feet
S = Posted speed limit or anticipated speed in mph

C. Partial Street Improvements: Designs for partial street improvements shall consider the entire future street improvement so that related facilities, grades, slopes, utility stub-outs, future curb inlets, future service lines, potential conflicts, and other issues will be identified. The partial street shall be designed so that future completion of the street and related facilities can be easily coordinated with the initial partial street improvement and minimize damage to the street structure. Construction plans shall clearly show the paving limits for the partial street and identify all items that are to be constructed by others in the future.

D. Sidewalks and Driveways: Dimensions and spacing of sidewalks, sidewalk ramps, and driveway approaches will be within the parameters of the Development Code, the *Standard Construction Specifications,* and the Americans with Disabilities Act (ADA). Show sidewalk ramps on the plans at each intersection curb return and other required locations to verify adequate landing and passage area. Identify sidewalk obstructions on the plans and verify adequate clear space for passage.

1. Setback Sidewalk: The standard configuration for new sidewalk construction is setback, with the sidewalk and landscape strip width as required in the Development Code.
2. Curbside Sidewalk: A curbside sidewalk may be used only when the setback configuration is not feasible and is approved by the City Engineer.

3. Driveway Approaches: All driveway approaches to be constructed shall be shown on the plans to verify that the design meets minimum ADA requirements. Design elements to be considered are adequate clear space for passage behind the approach ramp and/or proper slope of the depressed curb transition with curbside sidewalk. Commercial driveways with a standard curb return shall not be used without prior approval of the City Engineer.

E. Cut and Fill Slopes: Catch points for cut and fill shall be shown on the plans so that slope limits outside the right-of-way are identified. The plans shall show the direction of natural drainage and address the routing of runoff to prevent erosion of newly constructed slopes or blockage of the natural drainage.

The plans shall show existing slope easements, along with proposed slope easements and temporary construction access agreements that must be acquired to facilitate construction. All easement dimensions shall be shown on the plans.

F. Streetscape and Utility Appurtenances: Show all public and private items that currently exist or will be placed in the right-of-way that will impact the sidewalk and/or the landscape strip. Such items include but are not limited to fire hydrants, street lights, bus shelters, street signs, street trees, mail boxes, poles, vaults, and various utility appurtenances. Identify obstructions that would encroach into sidewalks and verify a minimum 4-foot width of clear space for passage exists or show how the impact will be mitigated.

D 2.05 VERTICAL DESIGN

The minimum street grade is 0.5 percent, and the maximum street grade shall not exceed 6 percent on arterial streets, 10 percent on collector streets, and 12 percent on local residential streets. Beginning, ending, centerline-centerline intersections, and sharp grade breaks not exceeding a total of 1 percent will be identified on the profile with street stations and elevations. Grade breaks over 1 percent shall utilize a vertical curve. The maximum superelevation rate permitted shall be 4 percent on residential and collector streets, and 6 percent on arterial streets.

These requirements are for standard conditions anticipated within the city. Areas in which topography may dictate, the City Engineer will entertain variance from these Design Standards.

Length of Vertical Curve: Vertical curves shall be parabolic and of a minimum length computed from the formula: $L = KA$

L = Length of vertical curve in feet
K = Design constant (rate of vertical curvature)
A = Algebraic difference in grades in percent

Selection of K values for crest vertical curves are based on sight distance requirements, and for sag vertical curves on headlight sight distance. K is a constant for each design speed and the values to be used are listed in the table below:

Table D 2.05-A K Values for Vertical Curve

Design Speed	K Values			
Mph	Crest Vertical Curve		Sag Vertical Curve	
	Minimum	Desirable	Minimum	Desirable
20	10		20	
25	20		30	
30	30	30	40	40
35	40	50	50	50
40	60	80	60	70
45	80	120	70	90

A. Curb and Gutter Grades: The minimum gutter grade, including curb returns, shall be 0.5 percent. All curb return data shall be summarized in a table on the plan sheet. The table shall show the total length of the return, delta angle, curb radius distance, and elevations of the beginning, ¼ delta, ½ delta, ¾ delta, and end of the return.

B. Partial Street Improvements: If the curb and gutter on the side of the street not being constructed is anticipated to be at different grade than the curb and gutter that will be constructed, the construction plans will clearly show the future curb and identify all items that are to be constructed by others in the future.

The profile view will include the bottom of the ditch or swale constructed on the side without curb and gutter, and shall show all culverts, drain pipes, drainage inlets, and drainage outlets.

C. Cut and Fill Slopes: The catch points for cut and fill slopes shall be shown on the plan. The design shall address the collection of natural drainage and routing of runoff to prevent erosion of newly constructed slopes or blockage of the natural drainage.

D. Utility Appurtenances: The profile will show all utility appurtenances such as manholes, curb inlets, culverts, and drainage inlets and outlets. Each item shall be labeled with the station and the finish grade elevation for the rim, top of curb, and all inverts. Pipelines along the street shall be shown in profile as well as the cross section of pipes that cross the construction area.

D 3.00 – ALLEY DESIGN

D 3.01 GENERAL REQUIREMENTS

All alleys shall be constructed of Portland Cement Concrete (PCC) with an inverted crown to collect drainage at centerline. The minimum pavement structure shall be 8 inches of PCC over 2 inches of base rock, placed over geotextile fabric. For alleys subject to industrial or special loading considerations, or if required by the City Engineer, a structural pavement design will be calculated to determine if additional PCC thickness is required for the anticipated loading.

Show all private improvements that will be impacted including garages or other structures, stairs, vaults, fences, walls, driveways, parking lots, walkways, or other items. Indicate existing drainage patterns and show private drainage inlets, outlets, and pipes beyond the alley right-of-way that will be impacted by the alley construction.

E. Joint Pattern: The PCC pavement shall be placed full width in one pour, with no longitudinal joints. The alley design shall include a transverse joint pattern, shown on the plans, so that the joints are spaced to create panel lengths that are 0.75 to 1.25 times the alley width. The joint pattern will be coordinated to intersect with utility features such as poles, manholes, and catch basins. At catch basins, a transverse joint shall be placed at each end of the catch basin to control cracking at the corners of the frame.

F. Alley Approaches: Alley approaches shall be constructed as commercial driveways in all respects, except that the structural section will be increased to 10 inches or match the alley pavement structure for which it provides access, whichever is greater. Alley approaches with a standard curb return shall not be used without prior approval of the City Engineer.

D 4.00 – STRUCTURAL PAVEMENT DESIGN

Standard pavement structures for Asphalt Concrete (AC) and Portland Cement Concrete (PCC) pavements are defined in the City of Albany *Standard Construction Specifications*. It is the City's policy to only allow PCC pavements in new subdivisions with all new utilities installed prior to street construction. Design requirements and procedures are summarized in the appropriate sections below.

D 4.01 GENERAL REQUIREMENTS

The City has a standard structural section for local streets. Collector and arterial streets shall undergo a full structural section design.

Design inputs shall consider soil characteristics, traffic loading data, and structural strength coefficients of the pavement materials. The PCC structural pavement design shall apply to both street and alley pavements. The City Engineer may require a structural pavement design to be generated when it is suspected that unsuitable soil conditions, high percentage of trucks, or any other condition may require the pavement structure to be increased.

The design shall be based on a geotechnical investigation to determine soil characteristics, structural strength coefficients for the soil, and traffic loading data approved by the City. The design will be submitted for review with all supporting documentation and calculations for the structural design of the pavement. Any modification to the standard minimum pavement structure must be approved by the City Engineer.

D 4.02 SOIL CHARACTERISTICS

The structural characteristics of the soils underlying the proposed street will be assumed as fair, or may be specifically established by a geotechnical engineer. The classification of soil and corresponding ability to support the proposed street structure and anticipated loading is common to both AC and PCC pavement designs.

The structural characteristics for treated or reprocessed materials used in the pavement design shall be established by a geotechnical engineer and documented in the design calculations provided by the design engineer.

A. Native Materials: If a geotechnical study is not undertaken, the native material classification shall be assumed to be fair. A soil classified as fair is typified as having values for the resilient modulus (M_R) of 5,000 psi or other equivalent designation. For designs that assume fair soils, this value will be used.

B. Subgrade Stabilization: Any part of the subgrade that is found to be inadequate will be stabilized to establish a new subgrade structure equivalent to the native subgrade under dry summer conditions. Rock used to replace all or a portion of the subgrade shall not be used to reduce the pavement thickness.

C. Existing Street Structure: Whenever a street is to be constructed to a new grade or alignment such that the new street section is built over an existing street structure, any existing pavements shall be broken up and removed.

D 4.03 TRAFFIC DATA

Traffic loading data for the pavement design shall be determined for all arterial, collector, and non-residential local streets using current and 20-year future traffic volumes. The data will include a vehicle classification breakdown for passenger cars, buses, and 2, 3, 4, and 5-axle trucks. The volumes shall be provided in the form of Average Daily Traffic (ADT) so that loading factors can be determined by converting to standard 18,000 pound equivalent axle loads (EAL) for each vehicle class, and summing to determine the total traffic load.

Traffic data shall be submitted by a licensed engineer for the City's approval, or may be provided by the City if data is available. Traffic data from the City is limited to information that is readily available from existing traffic counts or based on the City of Albany's *Transportation System Plan.*

D 4.04 ASPHALT CONCRETE (AC)

Design of the AC pavement structural section shall follow the latest edition of Asphalt Pavement Association of Oregon (APAO) *Asphalt Pavement Design Guide.* All pavement structures shall be based on a 20-year design traffic-loading period with 90 percent reliability.

A. Minimum Structure: The minimum structural section for a new or reconstructed local street shall consist of 12 inches of 100% fractured face crushed aggregate base placed on a geotextile subgrade fabric, and 5 inches of AC pavement. The pavement will consist of a 3-inch base lift of B-mix AC, and a 2-inch surface lift of C-mix AC. The maximum thickness for any lift of AC will be 3 inches.

For collector streets, the minimum AC thickness shall be increased to 7 inches, consisting of a 2-inch and a 3-inch lift of B-mix AC and a 2-inch surface lift of C-mix AC. For arterial streets, the minimum AC thickness shall be increased to 8 inches, consisting of two 3-inch lifts of B-mix AC and a 2-inch surface lift of C-mix AC.

