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ENGINEERING DESIGN STANDARDS

SECTION 1

GENERAL

1.01 PURPOSE:

The purpose of these Public Works Standard Specifications and Details is to provide certain minimum standards for the design, construction, repair and alterations of streets, roadways, alleys, storm drain system, sewer system, water supply system, landscaping and irrigation, including all other public improvements and all appurtenances thereunto, within the City of Healdsburg, where any portion of such improvement is to be transferred over to the City of Healdsburg for operation and/or maintenance. Any items that are not included in the Public Works Standard Specifications and Details shall be designed as required by the City Engineer.

1.02 DEFINITIONS:

The intent and meaning of the following terms as used in the Healdsburg Public Works Standard Specifications and Details shall be as defined below:

- A. Caltrans Highway Design Manual: Shall mean the latest edition of the California Department of Transportation's "Highway Design Manual".
- B. Caltrans Manual on Uniform Traffic Control Devices: Shall mean the latest edition of the California Department of Transportation's "Manual on Uniform Traffic Control Devices".
- C. Caltrans Standard Plans: Shall mean the latest edition of the California Department of Transportation's "Standard Plans".
- D. Caltrans Standard Specifications: Shall mean the latest edition of the California Department of Transportation's "Standard Specifications".
- E. City: Shall mean the City of Healdsburg, a municipal corporation.
- F. City Code: Shall mean the latest edition of the Code of the City of Healdsburg, including all adopted ordinances and resolutions that superseded or otherwise update the various provisions of the City Code.
- G. City Engineer: Shall mean the City Engineer of the City of Healdsburg.
- H. Consulting Engineer: Any person or persons, firm, partnership, or corporation legally authorized to practice civil engineering in the State of California.
- I. Consulting Land Surveyor: Any person or persons, firm, partnership, or corporation legally authorized to practice land surveying in the State of California.
- J. Developer: Shall mean any person, firm, corporation, partnership or association engaged in the development of property in part or in whole by the placing of any improvements thereon, whether the property was previously developed in whole, in part, or at all.
- K. Easement: Shall mean an easement dedicated to the City or Public Utility that shall be continuing and irrevocable unless formally abandoned.
- L. Final Map: Shall mean a subdivision with five (5) or more parcels.
- M. Final Parcel Map or Parcel Map: Shall mean a subdivision with four (4) or fewer parcels.

- N. General Plan: Shall mean the General Plan, including all revisions, as adopted by the City Council of the City of Healdsburg.
- O. Geotechnical (Soils) Report: Shall mean a report as prepared by any person or persons, firm, partnership, or corporation legally licensed to prepare "Geotechnical Reports" in the State of California and shall include all amendments, addendums, etc. Reports shall be submitted in 8-1/2 x 11-inch bound folders. The analysis must at a minimum include a map of the subject area showing existing streets, contours and location and type/characteristics of soils samples obtained. Where possible, the proposed street pattern shall be shown. The results of all field data and laboratory tests shall be included. Design for proposed street sections shall be based on the minimum criteria contained herein. Street structural section design shall include recommendations for: natural subgrade, sub-base, base and pavement compaction and thickness to achieve design strength. In no instance shall structural sections be less than those outlined in the Street Design Section of these Public Works Standards.
- P. Improvements: Refers to street work, sidewalk, curb, gutter, driveways, water supply systems, sanitary sewer systems, storm drain systems, other public utilities, landscaping, and fences to be installed by the Developer on land to be used for public right-of-way.
- MS4 Permit: Refers to the current applicable municipal separate storm sewer system permit in effect for the City of Healdsburg.
- Q. NAD83: Shall mean North American Datum of 1983 California State Planes, Zone II, US Foot (horizontal).
- R. NAVD88: Shall mean North American Vertical Datum of 1988.
- S. Project applicant: The person appointed by the Developer to act as the contact between the Developer and his agents (e.g., Consulting Engineer, Consulting Surveyor, etc.) and City staff regarding the processing of the construction plans and maps (parcel map or final map).
- T. Public Work Standards: Shall mean the latest edition of the City of Healdsburg Public Works Department Standard Specifications and Details.
- U. Sonoma Water Flood Management Design Manual: Shall mean the current version of the Sonoma Water Flood Management Design Manual.
- V. Specific Plan: Shall mean any and all specific plan documents which have been adopted for a given design area by the City Council of the City of Healdsburg.
- W. Subdivision Map Act: Shall mean the latest edition of the Subdivision Map Act as adopted in the Government Code of the State of California.
- X. Subdivision Ordinance: Shall mean Chapter 17A of the City Code as adopted by the City Council of the City of Healdsburg, and any subsequent amending legislation thereof.
- Y. Tentative Map: Shall mean the Tentative Map and attached Conditions of Approval for the specific project as approved by the City Council of the City of Healdsburg.
- Z. Zoning Ordinance: Shall mean Chapter 18 of the City Code as adopted by the City Council of the City of Healdsburg, and any subsequent amending legislation thereof.