These minimum structures can be modified if the engineer performs a full structural design calculation that is acceptable to the City Engineer. The thickness of the crushed aggregate base will not exceed 12 inches.

The above structural layer coefficients assume that construction will take place during dry summer conditions. If construction takes place outside of dry summer conditions, measures will be taken to stabilize all poor performing subgrade soils.

B. Structural Strength Coefficients: When calculating the structural strength of each layer of the pavement structure, use the following values:

0.42 per inch for hot mix AC
0.06 per inch for clean, crushed aggregate base

The minimum structural section for a local street has a Structural Number (SN) of 2.8, determined as follows:

$$SN = (0.06)(12 \text{ inches}) + (0.42)(5 \text{ inches}) = 2.82$$

If the required SN is greater than 2.8, the design engineer will increase the thickness of the AC in increments of 0.5-inch. The City Engineer must approve alternate structural materials and their strength coefficients for use.

Geotextile fabric protects the crushed aggregate base from contamination with soil particles, preserving the structural integrity of the aggregate during the service life of the pavement. The geotextile fabric has no strength coefficient for purposes of determining the pavement structure.

C. Structural Overlay: A structural overlay may be considered to extend the useful life of the existing pavement structure by increasing the composite pavement Structural Number. The total structural number required for traffic loading during the design period shall be determined as described above.

Overlays shall not be feathered to match existing street pavement surfaces at paving limit lines. Taper grinding, butt grinding, or removal and reconstruction of the existing pavement will be required so the finished overlay surface will match the existing gutter or pavement grade.

1. Existing Structure: The Structural Number of the existing pavement structure may be determined by non-destructive testing, sample pits, or both. All testing methods must be approved by the City Engineer prior to performing the tests.

   When taper or butt grinding are employed in the design, the Structural Number of the existing pavement at those locations will be determined for the pavement thickness remaining after grinding.

2. Overlay Thickness: The required overlay thickness is determined by calculating the additional AC layer necessary to meet the value of the desired Structural Number. The minimum nominal overlay thickness will be 2 inches, and at no point will the overlay thickness be less than 2-inches thick.

3. Paving Fabric: An approved paving fabric will be placed over the existing pavement immediately prior to the overlay, with the edge of the roll no more than 6 inches from the gutter or paving limit line. Required crack filling to support the fabric, and the fabric installation, shall be according to the manufacturer's recommendations. At no point will the pavement thickness over the fabric be less than 2 inches. The purpose of incorporating paving fabric is to create a waterproof membrane within the pavement structure to further protect the structure from water intrusion. While paving fabric may delay reflective cracking, it is not presumed to prevent it.

4. Limitations: The street must be evaluated for limiting factors that would make an overlay undesirable. The maximum cross slope after the overlay is placed must be determined and may not exceed 6 percent without approval of the City Engineer. Check driveway approach grades to verify that vehicles will not scrape and that vehicles pulling trailers will reasonably be able to access the driveways without scraping or dragging.

D 4.05 PORTLAND CEMENT CONCRETE (PCC)

Design of the PCC pavement structural section shall follow the Portland Cement Association (PCA) or American Concrete Pavement Association (ACPA) design guides. The design will have a 90 percent statistical reliability of adequately supporting the design traffic loading without requiring any major maintenance or repair.

A. Minimum Structure: The minimum slab thickness shall be 8 inches for residential streets, 9 inches for collector streets, and ten inches for arterial streets. A leveling course of no less than 2 inches of crushed aggregate base shall be placed under all concrete street sections.

B. Joints: A typical joint pattern shall be specified and shown on the plans, so that the joints are spaced to create panel length to width ratios that are 1.00 to 1.35.

5. Transverse Joints: The transverse joint pattern shall be slightly skewed in relation to the direction of traffic and be coordinated to match with all curb joints. The spacing of transverse joints will generally not be greater than 15 feet.

6. Longitudinal Joints: A longitudinal joint shall be sawcut along the street centerline. Supplemental longitudinal joints shall be specified if the resulting half-street panel width exceeds 18 feet.

D 5.00 – STRIPING AND PAVEMENT MARKING PLANS

A striping plan shall be provided for review and approval by the City Engineer prior to the application of any permanent pavement markings. All striping and pavement marking design shall comply with the standards contained in the current version of the *Manual on Uniform Traffic Control Devices*.

D 5.01 STRIPING MATERIALS

Permanent striping for new and re-constructed streets shall consist of hot inlay tape unless otherwise approved by the City Engineer. These materials are rolls or pre-cut sheets that are placed on the fresh AC mat during the final compaction process. The City Engineer may approve the use of thermally fused markings or paint for striping on existing asphalt or concrete street surfaces.

A. Hot Inlay Tape: Hot inlay materials shall be as described in the *Standard Construction Specifications*.

B. Thermally Fused Markings: Thermally fused marking material shall be Premark manufactured by Flint Trading Company or an approved equal.

C. Paint: Painted pavement markings shall consist of a minimum of two coats of paint that conforms to the current Oregon State Highway Division's *Standard Specifications for White and Yellow Traffic Line Bead Binder Paint*.

D. Raised Pavement Markers: Raised pavement markers shall be reflectorized and match the color of the strip they are complementing. Blue markers shall be placed near the center of the street at fire hydrant locations, offset 8 inches toward the hydrant. Markers shall comply with the *Standard Construction Specifications*.

D 6.00 – ILLUMINATION

D 6.01 GENERAL

A. Improvement Plans. The Engineer shall show the proposed illumination system on the project improvement plans. All illumination systems shall be designed in accordance with this standard, accepted engineering practices, and electric utility guidelines.

B. Coordination. For all projects that include the installation of luminaires, the developer must contact the electric utility early in the design process to coordinate providing service to the modified street network. The City and the electric utility shall approve luminaire and service point locations prior to approval of the improvement plans and issuance of a Construction Permit. Luminaires must be installed and operational prior to City acceptance of public improvements.

D 6.02 AVERAGE MAINTAINED HORIZONTAL ILLUMINATION

A. Minimum Average Foot-Candle Requirements.

Table D 6.02-A ROADWAY SEGMENTS

STREET CLASSIFICATION	Residential	Commercial or Industrial
Local	----	0.9 fc
Collector	0.6 fc	1.2 fc
Arterial	0.9 fc	1.6 fc

Source: IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.

Notes: Collector and arterial streets shall have a minimum weak point foot candle measurement of 0.2 fc.

Table D 6.02-B ROADWAY INTERSECTIONS

STREET CLASSIFICATION		Residential			Commercial or Industrial		
		Local	Collector	Arterial	Local	Collector	Arterial
Residential	Collector	1.0 fc	1.2 fc				
	Arterial	1.3 fc	1.5 fc	1.8 fc			
Commercial or Industrial	Local	1.3 fc	1.5 fc	1.8 fc	1.8 fc		
	Collector	1.6 fc	1.8 fc	2.1 fc	2.1 fc	2.4 fc	
	Arterial	2.0 fc	2.2 fc	2.5 fc	2.5 fc	2.8 fc	3.2 fc

Source: IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.

Notes: 1. Intersection Lighting Level = Sum of Intersecting Street Lighting Levels.
2. Collector and Arterial streets shall have a minimum weak point foot candle measurement of 0.2 fc.

Table D 6.02-C MINIMUM AVERAGE UNIFORMITY RATIO

STREET CLASSIFICATION	MINIMUM AVERAGE UNIFORMITY RATIO
Local	6:1
Collector	4:1
Arterial	3:1

Source: IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.

Table D 6.02-D LUMINAIRE TYPES

BRAND	MODEL	WATTAGE	LIGHT SOURCE	LENS TYPE	DISTRIBUTION	PHOTO I.D. NUMBER
General Electric	M-250R2	100W	HPS	Acrylic, Refracting	M-S-II	7244
	M-400R2	200W	HPS	Glass, Flat	M-C-III	7356
		400W				

Source: Pacific Power and Light Company.

Table D 6.02-E AVERAGE MAINTAINED LUMENS

LUMINAIRE TYPE	INITIAL LUMEN VALUE	DEPRECIATION FACTOR	MAINTAINED LUMEN VALUE
100W HPS (M-S-II)	9,500	0.84	7,980
200W HPS (M-C-III)	22,000	0.84	18,480
400W HPS (M-C-III)	50,000	0.84	42,000

Source: Pacific Power and Light Company.
Notes: 1. Maintained Lumen Value = Initial Lumen Value x Depreciation Factor.

D 6.03 LOCATION

A. Requirements:

1. Location. Luminaire locations shall be subject to the approval of the City Engineer or their designee. Luminaries shall be located at property lines and curb returns where possible. A minimum of one luminaire shall be located at each residential local street intersection, each 3-legged intersection (all classifications), and at the end of each cul-de-sac or permanent dead-end street. A minimum of 2 or more luminaires shall be located at all other street intersections. Luminaire locations shall be as follows (those not specified shall be determined by the Transportation Engineering Section of the Public Works Department):

MAXIMUM LUMINAIRE SPACING TABLE							
Street Width	Sidewalk Location	Pole Config.	(1) Pole Location	Pole Height	Mast Arm Length	Luminaire Type	Max. Spacing
Residential Local Streets:							
Varies	Setback	Staggered	3.0' FC	30'	8'	100W HPS (M-S-II)	300'
Commercial or Industrial Local Streets:							
36'	Setback	Staggered	3.0' FC	30'	8'	200W HPS (M-C-III)	210'
48'	Setback	Staggered	3.0' FC	30'	8'	200W HPS (M-C-III)	190'
Residential Collector Streets:							
36'	Setback	Staggered	3.0' FC	30'	8'	100W HPS (M-S-II)	150'
48'	Setback	Staggered	3.0' FC	35'	8'	200W HPS (M-C-III)	195'
Commercial or Industrial Collector Streets:							
36'	Setback	Staggered	3.0' FC	30'	8'	200W HPS (M-C-III)	170'
48'	Setback	Staggered	3.0' FC	30'	8'	200W HPS (M-C-III)	140'
Residential, Commercial, or Industrial Arterial Streets:							
40'-70'	Setback	Opposite Across	3.0' FC	35'	6'-14'	City Calc.	City Calc.

Source of Calculations: ALADAN II, A Lighting Application Design & Analysis Computer Program, Rev. 2.00, GE Company, 1992.

Notes: 1. Distances are to the center of the pole as measured from the face of curb (FC), or from the back of walkway (BW).
2. Street widths that vary from those listed above can either use maximum luminaire spacing of next higher width street, or require separate City calculation.

D 7.00 – SPECIALTY PAVEMENT TREATMENTS AND TRAFFIC CALMING

All specialty pavement treatments proposed to alter color, surface texture, or surface material shall be submitted by the design engineer and are subject to review and approval by the City Engineer. These materials and treatments may include colored concrete, stamped patterns, inlayed materials, interlocking pavers, or any other alternative treatments or materials.

D 8.00 – STREETSCAPE APPURTENANCES

Items that will be modified or placed in the right-of-way shall be identified and specified. Such items include but are not limited to street signs, bus shelters, street trees, and mail boxes. Obstructions that will encroach into sidewalk areas will be identified. Adequate clear space for passage or how the impact will be mitigated will be shown on the plans.

D 8.01 STREET SIGNS

Street signs shall meet MUTCD, Standard Highway Sign and City of Albany requirements. The type and location of the signs will be shown or described on the plans.

A. Regulatory/Informational Signs: Street sign sizes and placement locations shall be reviewed and approved by the City Engineer. Except for street name plates or other signs as approved, all signs will utilize high intensity reflective sheeting. Standard STOP and warning sign sizes are 30 inch x 30 inch, but larger sizes may be required at specific locations. Other regulatory and informational signs will follow standard size and content as described in the MUTCD or as directed by the City Engineer.

B. Street Name Signs: Street name signs shall be as specified in the *Standard Construction Specifications*.

D 8.02 BUS SHELTERS

At required locations, bus shelters shall be installed as directed. Coordinate with the Transportation Services section of Public Works to determine location and orientation of the shelters. Current specifications for the concrete pad and bus shelter structure are available from Transportation Services.

The shelters may be located in the landscape strip if adequate room exists or behind the sidewalk within the right-of-way or in an easement for that purpose. In no case shall the shelter be placed within the designated sidewalk area as an obstruction that would require a pedestrian to maneuver around the shelter.

D 8.03 STREET TREES

Current specifications for furnishing, planting, and establishing trees are available from the City Forester in Public Works. The design engineer may initially coordinate with the City Forester for recommendations of appropriate tree species, location, and spacing to follow the guidelines set forth in the City of Albany's *Urban Forest Master Plan*. New trees will not be planted in clear vision areas or otherwise interfere with required site distances, including intersections and railroad crossings. Final plans and specifications for street trees and related vegetation or appurtenances shall be reviewed for approval by the City Forester.

D 8.04 MAILBOXES

Final locations for mailboxes shall be coordinated with the U.S. Postal Service (USPS). The engineer shall work with the USPS to ensure that mailboxes are installed according to the *Standard Construction Specifications*, meet ADA requirements, and shall be acceptable to the United States Postal Service. Mailbox locations shall be identified on plans for the construction of public improvements.

D 9.00 – PEDESTRIAN AND MULTI-USE PATHS

Pedestrian paths providing connectivity within residential areas shall be constructed to sidewalk standards, to the width specified in the land use decision or by the City Engineer. Multi-use paths shall be assumed as shared use pedestrian/bike paths with a minimum width of 10 feet and a minimum vertical clearance of 8 feet to overhead obstructions for bicyclists. Proposed modifications due to physical constraints or other circumstances must be approved by the City Engineer.

D 9.01 MATERIAL

All paths shall be constructed with PCC pavement. The minimum structural PCC pavement section will be 4 inches of 4,000 psi PCC pavement over 3 inches of crushed aggregate base. If the path is intended to support utility maintenance trucks, the PCC thickness shall be increased to 6 inches.

D 9.02 DRAINAGE

Where a path is constructed on a hillside or along an unimproved hillside roadway, a ditch of suitable dimensions shall be placed on the uphill side to intercept the hillside runoff. This ditch shall be a minimum of 3 feet from the edge of pavement. There shall be a minimum 1-foot shoulder between the edge of the path and the top of ditch. Where possible, catch basins shall be installed to intercept the runoff water and carry it under the bike path. Drainage grates and manholes shall be located outside the traveled way of the bicyclists with the slits of the drainage grates placed perpendicular to the bike path.

Where possible, natural ground cover should be included in the design to prevent erosion on cut and fill slopes.

D 10.00 – TRAFFIC SIGNALS

A licensed traffic engineer registered in the State of Oregon shall design traffic signals. All documentation of traffic studies, field data, and recommendations will be coordinated with the traffic section of Public Works. All plans and specifications shall be in accordance with Oregon Department of Transportation (ODOT) and MUTCD requirements or as modified by the traffic engineer. The final design of the traffic signal must be approved and accepted by the City Engineer.

D 11.00 – BRIDGES

Bridges shall be designed by a licensed professional engineer, registered in the State of Oregon. All documentation of hydrological and soil studies, field data, and recommendations shall be coordinated with the City Engineer. All plans and specifications will be in accordance with Oregon Department of Transportation (ODOT) and MUTCD requirements, or as modified by the professional engineer. The final bridge design must be approved and accepted by the City Engineer.

CITY OF ALBANY

DEPARTMENT OF PUBLIC WORKS

DIVISION E
STORMWATER MANAGEMENT
DESIGN STANDARDS

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ALBANY, OREGON 97321

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DIVISION E - STORMWATER MANAGEMENT

E 1.00 – GENERAL

E 1.01 PURPOSE

The purpose of these *Storm Water Management Design Standards* is to provide a consistent policy under which certain physical aspects of storm water management will be implemented. Most of the elements contained in this document are Public Works oriented and most are related to the development or platting process; however, it is intended that they apply to both public and private work designated herein.

These Design Standards cannot provide for all situations. They are intended to assist, but not to serve as a substitute for competent work by design professionals. Engineers are expected to bring the best of skills from their respective disciplines to each project. If the Engineer anticipates challenges in meeting these standards, they should contact the City prior to extensive design efforts.

These Design Standards are not intended to limit unreasonably any innovative or creative effort that could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged on the likelihood that such variance will produce a compensating or comparable result, in every way adequate for the user and City resident over the life cycle of the improvement.

Note that the presentation, layout, and general configuration of all engineering design drawings shall be in conformance with Albany's drafting design criteria as outlined in Division A of the Design Standards. Engineer will prepare the project design drawings in conformance with the requirements contained therein.

The standards have the objective of developing a storm water management system that will:

A. Be of adequate design to safely manage storm water generated upstream and on the site from given storm intervals to an approved point of disposal

B. Provide points of connection for storm water generated by future development upstream

C. Prevent the uncontrolled or irresponsible discharge of storm water onto adjoining public or private property

D. Prevent the capacity of downstream channels and storm drainage facilities from being exceeded

E. Have sufficient structural strength to resist erosion and all external loads that may be imposed

F. Maintain the runoff characteristics of the original undeveloped drainage basin, where feasible, as determined by the City Engineer

G. Maximize efficient use of Albany's natural drainage system of streams, lakes, and wetlands

H. Maintain or improve overall storm water quality

I. Be designed in a manner to allow economical future maintenance

J. Be designed using materials to insure a minimum practical design life of 75 years

K. Be consistent with the *Albany Municipal Code* (AMC), *Albany Development Code*, Albany *Standard Construction Specifications* and all applicable state and federal regulations and requirements for storm water quantity and quality.

E 1.02 SHORTENED DESIGNATION

These City of Albany *Storm Water Management Design Standards* shall be cited routinely in the text as the "Design Standards."

E 1.03 APPLICABILITY

These Design Standards shall govern all construction and upgrading of all public drainage facilities in the City of Albany and applicable work within its service areas.

Permanent drainage facilities shall be provided on all property improvements within the City of Albany per these Design Standards for the following types of development:

A. All major partitions and subdivisions.

B. All commercial, industrial, and multifamily developments creating new impervious surfaces of greater than three thousand square feet in area within any twelve-month period. These Design standards are intended to fulfill the requirements of the "Special Storm Sewers" section of the Uniform Plumbing Code for private storm drains.

C. Developments entailing construction that would change the point of discharge of surface waters, the quantity of discharge, or discharge surface waters at a higher velocity or flow than that of the preconstruction discharge rate, or add to pollution of surface waters.

D. Construction or reconstruction of public roadways and temporary detours.

E. Developments entailing construction in or adjacent to any existing stream or surface watercourse including intermittent streams.

F. Developments requiring construction in or adjacent to the 100-year floodplain of any stream.

E 1.04 REFERENCES

The Design Standards are intended to be consistent with the most currently adopted provisions of all storm water-related guidelines including but not limited to:

A. Albany Area Storm Water Management Plans

B. Oregon Statewide Planning Goals and Guidelines

C. *Albany Transportation System Plan* (TSP)

D. *Albany Municipal Code* (AMC)

E. Albany Comprehensive Plan

F. *Albany Development Code* (ADC)

G. Albany Facility Plans

E 1.05 STANDARD CONSTRUCTION SPECIFICATIONS

Except where the standards provide otherwise, design detail, workmanship and materials shall be in accordance with the current edition of the *Standard Construction Specifications* prepared by the City of Albany.

E 1.06 DEFINITIONS AND TERMS

A. City Engineer. The City Engineer of the City of Albany or his/her authorized representative.

B. Creek. Any and all surface water routes generally consisting of a channel having a bed, banks, and/or sides in which surface waters flow in draining from higher to lower land, both perennial and intermittent; the channel, banks, and intervening artificial components, excluding flows that do not persist for more than 24 hours after cessation of one-half (1/2) inch of rainfall in a 24-hour period from October through March.

C. Definition of Words. Wherever in these standards the words directed, required, permitted, ordered, designated, or words of like importance are used, they shall be understood to mean the direction, requirement, permission, or order of designation of the City Engineer. Similarly, the words approved, acceptable, and satisfactory shall mean approved by, acceptable to, or satisfactory to the City Engineer.