1.03 CONFLICT RESOLUTION:

In the event that these Public Works Standards conflict with the General Plan, Zoning Ordinance, Subdivision Ordinance, Specific Plan or Approved Tentative Map, the conflicting provisions of the General Plan, Zoning Ordinance, Subdivision Ordinance, Specific Plan or approved Tentative Map

shall prevail over these Public Works Standards. In the event that these Public Works Standards conflict with any other City ordinance, these Public Works Standards shall prevail unless otherwise approved by the City Engineer.

In the case of conflict occurring between the various sections of these Public Works Standards, the following order of precedence shall apply:

- A. The Specific Provisions shall prevail over all other sections.
- B. The Specific Provisions and Engineering Design Standards shall prevail over the Public Works Standard Details.

SECTION 2

CONSTRUCTION PLANS AND MAPS

2.01 GENERAL:

Complete plans and specifications for all proposed improvements including any necessary dedications and easements shall be submitted to the Public Works Department for approval and must be approved in writing by the City Engineer prior to the beginning of construction of any such improvements. This shall apply where it is the intent that any portion of such improvement will be transferred to the City. Such plans shall be prepared by a Consulting Engineer.

2.02 CONSTRUCTION PLANS:

A. **Preparation of Construction Plans:** Construction plans shall be prepared in accordance with the following requirements. In cases of extreme grades, extremely curved streets, or other unusual circumstance, the City Engineer may approve reasonable deviations from these requirements.

1. **All Sheets:** Each drawing shall include the following minimum information, as appropriate:

a. **Dimensions:** Construction plans shall be 24 inches by 36 inches with a 1.5-inch clear margin on the left edge and 1-inch margins on all other edges.

b. **Scale (written and graphic) and north arrow:**

- Horizontal scale: 1 inch = 20 feet
- Vertical scale: 1 inch = 4 feet

c. **Title Block:** All of the following information shall be provided in the Title Block located along lower edge or right edge of sheet:

- Consulting Engineer's name, signature and seal with the registration number and expiration date.
- Date plans prepared.
- Title of project.
- Title of sheet (i.e., UTILITY PLAN for Healdsburg Avenue).
- Sheet number and total number of sheets.
- Revision Block.

d. **Improvements:** All existing, proposed and future (if known) improvements shall be provided within and 100 feet past the project boundary.

e. **Stationing:** The survey stationing shall normally read from left to right with the north arrow pointing either to the top or left edge of the sheet. All stationing shall be a continuation of existing improvements where possible.

f. **Elevations:** All vertical elevation information shall be on the NAVD88 Datum.

2. **Title Sheet:** All of the following shall be incorporated into the Title Sheet, unless otherwise approved by the City Engineer. Additional sheets may be added as needed.

a. **Name of Subdivision or Project.**

- b. Vicinity Map with north arrow. The vicinity map shall identify the nearest Highway 101 on-ramp and off-ramp with a logical route to the project.
 - c. Index of sheets.
 - d. Approval of Signature Blocks.
 - e. Legend defining all symbols used in the plans.
 - f. Construction notes not covered by the plan specific notes (i.e., Utility Plan Notes, Grading Plan Notes, etc.).
 - g. Abbreviations list, all abbreviations shall be per industry standards.
 - h. Typical Street Section for each varying street width. Construction plans shall indicate the design "R" value and traffic index (TI) for the roadway.
 - i. Temporary and permanent benchmarks, including the physical description, location and shall use NAVD88 datum.
 - j. Name, address and telephone number of Developer, Consulting Engineer and Geotechnical Engineer.
 - k. Project Layout: Plan view of the entire project, drawn to a scale of no smaller than 1 inch = 100 feet that shows the following elements:
 - Street right-of-way.
 - Water and sewer mains.
 - Storm drainage system.
 - Lot numbers.
 - Sheet index.
 - Flow arrows; and
 - Other miscellaneous improvements to be installed.
3. Street and Utility Plan: All public and private streets, utilities and the related improvements shall be shown as follows:
- a. Plan view of each street to be improved shall be shown on a separate sheet (extremely short streets may be shown on a single page). Construction plans shall include centerline stationing with all utilities including manholes, curb inlets, sewer laterals, water services, fire services, air release valves (ARV), blowoffs, water sample stations, driveways, etc.
 - b. Profile view of each street shall be clearly shown immediately above its plan view. Both the inside top and bottom of all pipes shall be shown. Top of curb elevations shall be shown at grade break points, manhole and curb inlet inverts, and crossings of water, sewer and/or storm drainpipes, and at each lot line or every 100 feet, whichever is less.
 - c. Cross Section views of new street improvements where, in the opinion of the City Engineer, the cross sections are necessary to graphically show that the new street sections conform to existing street sections. Cross sections shall clearly show existing cross slopes, proposed cross slopes, curb and gutter.
 - d. Notes specific to street and utility plan improvements.
4. Site Development (Grading) Plan: All public and private drainage, grading, and the related improvements specific to Site Development Plans Improvements.