D. Detention. The holding of runoff for a short period of time and then releasing it to the natural water course where it returns to the hydrologic cycle.

E. Drainage Facilities. Pipes, ditches, detention basins, creeks, culvert bridges, etc., used singularly or in combination with each other for the purpose of conveying or storing runoff.

F. *Drainage Master Plan*. A document adopted by Albany's City Council that describes Albany's existing and planned Trunk Drainage System. The planned drainage system is based on runoff projected for Albany based on Albany's full development under the adopted Comprehensive Plan.

G. Easement. Easements are areas along the line of all public storm drains that are outside of dedicated storm drain or road easements or rights-of-way, and shall be prepared on City forms granting rights along the line of the storm drain to the City.

H. F.I.R.M. Food Insurance Rate Maps, which have been developed by the Federal Emergency Management Agency, showing flood elevations for various creeks and rivers.

I. Impervious Areas / Impervious Surfaces. Those hard surface areas located upon real property that either prevent or retard saturation of water into the land surface, as existed under natural conditions pre-existent to development, and cause water to run off the land surface in greater quantities or at an increased rate of flow from that present under natural conditions pre-existent to development. Common impervious surfaces include, but are not limited to rooftops, concrete or asphalt sidewalks, walkways, patio areas, driveways, parking lots or storage areas and graveled, oiled, macadam or other surfaces that similarly impact the natural saturation or runoff patterns that existed prior to development.

J. Natural Location. The location of those channels, swales, and other non-manmade conveyance systems as defined by the first documented topographic contours existing for the subject property either from maps or photographs.

K. Peak Discharge. The maximum water runoff rate (cfs) determined for the design storm.

L. Plans. Construction plans, including system site plans, storm drain plans and profiles, cross sections, detailed drawings, etc., or reproductions thereof, approved or to be approved by the City Engineer, which show the location, character, dimensions, and details for the work to be done, in which constitute a supplement to these Design Standards.

M. Private Storm Drain. Means a storm drain located on private property serving one or more structures on the same premises or parking lot catch basins.

N. Public Storm Drain. Means any storm drain in the public right-of-way or easement operated and maintained by the City.

O. Receiving Bodies of Water. Creeks, streams, lakes, and other bodies of water into which waters are artificially or naturally directed.

P. Release Rate. The controlled rate of release of drainage, storm, and runoff water from property, storage pond, runoff detention pond, or other facility during and following a storm event.

Q. Right-of-Way. All land or interest therein which by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public within which the City shall have the right to install and maintain storm drains.

R. Sedimentation. Disposition of erosional debris-soil sediment displaced by erosion and transported by water from a high elevation to an area of lower gradient where sediments are deposited as a result of slack water.

E 1.07 APPROVAL OF ALTERNATE MATERIALS OR METHODS

Any alternate material or method not explicitly approved herein will be considered for approval on the basis of the objectives set forth in E 1.01 PURPOSE. Persons seeking such approvals shall make application in writing. The written application is to include, but is not limited to, the manufacturers specifications and testing results, design drawings, calculations, and other pertinent information. Any alternate must meet or exceed the minimum requirements set in these Standards. Approval of any major deviation from these Standards will normally be in written form. Approval of minor matters will be made in writing if requested.

Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

E 2.00 – DRAINAGE PLAN

E 2.01 DRAINAGE SITE PLANS

A site plan, drawn to scale, showing the existing and proposed drainage of the parcel shall be submitted with the drainage report for a development. The existing and proposed drainage plan shall be on separate plan sheets. The proposed plan shall show profile and plan view of the proposed improvements.

E 2.02 EXISTING DRAINAGE PLAN

A topographical contour map clearly defining existing conditions:

A. The plan shall clearly show the drainage basins within the improvement limits. Existing routing and discharge locations of the basins shall be shown.

B. Existing contours of the land at two (2) foot intervals or as approved by the City Engineer with the location of existing buildings, structures, and public and private utilities on the property. Location of any existing building or structure on adjacent property that is within fifteen (15) feet of a proposed public drainage facility.

C. All areas improved or unimproved, lying upstream and draining to or through the proposed development.

D. All areas improved or unimproved, lying downstream, to a trunk line, that will receive the runoff developed from the site.

E. Location of existing drainage facilities that transport surface water onto, across, or from the site, including natural watercourses, artificial channels, drain pipes, or culverts.

F. Locations of springs or other subsurface water outlets.

G. Arrows indicating drainage direction in all public and private property and for all hydraulic conveyance systems.

H. The route used in determining the pre-developed time of concentration.

E 2.03 PROPOSED DRAINAGE PLAN

The drainage plan can propose either open channel or closed conduit improvements. Applicability of open channel improvements will be reviewed on a case-by-case basis. A topographic contour plan clearly defining proposed improvements:

A. The plan shall clearly show the drainage basins within the improvement limits. Proposed routing of all piping and other drainage improvements and discharge locations of the basins shall be shown.

B. Proposed contours of the land after completion of the project at two (2)-foot intervals or as approved by the City Engineer. This shall include elevations, dimensions and location, extent, and slopes of all grading work proposed to be done.

C. Identify cut and fill areas, soils types, topography, and vegetation.

D. Proposed full erosion control plan including, sediment fences, interceptor ditches (channels), velocity check dams, matting, areas of proposed reseeding, and any other proposed erosion control measures.

E. Location of proposed drainage facilities that transport surface water across or from the site, including natural watercourses, artificial channels, under drain pipes, and culverts.

F. Boundaries of all areas that will be paved or otherwise altered in a manner that will increase surface water runoff and boundaries of all areas to remain in an existing or natural condition.

G. The route used in determining the post-developed time of concentration.

E 3.00 – DESIGN & CALCULATIONS

E 3.01 GENERAL REQUIREMENTS

Storm drainage design within a development area must include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multifamily, commercial, or industrial buildings, and to insure future extension of the drainage system to the entire drainage basin in conformance with the AMC and adopted Storm Water Management Plans. Control of both water quantity and quality shall be included as part of the design considerations. Provisions that must be met are:

A. Surface or subsurface drainage, caused or affected by the changing of the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume and/or rate or location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal. Requirements of the Albany Building Division shall also be met regarding alteration of drainage patterns.

B. Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipators within the subject property to minimize downstream damage and with no diversion at any of these points.

C. The approved point of discharge for all storm water may be a storm drain, existing open channel, creek, detention, or retention pond approved by the City Engineer. Acceptance of suggested systems will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility/maintainability of the alternate design.

D. When private property must be crossed in order to reach an approved point of discharge, it shall be the developer's responsibility to acquire a recorded drainage easement (dedicated to the City) from the private property owner meeting the approval of the City Engineer. The developer must secure all signed easement documents from private property owners prior to final plan approval.

E. The peak discharge from the subject property may not be increased from conditions existing prior to the proposed development except where it can be satisfactorily demonstrated by the applicant that there is no adverse impact.

F. Retention/detention facilities must be provided in order to maintain surface water discharge rates at or below the existing design storm peak discharge except where it can be demonstrated by the applicant that no adverse impact will result from not providing said facilities. A basin analysis may be required to assure that the detention system does not adversely impact the operation of the storm drain system it is discharging to.

G. All storm drain system designs (conveyance, flow restrictions, detention) shall make adequate provisions for collecting all storm water run-off. The system shall accommodate all run-off from upstream tributary areas whether or not such areas are within the proposed development. The amount of run-off to be accommodated shall be based upon ultimate development of all upstream tributary areas.

   Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by the City Engineer.

H. An erosion control plan shall be developed for all phases of the project construction to protect downstream waters and minimize erosion.

I. Storm water quality enhancements are encouraged and storm water quality Best Management Practices (BMPs) shall be incorporated into the design.

J. All other State and Federal permitting requirements must be met. The Developer shall produce copies of approved permits for the City prior to final plan approval.

E 3.02 RUNOFF CALCULATIONS AND SYSTEM CAPACITY

Calculations for storm drain design shall be submitted with all storm drain improvement projects. Calculations shall clearly show how flows were calculated and also how the proposed storm system is capable of conveying these flows. For projects that require detention, full pre-development and post-development calculations shall be submitted.

Basin maps shall be submitted with all calculations and shall show clearly how storm water is being routed through the improvements.

A. Rational Method. The rational method is an acceptable way to calculate peak discharge for the sizing of storm drainage conveyance systems for laterals and collector systems in which detention is NOT required. It may NOT be used to size detention systems or trunk lines or for projects that are greater than 100 acres in size. Refer to Section E3.02.D Drainage System Capacity to determine which design storm the improvement must convey.

Equation $Q = C * I * A$

Where:

- **Q** *is peak flow in cubic feet per second.*
- **C** *is a runoff coefficient determined by ground cover. The engineer must document the methodology used in determining the value proposed.*
- **I** *is rainfall intensity in inches per hour. Rainfall intensity found on the ODOT Zone 7, I-D-F curve (see Section E 9.03 - Appendix) shall be used. For the rational method, the basin time of concentration is used as the storm duration. The time of concentration must first be calculated (see Section E3.02.C Time of Concentration), then the rainfall intensity can be read from the I-D-F curve.*
- **A** *is the basin area in acres.*

B. Basin Hydrographs. Trunk lines and all improvements that require detention shall be designed only after a full analysis of the basins contributing to the improvements is completed. Hydrographs for all basins shall be developed.

The City standard for hydrograph development is the Soil Conservation Service (SCS) TR-20 methodology. Analysis can be done using computer software that uses the TR-20 methodology for developing hydrographs or it can be done manually using the TR-55 methodology. If a software package is used, documentation of the software's processing and methodology shall be submitted with the results. All input and assumptions shall be clearly documented.

The input information needed for the TR-20 methodology is:

- Time of Concentration (see E3.02.C Time of Concentration)
- Curve Number (CN) – The CN takes into account the ground cover and the soil type. County soil surveys shall be used to determine the soil type. The SCS "Urban Hydrology for Small Watersheds" handbook shall be used in determining the hydrologic classification for soils. Most soils in Albany are group "C" or "D."
- Rainfall distribution – Albany has a Type IA rainfall distribution.
- Total 24-hour Rainfall – See Section E 9.01 – 24-Hour Rainfall for Albany
- Basin Area

C. Time of Concentration. Time of concentration is a very important variable in determining runoff volumes and peak flows. Time of concentration calculations shall be submitted for review.

There are three components that shall be considered when determining time of concentration: sheet flow, shallow concentrated flow, and channel/pipe flow. Each of these should be calculated separately and then added together to determine the basin time of concentration.

1. Sheet Flow. This is the first leg of runoff. It is generally accepted that sheet flow only occurs for a maximum of 300 feet before the flow regime turns to shallow concentrated flow. Sheet flow shall be calculated using the Manning's kinematic solution:

$$T_t = 0.007(nL)^{0.8} / (P_2)^{0.5}S^{0.4}$$

Where: T_t = Travel Time (hours)
n = Manning's n
L = Length of flow (feet)
P_2 = 2-year, 24-hour rainfall (inches)
S = Slope (feet/foot)

2. Shallow Concentrated Flow. To determine the flow time of runoff in the shallow concentrated flow regime, you need to estimate the flow velocity. Use the figure in Section E 9.02 – Appendix in determining the flow velocity of the shallow concentrated flow. Once the velocity is estimated, divide the distance of flow by velocity to get flow time.

3. Channel/Pipe Flow. Use Manning's equation to calculate velocities in the channels and pipes, then divide flow length by velocity to get flow time.

The three runoff flow components shall be added together to determine the total time of concentration. A map showing the assumed flow path shall be provided with the time of concentration calculations.

D. Drainage System Capacity. For design purposes, it is necessary to define the various parts of the storm drainage system and to specify the magnitude of flow that each part must be capable of carrying.

Pipes, culverts, and ditches shall be designed to convey the peak discharge of the storm shown in the table below.

TABLE E 3.02 – A

Element	Definition	24-Hour Design Storm
Catch Basins/Inlets	Catch basins and inlets located within roadways.	10 year
Feeder	Pipe/ditch of any size that serves a private development or single subdivision of 5 acres or less.	10 year
Collector	Pipe/ditch of any size that serves multiple private developments/subdivisions or a single private development or subdivision equal to or greater than 5 acres within the same drainage sub-basin.	25 year
Trunk	Drainage improvements that serve more than 100 acres and/or multiple drainage sub-basins as defined in the City's Storm Drain master Plan(s) or as otherwise required by the City Engineer.	50 year

E 3.03 SUPPORTING DATA

A. Background computations for sizing drainage facilities shall include:

1. Peak discharge rate and volume of surface water for the design storm currently entering and leaving the subject property; or if the City Engineer determines that the property is in an interim flood hazard area, then a 50-year storm shall be used.

   Discharge volumes shall be computed for both the current land use conditions and full development of the tributary basin area.

2. Peak discharge and rate of runoff that will be generated within the subject property due to the design storm after development occurs.
3. Peak discharge and rate of runoff that will be generated by the design storm at all naturally occurring points of discharge from the property (cubic feet per second, predevelopment, and post-development). For projects that require detention, 2-year, 10-year, and 25-year storms must be analyzed.
4. The proposed methods of handling, storing, and discharging of peak loads:
   a) Proposed improvement for handling the computed runoff, including the location and capacity of all natural or proposed drainage facilities and easements. The method of discharging storm drainage offsite at the naturally occurring location and provisions needed to control the velocity, volume, and direction of the discharge in order to minimize damage to other properties, stream banks, and overall water quality.
   b) Drawings of proposed open channel and closed conduit system to be shown on construction drawings.
      1) Proposed cross-section of the channel with stable side slopes shown on the plan.
      2) For open channel improvements, the water surface elevation (backwater curve) of the flow for the design storm shall be indicated on the cross-section.
      3) For closed conduit improvements, the HGL of the flow for the design storms shall be indicated on the cross-section.

E 4.00 – PIPES AND CLOSED CONDUIT

E 4.01 GENERAL

All storm drains shall be laid on a consistent and uniform grade as specified in the latest edition of **Albany's** *Standard Construction Specifications*. Changes in piping size and grade shall only occur at manholes. All pipes and closed conduit materials shall conform to the *Standard Construction Specifications*. Joints shall have gaskets and be water tight.

E 4.02 PIPE SIZE

The minimum size for storm drains shall not be less than ten (10) inches inside diameter and shall begin at a structure and shall terminate at an approved point of disposal. Proposed exceptions to the above will be reviewed and considered for approval on a case-by-case basis by the City Engineer of Public Works. When two (2) parallel pipes are installed in-lieu-of one large pipe or a box culvert, the minimum separation between the pipes shall be one (1) foot or one-third the diameter of the largest diameter pipe, whichever is greater. This requirement may be waived if the void between the pipes below the spring line is filled by grouting or other approved method/substance.

E 4.03 GRADE

All storm drains shall be laid on a grade that will produce a mean velocity (when flowing full) of at least three (3) feet per second, based upon Manning's pipe friction formula using a roughness coefficient valued at not less than 0.01, or the pipe manufacturer's recommendations, whichever is greater.

The minimum grade may be reduced to produce an absolute minimum velocity of 2.0 fps upon approval of the City Engineer. But the grade of any pipe, regardless of diameter, shall not be less than .002 feet per foot unless otherwise authorized by the City Engineer. Other cases requiring a flatter grade than permitted above shall also be reviewed on a case-by-case basis for approval by the City Engineer.

Engineers are cautioned not to specify storm drains of sizes that are obviously larger than is necessary for satisfactory carrying capacity, but which are specified solely in order to meet grade requirements, i.e., a twelve (12) inch pipe for a ten (10) inch pipe to acquire a decrease in slope.

The maximum grade for storm drains will generally be limited such that pipeline velocities when flowing full do not exceed 15 ft/sec. If, out of necessity, velocities greater than this will result, ductile iron piping shall be used. Outside drop manholes with flatter pipe slopes can also be used.

E 4.04 ALIGNMENT

Generally, storm drains shall be laid on a straight alignment between catch basins and between manholes.

A. Where storm drains are being designed for installation parallel to other utility pipe or conduit lines, the vertical location shall be in such a manner that will permit future side connections of main or lateral storm drains and avoid conflicts with parallel utilities without abrupt changes in vertical grade of main or lateral storm drains. Location within easements or right-of-ways shall be in accordance with the *Standard Construction Specifications*. A minimum separation of 10 feet shall be maintained between storm drain lines and all other public utilities.

B. Under normal conditions, storm drains shall be located in the street right-of-way ten (10) feet from the centerline and preferably on the low side and on the south and west sides of the street, except when curb inlet locations warrant otherwise. Piping between curb inlets and storm drain lines shall be at near right angles to the street and other utility lines. All exceptions shall be reviewed on a case-by-case basis for approval.

C. Right-of-way and easement locations for public storm drains serving a PUD, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas that will permit an unobstructed vehicle access for maintenance by City forces.

D. All rights-of-way and easements must be furnished to the City for review and approval prior to recording. The City will record the easements after City Council acceptance. Each easement shall be according to the City's standards.

E 4.05 COVER REQUIREMENTS

Storm drains shall be at a minimum depth of 3 feet or greater below the finish grade elevation. Minimum pipe depth shall be measured between the finished surface grade at the center line of the storm drain and the top of storm drain pipe. Storm drains at depths less than this create problems with water line crossings, sewer lateral crossings, and proper cover over the pipe per manufacture's recommendations. Fill may be required on development sites to maintain adequate cover over sewer lines.

In some extreme locations where flat terrain limits the extension of storm drains, the City Engineer may allow some pipeline configuration changes as well as alternate pipe cover depths in conjunction with site filling. Storm drain pipes with depths less than 3 feet, where allowed by the City Engineer, shall be connected from catch basin to catch basin in lieu of the use of manholes. Special pipe material such as ductile iron pipe (down to 30-inch cover) or reinforced concrete pipe (down to 18 inches of cover) will be required.

In areas of flat terrain, the design engineer must show that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site or that other drainage options are available to the upstream property.

5.00 – INLETS, OUTLETS, CONNECTIONS

E 5.01 CURB INLETS

A. Curb inlet basins may be connected together (maximum of 4) at intersections to minimize the number of pipe crossings of the streets and number of manhole penetrations required. Curb inlet piping shall be connected to the storm drain system at manholes.

B. Inlets shall be spaced to assure that the flow in the streets can be intercepted and no ponding in the street occurs during the design storm. However, the maximum total length of curb and gutter that may be drained by a curb inlet is four hundred (400) feet. Curb inlets shall be located on the upstream side of curb returns. In addition, catch basins shall be installed where street improvements end on a descending grade and shall be piped to an approved point of disposal.

C. The width of gutter flow on residential streets shall not exceed 8 feet from face of curb or top the curb for a ten (10) year design storm at any point along the street.

D. Curb inlets shall be designed to completely intercept the ten (10) year design storm gutter flow.

E. Curb inlets shall be located so as not to interfere with other construction elements (e.g., driveways, pedestrian ramps, etc.). Exceptions will be considered on a case-by-case basis.

E 5.02 SURFACE DRAINAGE INTERCEPTION

Inlet structures shall be built wherever a surface drainage (creek/ditch/swale) is intercepted and placed into a piped system. The inlet structure shall be concrete. All inlet structures for pipes shall have grating covering the inlet. The grate shall have the bars oriented in the vertical direction. The inlet grate shall be removable.

The invert of the inlet structure shall be at or below the invert of the drainage being intercepted. The inlet shall be designed to accommodate the anticipated peak flows of the surface drainage at the design storm outlined in Table E 3.02 – A.

Special attention shall be paid to where water will accumulate and flow, should the inlet become clogged or blocked. In sensitive areas, accommodations for overflows caused by inlet clogging shall be made such that the overflow does not damage downstream areas.

E 5.03 SLOPE INTERCEPT INLETS

Slope intercept drains shall be provided at the following locations:

A. Along the upper boundaries of a development where the natural ground slope exceeds ten (10%) percent to intercept drainage from the tributary area above the site.

B. Along the lower boundary of a development where the natural ground slope exceeds ten (10%) percent to prevent drainage onto a lower tributary area other than by means of an approved point of disposal.