5. Signing and Striping Plan: All traffic control devices, including all signing and striping with quantities tabularized on the plan specific to the Signing and Striping Plan Improvements. Where applicable, designations for type of striping shall conform to the Caltrans Standard Plans and Caltrans Manual on Uniform Traffic Control Devices.
 6. Storm Water Pollution Prevention Plan (SWPPP): All measures proposed to prevent and control erosion shall be provided for the entire site. In addition, the erosion prevention plan shall include construction notes specific to the Erosion Prevention Plan work.
 - A. Projects that include one acre or more of land disturbing area must obtain coverage with the State of California Water Resources Control Board through the “Stormwater Multiple Application and Report Tracking System” (SMARTS) and comply with all City of Healdsburg stormwater ordinance regulations and MS4 permit requirements.
 - B. Projects that include less than one acre of land disturbing area must comply with all City of Healdsburg stormwater ordinance regulations and MS4 permit requirements.
 - C. Projects that create or replace impervious surface areas as listed in the current version of the MS4 permit must submit storm water low impact development reports, plans and calculations and must comply with all applicable low impact development requirements.
 7. Landscaping and Irrigation Plan: The landscaping and irrigation plan shall identify the proposed location and type of all street trees, other required vegetation and irrigation systems as required. In addition, the landscaping and irrigation plan shall include construction notes specific to Landscaping and Irrigation Plan Improvements. All landscaping and irrigation plans shall include calculations demonstrating the project is in compliance with the city’s water efficiency landscape ordinance (WELO).
- B. Submittal of Construction Plans: Construction plans shall be submitted by the Project Lead Person to the City Engineer for review along with the proposed subdivision map (final map or parcel map) for the proposed subdivision. Complete submittals shall include the following:
1. A completed and signed “Submittal Checklist for Completeness Subdivision Improvement Plans and Final Map.”
 2. Ten (6) copies on 24” X 36” bond paper of the complete construction plan set and a .PDF file of the construction plans.
 3. Engineer’s estimate for all proposed improvements including joint trench work with subsequent payment of City engineering review fees. Separate estimates shall be provided for the public and private improvements.
 4. Payment of Public Works fee/developer deposit for plan checking construction plans.
 5. Storm drain system design calculations and supporting information. All storm drain system design calculations shall be in compliance with these engineering design standards as well as the current edition of the Sonoma Water “Flood Management Design Manual.”
 6. Two (2) copies of the sewer system design calculations and supporting information.
 7. Two (2) copies of the water system domestic and fire supply flow and pressure calculations.
 8. Two (2) copies of the geotechnical report, including all amendments, addendums, etc.

9. Two (2) copies of the cathodic protection design for the public water system, only if required by the City Engineer.
10. Two (2) copies of the arborist report and supporting information.
11. One (1) copy of the Storm Water Pollution Prevention Plan (SWPPP).
12. One (1) copy of the Notice of Intent (NOI) as required by the State Water Resources Control Board.
13. One copy of the storm water low impact development report, plans, and calculations.
14. One (1) copy of the 401 Certification as required by the State Water Resources Control Board, and other environmental permitting documents as determined by the City of Healdsburg.
15. Other material as required by the Conditions of Approval for the project. All project conditions of approval and mitigation measures shall be included on a sheet in the improvement plans.
16. The city may require submittal of all application documents in .PDF and/or other electronic formats.
17. In addition to the above, repeat submittals shall satisfy all City comments from the previous submittal.