C. Along the top of all cuts that exceed four (4) feet with cut slopes that exceed 2:1 where the tributary drainage area above the cut slopes towards the cut and has a drainage path greater than forty (40) feet, measured horizontally.

E 5.04 SUBSURFACE DRAINAGE INTERCEPTION

Subsurface drains (underdrains) shall be provided at the following locations:

A. On all cut and fill slopes in excess of four (4) feet for stability except when a soils report submitted by a registered professional engineer experienced in soils certifies they are not required.

B. For all existing springs or springs intercepted during construction activity for other facilities, i.e., sewer, water mains, or street excavations.

C. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or underfloor flooding of buildings.

The drainage line installed shall begin at a cleanout and terminate at an approved point of discharge. Open-jointed storm drain lines will not be considered as an acceptable solution.

E 5.05 OUTLETS INTO SURFACE DRAINAGE CHANNELS

Storm drain lines shall enter a creek or drainage channel at 90° or less to the direction of flow. The outlet shall have a head wall and scour pad or riprap to prevent erosion of the existing bank or channel bottom. All outlet structures for pipes of 24-inches in diameter or greater shall have grating covering the outlet. The grate shall have the bars oriented in the vertical direction. Outlet grates shall be attached to the outlet structure with a hinged connection at the top of the grate.

The outlet shall not intrude into the channel and reduce flow capacity of the channel. Pipe ends shall be beveled to match the side slope of the channel. Energy dissipation measures and armament of the opposite channel bank are required at the outlet. The size of the receiving facility will govern what protective measures are required

Backflow valves may be required on outlet structures to prevent backwater from surcharging and flooding the new storm drain improvements.

E 5.06 MANHOLES

Changes in piping size and grade shall only occur at manholes. In general, storm drains shall be designed to have access for cleaning no further than 450 feet apart. Manhole rims in unimproved areas shall be a minimum of 12-inches above the surrounding ground and be marked with a metal marker post.

A. All connections, junctions, changes of grade, changes in size and alignment shall be made at manholes. Tee connections in storm lines shall not be allowed (with the exception of 4- and 6-inch service laterals). All private connections to the public system shall be reviewed on a case-by-case basis. Private connections to the public system might be allowed using a tee connection under specific conditions.

B. Where the pipe size decreases upstream through the manhole, the upstream pipe crown shall match the elevation of the crown of the downstream pipe. Where grade is limited, matching 0.8 of the pipe diameters may be used.

C. In some extreme locations where flat terrain limits the extension of storm drains, the City Engineer may allow some pipeline configuration changes in conjunction with site filling. Storm drain pipes with depths less than 3 feet, where allowed by the City Engineer, shall be connected from catch basin to catch basin in lieu of the use of manholes.

E 6.00 – SURFACE DRAINAGE

E 6.01 SURFACE DRAINAGE

For purposes of these Design Standards, surface drainage routes will be classified according to two general categories: constructed watercourses and natural creeks.

A. Plan requirements for surface drainage courses shall include the requirements previously specified in Section E 2.00 Drainage Plan and the following supporting data and calculations:

1. Profile of the channel showing the existing flowline and top of bank, proposed flowline and top of bank, and design water surface profile (backwater curve).

2. A minimum of three (3) cross sections of the existing channel adjoining or crossing the property taken at the upstream, midsection, and downstream boundaries of the property. More sections may be required depending on the length of the reach and existing channel alignment.

3. Calculations for arriving at the design flow rate: The City will furnish the flow rate when records are available. Analyze the proposed system and show that the channel cross section after improvement will pass the design storm with one (1) foot of freeboard to the top of bank. For channels shown on the F.I.R.M. maps, show that the channel cross section after improvement will pass the base flood at or below the 100-year flood elevation shown on the F.I.R.M.

4. Open channels shall have rights-of-way sufficient in width to cover the 100-year Floodplain Line when a 100-year design storm is required or fifteen (15) feet from the top of the recognized bank, whichever is greater.

E 6.02 CONSTRUCTED WATERCOURSE REQUIREMENTS

A. Constructed watercourses shall be designed with a "natural" curved alignment with a variable side slope not to exceed four to one, except that in tight spots created by existing natural features (e.g., boulders, large trees, etc.) where the slope can be three to one until the natural feature is bypassed or where steeper slopes are needed and do not impair the hydraulic efficiency of the waterway. The watercourse shall include a low flow channel as described below and will be reviewed on a case-by-case basis for approval.

   The bank shall be designed with one (1) foot of free board above the design storm with a minimum top of bank width of six (6) feet. A larger width shall be provided when required by the City Engineer for maintenance purposes. The backslope of the bank shall not exceed two (2) horizontal to one (1) vertical. The existing ground adjacent to the toe of the bank backslope shall be graded to slope away at 2 percent to prevent water ponding at the backslope toe.

B. Design shall be curvilinear with a 100-foot minimum radius. Tighter curves may be used if the City Engineer determines that sufficient erosion control has been incorporated into the design to maintain stable bank conditions following development.

C. A low flow channel shall be designed to carry a two-year design storm or the normal low water flow of a year-round creek, whichever is greater. Low flow channel slopes shall not exceed two to one and shall be stabilized to the satisfaction of the City Engineer. In general, bank stabilization will be required in any channel with a design flow velocity in excess of three feet per second.

D. Capacity of channels shall be determined by the Manning Formula. The value for "n" shall be 0.033 for maintained grass-lined swales. The value for "n" shall be 0.035 for channels with rock-lined bottoms.

E. Existing ditches approved for the point of discharge for storm drains and culverts shall be provided with rock-lined bottoms and side slopes at the discharge point of storm drain or culvert. The rock shall extend for a minimum distance of eight feet downstream from the end of the storm drain or culvert.

F. All channel sides and bottoms shall be seeded, sodded, or rock lined immediately following construction. Bank stabilization measures shall be designed and included in the construction plans.

G. Points of discharge from culverts and storm drains into ditches and swales 15 percent or greater in grade shall be rock lined with boulders with one face a minimum of 24 inches in dimension. Said rock lining shall extend for a distance of ten feet minimum from the point of culvert or storm drain discharge and shall have a width three feet in excess of the diameter of the culvert or storm drain. Special energy dissipaters may be substituted for boulders at the discretion of the City Engineer.

E 6.03 NATURAL CREEK REQUIREMENTS

A permit must be obtained from the Division of State Lands and the Department of Fish and Wildlife for all work between the creek banks.

A. Natural creeks shall be preserved and all work in and adjacent to creeks shall incorporate both temporary and permanent erosion control measures to protect disturbed areas from erosion and damage. No alteration will be permitted that reduces the overall creek capacity.

B. Creek channel design and construction practices shall be such that the cumulative incremental effects of creek work considered alone or together with existing or similar projects in the vicinity will not result in substantial damage to existing waterways and surface waters by erosion, siltation or sedimentation, significant changes in water quality, increased downstream water velocity, significant harmful deterioration of groundwater drainage, or significant deterioration of aquatic wildlife habitat as determined by the City Engineer.

C. Creek construction, relocation, and/or reconstruction may be approved if the City Engineer determines that such a proposal will result in an overall benefit to or maintenance of a surface water system of equal quality in terms of water quantity and quality control and the Developer can obtain the appropriate State and Federal permits.

D. Any and all stream work shall be consistent with the floodplain management policies and regulations and as set forth in AMC or any amendments thereto.

E. Any and all stream work shall be consistent with the *Stormwater Management Plan.*

E 7.00 – STORMWATER DETENTION

E 7.01 GENERAL REQUIREMENTS

A. All storm drainage runoff originating from and/or draining to any proposed development shall be controlled and/or conveyed in accordance with all City standards and policies as described in these Design Standards. When existing conditions make storm drainage detention impossible for a portion of a site, the City Engineer may permit compensatory storage volume to be provided on another portion of the site, provided the total site area is tributary to one drainage basin both prior to and after development. In no case shall the runoff rate from the total site exceed the allowable release rate.

B. Detention basins will be required to detain post-developed runoff from the 2-year, 5-year, 10-year, and 25-year twenty four hour storm to pre-developed quantities. If the project area is greater than 100 acres or covers multiple drainage sub-basins, then the 50-year twenty four hour storm must also be detained to pre-developed peak volumes. Potential downstream damage due to detention system failure/overflow may require greater detention requirements or improvements downstream. In no case shall the release rates increase the flooding conditions downstream. An emergency overflow must be designed to accommodate 100-year storm flows.

C. The minimum allowable diameter for an orifice in a flow control structure shall be 2-inches due to the possibility of clogging or plugging.

D. Detention requirements may be waived by the City Engineer when discharge will be released directly into the Willamette River. Direct discharge shall not exclude the use of erosion control or other water quality control techniques within the development. Waiver of the detention requirement may also be allowed along a channel that has been fully improved to accommodate the 100-year design storm.

E. Detention facilities shall be open basins or ponds or underground storage (pipe/chamber), or combinations of the above.

F. Drainage plans shall include a plan and profile of the facilities. The profile requirement for private drainage systems may be waived at the discretion of the City Engineer when sufficient data is provided on the plan in a clear and concise manner including the following minimum hydraulic and physical data: 1) grades, bottom elevations of ditches, channels, ponds and swales, parking lots and recharge trenches; 2) inverts of pipes; 3) inverts and tops of all structures such as manholes, catch basins, chambers, or similar structures; and 4) size, length, and slope of all pipes

or other detention or conveyance facilities, including the invert elevations of the existing or any other storm drainage system that the subject drainage proposes to discharge into. The design volume of all detention ponds shall also be shown on the plan as well as a note indicating that ponds shall be inspected prior to landscaping.

G. All aspects of the on-site drainage system must be properly designed to handle all flows developed on-site and all flows that flow through the site from upstream. Designers should conceptualize how water will move into, through, and out of the system, looking for such potential problems as flow impediments, construction difficulties, future maintenance problems, and soil erosion potential.

H. All aspects of public health, safety, maintenance, nuisance abatement, and vector control must be carefully reviewed in every drainage control system plan. Protective measures are often necessary and shall be required whenever appropriate. The protective measures themselves shall be designed so as not to constitute hazards or nuisances.