Incomplete submittals will be returned to the project applicant unchecked. The City's target schedule is to return reviewed subdivision construction plan submittals within 6 weeks for the first submittal, within 4 weeks for the second submittal and 2 weeks for subsequent submittals. Should alterations or revisions to the construction plans or supporting reports/documents be required, the City will return to the project applicant 1 copy of the construction plan set and supporting reports/documents with the required corrections indicated thereon.

- C. Approval of Construction Plans: At such time as all necessary revisions have been made and the construction plans are approved for signature, the project applicant shall be notified of the submittal date to the City Council. Construction plans shall not be considered approved, and no construction shall begin until all of the following items have been satisfied:
1. The Healdsburg City Council has approved the final map or City Engineer has approved the final parcel map for this project.
 2. An electronic file of the complete construction plan set has been provided to the City Engineer in AutoCAD .DWG format and .PDF format, and another City approved compatible format as required.
 3. The City Engineer has signed the construction plans.
 4. A complete photo or digitally produced Mylar set of the construction plans has been submitted for City records. This Mylar plan set shall include all final revisions and be signed by the project geotechnical engineer and the Consulting Engineer. All Mylar sheets shall be archival quality prints capable of reproducing clear and legible copies and shall be polyester 4 mil film with emulsion surface and matte surface up.
 5. A minimum of 6 copies of the approved construction plan set have been submitted to the city.

6. A pre-construction meeting between the City of Healdsburg occurs with the project applicant, developer and contractor and the City of Healdsburg issues a written notice to proceed with construction.

No alterations, additions or changes shall be made to the approved construction plans unless such changes, corrections, or additions have been approved by the City Engineer in accordance with the revision process provided below. Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any California State Law, City Code or generally accepted good engineering practice, in keeping with the standards of the profession; even though such errors, omissions or conflicts may have been overlooked by the Public Works Department. Any such items shall be immediately brought to the attention of the City Engineer.

- D. Revision of Approved Construction Plans: Proposed revisions to the approved construction plans shall be submitted to the City Engineer for review similar to the submittal process provided above. A complete submittal shall include 6 copies of the construction plan sheets to be revised and electronic files in .PDF format, along with all necessary supporting information. All proposed revisions shall be clouded and sequentially numbered. Incomplete submittals will be returned without being reviewed. The revised construction plan sheets shall not be considered approved, and construction of the revised improvements shall not begin until the following items have been satisfied:

1. The project applicant shall submit the revised plan sheets for approval by the City Engineer.
2. Once approved, the project applicant shall provide 2 copies of the revised construction plan sheets in paper (bond) format to the City Engineer as well as an electronic file of the revised construction plan sheets in .PDF format.
3. Once approved the project applicant shall provide additional copies of the revised construction plan sheets to all other parties, as necessary.

All revisions to the construction plans shall be reflected in the record drawings as provided below.

- E. Final Acceptance of the Subdivision: Prior to acceptance of the subdivision by the City Council, the following items shall be satisfied:

1. The Developer shall complete the construction of all proposed improvements in accordance with the approved construction plans, these Public Works Standards, the project conditions of approval and mitigation measures, and all other requirements.
2. The project applicant shall provide the City Engineer a complete set of Mylar and .PDF construction plan record drawings. Mylar sheets shall be of the same quality as required in the approval process provided above. Record drawings shall include the following:
 - a. All approved revisions of the construction plans.
 - b. Field located improvements. The Consulting Land Surveyor shall survey these improvements in place and show the actual constructed horizontal and vertical alignment on the record drawings.
 - c. Improvements are required at the discretion of the project geotechnical engineer (i.e., sub-drains, keyways, etc.).

- d. The Consulting Land Surveyor shall provide a signed letter stating the location and elevation of the benchmark established by this subdivision in accordance with section 3.03 E.2. of these Public Works Standards. Other information provided by the city inspector or other City representative.

The Consulting Engineer and project geotechnical engineer shall sign the record drawings evidencing that the improvements were completed in accordance with the approved construction plans for their specific area of review.

3. The project geotechnical engineer shall provide the City Engineer with the final test results of all soils work.
4. The Developer shall provide the City with a maintenance bond as required under the provisions of the subdivision improvement agreement. The maintenance bond shall be in a form approved by the City Attorney.
5. The Consulting Land Surveyor shall provide a letter stating all monuments have been set and that he has been paid for his services in accordance with the Subdivision Map Act.
6. The Consulting Engineer or other qualified special inspector shall provide a letter evidencing that they have made regular inspections of all private improvements and that these private improvements have been constructed in substantial conformance with the construction plans.