I. The impact of a system failure should be analyzed both in terms of on-site and off-site effects. The impacts may be to adjacent properties, or to elements of the public drainage system or other private systems. The downstream consequences of failure of a detention pond shall be included in determining location and design parameters.

J. The frequency and difficulty of future maintenance can be minimized by thorough consideration during design of what could possibly go wrong in the system and what would be required to correct the problem. Facility design must incorporate maintenance considerations to ease such problems.

K. The use of the site should be evaluated to determine if hazardous materials or other pollutants are likely to be present, and if extraordinary design considerations are necessary.

L. The visual impact and other potential problems (mosquito breeding, smell, etc.) must be minimized. Concerns will vary with the site environment, but aesthetics should always be of concern to the designer.

M. It is important that runoff from rooftops pass through the detention system; the design should clearly indicate how roof runoff moves through the system.

N. Access, passable by a maintenance vehicle, to all control structures by appropriate equipment shall be provided with easements dedicated to the City.

O. All detention facilities shall have emergency overflow structures incorporated into their design. Flow capacity of the overflow shall be calculated and shown as supporting information. The overflow shall accommodate peak flows from a 100-year storm.

E 7.02 SURFACE PONDS

A. Slopes on all interiors of surface ponds shall not exceed four (4) feet horizontal to one (1) foot vertical for all detention ponds in PUD's, subdivisions, and land partitions. Ponds in commercial, industrial, and multifamily developments that are to remain under private ownership and maintenance shall have at least one interior slope not exceeding four (4) feet horizontal to one (1) foot vertical with all other interiors exceeding four to one (4:1) to be either retaining walls designed by a licensed structural engineer or a design submitted by a licensed engineer experienced in soils mechanics. Slopes on pond exteriors shall not exceed two horizontal to one vertical.

B. All ponds three (3) feet deep or less shall have a minimum bottom dimension of six (6) feet or as approved by the City Engineer. All ponds over three (3) feet deep shall have a minimum bottom dimension of 15 feet. Maximum water depth in all ponds shall be five (5) feet.

C. Ponds suited to multiple use are encouraged. Examples of multiple uses are sport courts, play areas, neighborhood parks, and picnic areas. Such ponds that will provide public access shall be designed with special attention to safety of the public during inundation of the pond. Side-slopes

shall be very gradual to avoid the risk of someone slipping into the pond and not being able to walk out.

D. All ponds shall be landscaped so as to provide slope stability and pleasant appearance by utilizing sodding, seeding, and planting of trees and shrubbery. Under no circumstances shall use of easily floatable or erodible materials (such as "bark dust") be permitted in pond interiors.

E. Maintenance of surface ponds in commercial, industrial, and multifamily developments shall be the responsibility of the property owner or owner's association. Maintenance of surface pond landscaping in single family residential areas and PUD developments shall be the responsibility of an owner's association or community club and shall be so stated on the face of the plat unless accepted for maintenance by the City. Failure to maintain a weed abatement program will be cause for the City to perform the work and bill the owner or owners.

F. Where berms are to be constructed as banks of detention ponds, they shall be designed by a certified and experienced independent geotechnical engineer. The geotechnical engineer shall stamp the plans for berm construction and certify that the pond and earth berm are safe for the intended use. Notes to the effect of the above shall be shown on the plans submitted for approval.

G. All City-maintained detention pond control structures not abutting a public right-of-way shall be accessible to the City of Albany for maintenance and operation. Access easements shall be provided, which shall be a minimum fifteen (15) feet wide and shall be improved to accommodate vehicular traffic year-round. Control structures shall be designed to operate automatically as much as possible.

H. A vehicular access must be provided to the bottom of the detention pond when the bottom width of the pond is 20 feet or greater and/or when the height of the pond interior wall exceeds five (5) feet.

I. The access grade into the proposed retention/detention pond shall be no steeper than five (5) feet horizontal to one (1) foot vertical.

J. All detention ponds shall have a minimum of one (1) foot of freeboard above the maximum design water surface.

K. Any embankment for a detention pond in excess of three (3) feet in height must be designed by a qualified geotechnical engineer and approved by the Public Works Department. The minimum top width of this berm shall be 15 feet, unless designed by a qualified, licensed engineer and approved by the Public Works Department. The geotechnical engineer, experienced in soils mechanics, shall inspect and certify the construction of any such berm.

L. Any embankment less than three (3) feet, including one (1) foot of freeboard, in depth forming one or more sides of a retention/detention pond shall have a minimum ten (10) foot wide top of berm with a back slope not to exceed two horizontal to one vertical unless otherwise approved by the City Engineer and designed by and with construction being certified by a licensed engineer experienced in soils mechanics.

M. The bottom of all constructed and graded retention/detention ponds shall be sloped no flatter than 0.01 foot/foot (1 percent) towards the outlets for drainage.

EXCEPTION: This requirement need not apply to natural ponds, which exist and are utilized for stormwater detention.

N. All detention ponds shall have a well-defined low flow channel to contain runoff of lesser storms. Any low flow channel shall be designed so as to enhance the pond landscaping and overall pond appearance.

O. Outlets of all detention ponds shall be provided with suitable debris barriers designed to protect the outlet from blockage or plugging. Properly-sized overflow structures shall be designed into the pond.

P. The maximum design water depth in all detention ponds shall be four (4) feet.

Q. The design volume of the detention pond shall be shown on the plan and the pond volume inspected prior to landscaping (a note to this effect shall be shown on the plans).

E 7.03 CLOSED DETENTION SYSTEM

A. A minimum grade of 0.003 feet per foot shall be used in any pipes or vaults used for closed detention systems.

B. The outfall control structure shall meet the standards set forth in the *Standard Construction Specifications* or as approved by the City Engineer.

C. Access to closed detention systems shall be provided at the upstream and downstream terminus of the system. The maximum distance between access points shall be 400 feet. Improvements shall be made to facilitate maintenance equipment access to the maintenance access points year-round. Maintenance access point shall not be in areas that can be fenced off by private property owners.

E 7.04 DETENTION POND RIGHT-OF-WAY / EASEMENTS

A. All detention ponds in plats may be required to be located in separate tracts dedicated to the City with access easements for maintenance where required.

B. Where a detention pond is located within the boundaries of a commercial lot and not in a separate dedicated tract, the peak design discharge water surface plain shall be shown as an easement on the final plat hard copy. Restrictions shall be added to the final plat hard copy and appear on the face of the plat.

C. A written restriction shall be added to the final plat hard copy to the affect that approval shall be obtained from the Department of Public Works before any structures, fill, or obstructions (including fences) are located within any drainage easement or delineated 100-year flood plain area.

D. A drainage easement shall be required for all public, closed storm drainage detention systems. The City Engineer may require wider easements where pipe diameter or vault widths exceed four feet.

E. All publicly maintained storm drainage systems including collection, conveyance, and flow restrictors not located in right-of-way shall be located in drainage easement or tract dedicated to the City of Albany.

F. Permanent access and drainage easements shall be granted to the City of Albany for any storm drainage detention facility, which is located in a development, and for an access road to that facility where said facility and access road are located on property other than the development but serve the development. Access roads shall provide all-weather access. The owner in fee simple and contract purchaser of the property upon which the access road and facility are to be located shall execute the said easement. The minimum access easement width shall be fifteen (15) feet.

E 8.00 – EROSION AND SEDIMENT CONTROL

E 8.01 EROSION / SEDIMENTATION CONTROL PLAN (ESCP)

A. Proposed measures for controlling runoff during all three phases of construction:

1. Prior to excavation or construction
2. During excavation and construction
3. After construction until the site is stabilized

B. For subdivision plats, this shall include temporary erosion control measures to be utilized by the applicant during installation of plat improvements and by subsequent builders during construction of dwellings and other lot improvements.

C. Prior to the initial clearing and grading of any land development, provisions shall be made for the interception of all potential silt-laden runoff that could result from said clearing and grading. Said interception shall preclude any silt-laden runoff from discharging from the proposed land development to downstream properties. Said interception shall cause all silt-laden runoff to be conveyed by open ditch or other means to whatever temporary facility is necessary to remove silt prior to discharge to downstream properties.

D. Prior to initial clearing and grading of construction site, an evaluation of the following factors must be carried out:

1. Soil Erodibility. Soil erodibility should be identified using Soil Conservation Service erodibility ratings. Erosion control techniques shall be designed accordingly.
2. Slope and Runoff. Cleared areas will require protection from erosion.
3. Cover. Erosion protection will be required for all disturbed areas.

E. Temporary/permanent hydroseeding or acceptable seeding and mulching must be provided whenever perennial cover cannot be established on sites that will be exposed for 30 days or more. Alternate treatments such as erosion control matting and/or bonded fiber matrix may be acceptable also.

F. The ESCP shall include industry standard Best Management Practices (BMPs). BMPs will be required regardless of the time of year of construction. The BMPs required during the wet weather season (October 1 through May 15) shall be consistent with preventing erosion during anticipated significant and prolonged wet weather events.

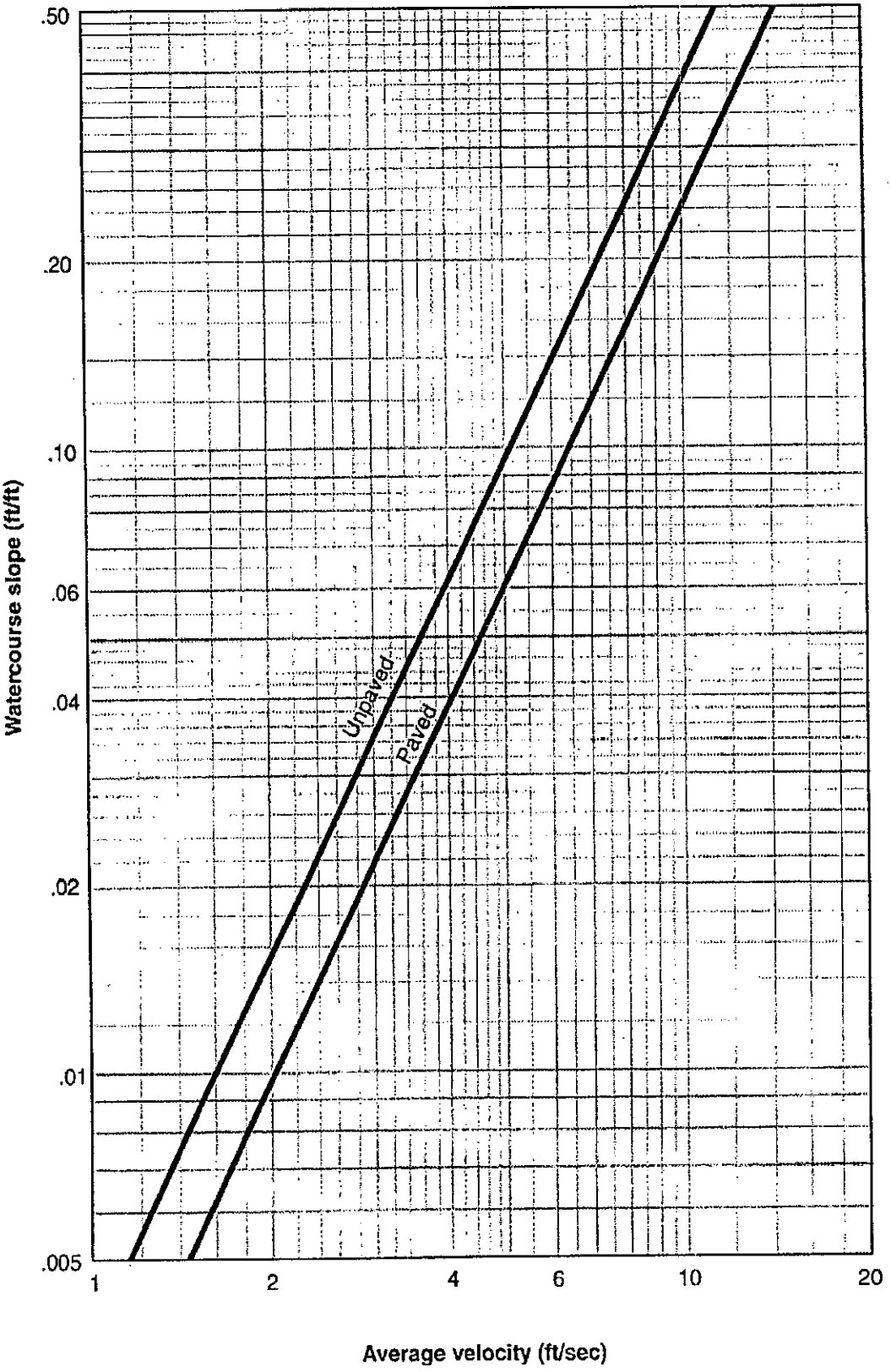
G. The ESCP shall contain the detailed drawing shown in Section E 9.03 Erosion Sediment Control Sign. The ESCP shall also contain a table that will provide a convenient place for the contractor to document the installation, maintenance, and inspections of all pollution control and BMPs associated with the construction site.

E 9.00 – APPENDIX

E 9.01 24-HOUR RAINFALL FOR ALBANY

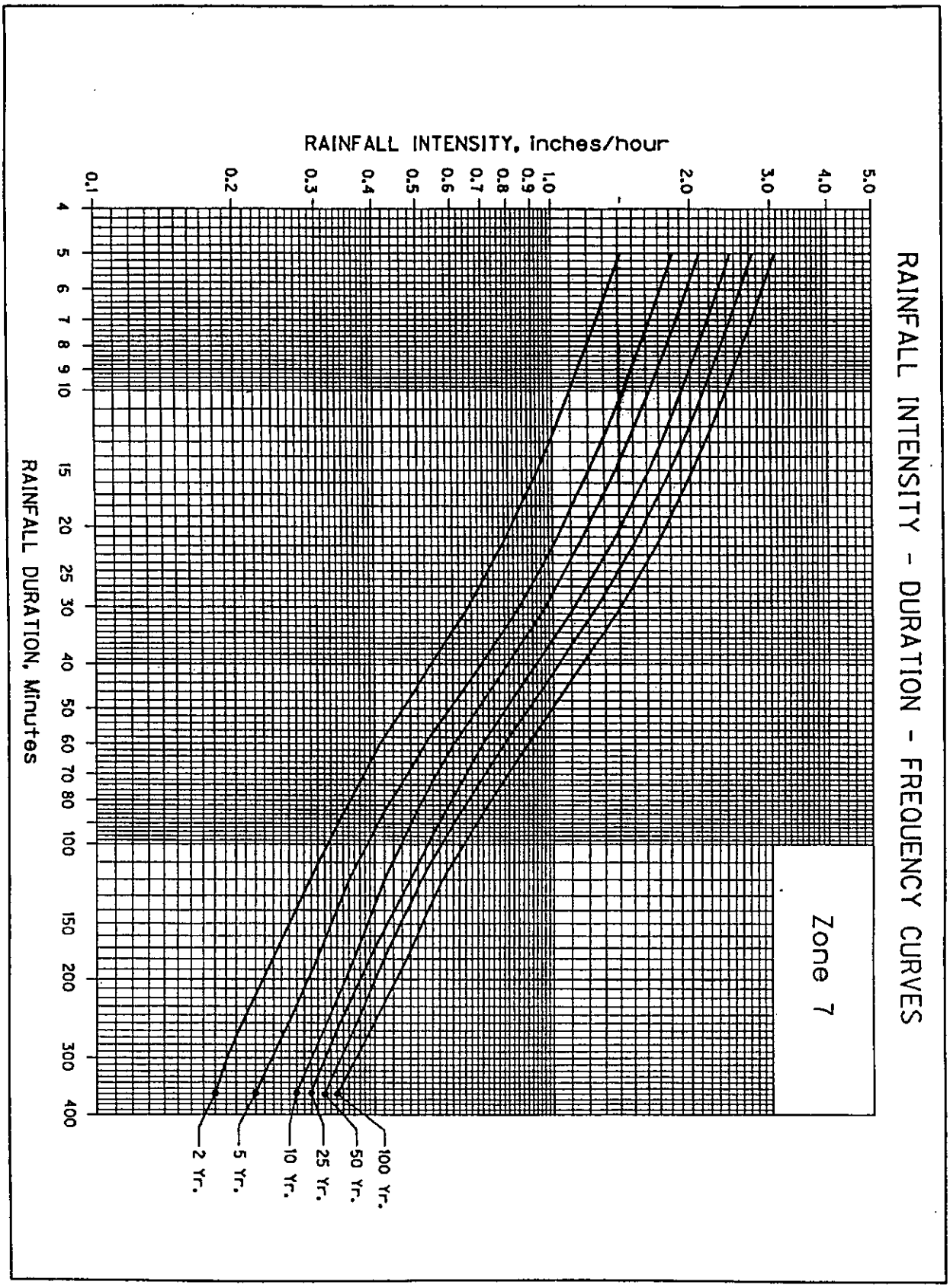
The following list of 24-hour rainfall totals for the given return intervals has been obtained from the Oregon State Climate Service and is based on historic observations at Hyslop field (between Albany and Corvallis).

Return Interval:	Peak 24-hour Rainfall
2 year	2.23 inches
5 year	2.86 inches
10 year	3.32 inches
25 year	3.93 inches
50 year	4.40 inches
100 year	4.86 inches



Average velocities for estimating travel time for shallow concentrated flow.

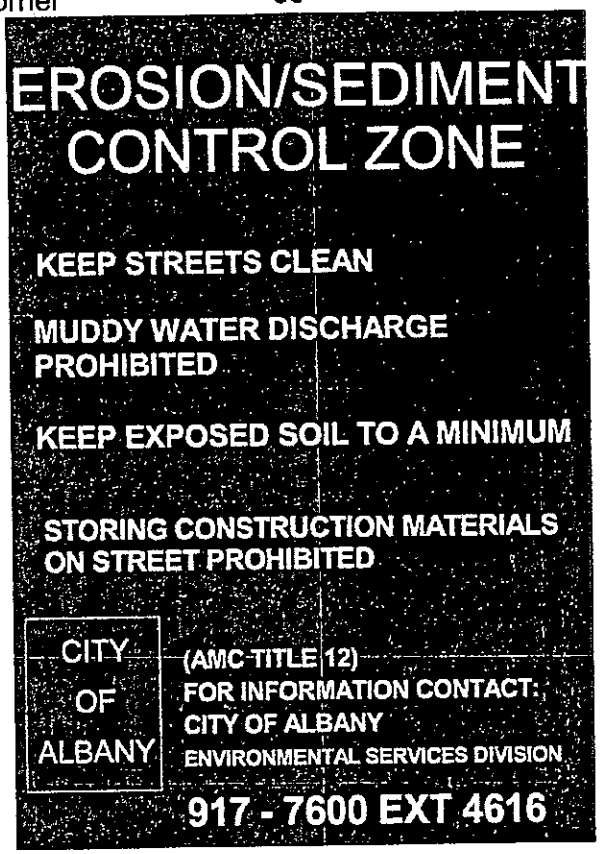
E 9.02-B RAINFALL INTENSITY-DURATION FREQUENCY CURVES



E 9.03 EROSION SEDIMENT CONTROL SIGN

MUTCD Radius Corner
(1 7/8" Radius)

30"



2" letters
1.5 " Spacing

1 1/2" letters

36"

1 1/4" Letters

1 1/4" letters

2" letters

NOTES:

1. The Erosion and Sediment Control Sign shall be 30" wide by 36" high. The sign material shall be annodized aluminum with a thickness of 0.08" .

2. Lettering shall be upper case Engineer's Grade white on green background with 1/2" white border.

3. Distance from ground to the bottom of the sign shall be 7'.

4. The sign shall be attached to a 2 3/8" O.D. galvanized steel post with a wall thickness of 0.95".

5. The pole base shall be a V-Lock Base, 30" 23 VR3 as manufactured by Foresight Products, Inc. or approved equal.

6. Signs shall be located per the City Engineer's directive.

7. Signs shall be attached to poles with 2 single clamps on U brackets for 2" I.D. pipe with hex head cap screws.

CITY OF ALBANY, OREGON	PUBLIC WORKS DEPARTMENT	
EROSION SEDIMENT CONTROL SIGN	NO SCALE	MAY 2004