2.03 MAPS:

A. Preparation of Maps: Maps for minor and major subdivisions shall be prepared in accordance with the following requirements:

1. All Sheets: Each drawing shall include the following minimum information, as appropriate:
 - a. Dimensions: All map sheets shall be 18 inches by 26 inches with a 1-inch clear margin on all edges.
 - b. Scale (written and graphic) and North Arrow: All sheets shall be drawn to a scale no smaller than 1 inch = 50 feet.
 - c. Title Block: All of the following information shall be provided in the Title Block located along lower edge or right edge of sheet:
 - Consulting Engineer's name, signature and seal with the registration number and expiration date.
 - Date plans prepared.
 - Title of map.
 - Title of sheet (i.e., Supplemental Information Sheet).
 - Sheet number and total number of sheets.

2. Certificate Sheet: The certificate sheet shall be organized (from right to left) with all applicable owner related certificates, followed by applicable City certificates and all applicable County certificates as provided in the following table:

| Owner Certificates | City Certificates | County Certificates |
|---|---|------------------------------------|
| Owner's Certificate | City Engineer's Certificate | County Tax Collector's Certificate |
| Owner's Acknowledgement | City Contract Surveyor | County Clerk's Certificate |
| Trustee's Certificate (As required) | Finance Director's Reimbursement District | County Recorder's Certificate |
| Trustee's Acknowledgement (As required) | City Planning Commission's Certificate | |
| Owners of Interest Certificate (As required) | City Clerk's Certificate (for final maps with dedications) | |
| Surveyor's Certificate | CITY MANAGER'S CERTIFICATE (FOR PARCEL MAPS WITH DEDICATIONS) | |

3. Map Sheet(s): Each map sheet shall be completed in conformance with the Subdivision Map Act.
4. Supplemental Information Sheet: Each minor and major subdivision map set shall include a supplemental information sheet as the last sheet in the map set, unless otherwise approved by the City Engineer. All local agency required information specific and/or unique to the project shall be provided on the Supplemental Information Sheet. In accordance with the Subdivision Map Act, the supplemental information sheet shall contain a statement that "the additional information is for informational purposes, describing conditions as of the date of filing, and is not intended to affect record title interest".
- C. Submittal of Maps: Parcel maps and final maps shall be submitted by the Project Lead Person to the City Engineer for review along with the construction plans for the proposed subdivision. Complete submittals shall include the following:
- D. Complete submittals shall include the following:
1. A completed and signed "Submittal Checklist for Completeness Subdivision Improvement Plans and Final Map." Six (6) copies of the complete map set. For digital submittals, submit one electronic file of each required item in .PDF format.
 2. Payment of the Public Works fee/deposit for plan checking the map.
 3. Two (2) sets of a current title report (less than 6 months old) for the entire legal boundary of property being divided and other supporting documents.
 4. Two (2) sets of all record documents referenced (recorded deeds, maps, etc.).

5. Two (2) sets of closure calculations (based upon 1 common set of coordinates).
6. Two (2) sets of current assessor's parcel maps.
7. Draft joint maintenance agreements/declarations for all private facilities intended for the common use of more than 1 property or as otherwise necessary.
8. Other material as required by the Conditions of Approval for the project.
9. In addition to the above, repeat submittals shall satisfy all City comments from the previous submittal.

Incomplete submittals will be returned to the project applicant unchecked. The City's target schedule is to return reviewed subdivision map submittals within 6 weeks for the first submittal, within 4 weeks for the second submittal and 2 weeks for subsequent submittals. Should alterations or revisions to the map set be required, the City will return to the project applicant 1 copy of the map set and corresponding documents with the required corrections indicated thereon.

- B. Approval of Maps: Final maps will only be scheduled for approval by the Healdsburg City Council and final parcel maps will be approved by the City Engineer only after all of the following items have been satisfied:
1. The Consulting Land Surveyor has made all necessary revisions to the map and supporting documents.
 2. The Developer has executed the subdivision improvement agreement.
 3. The Developer has paid all of the following City fees, as required:
 - a. Annexation fees or other required fees.
 - b. Inspection deposit for the construction of public improvements.
 - c. City Electric Department construction deposit.
 - d. Development (impact) fees that were previously deferred.
 - e. Outstanding reimbursements and/or assessments.
 - f. Assessment district reapportionment fees.
 4. The Developer has provided to the City a faithful performance bond, and labor and materials bond as required under the provisions of the subdivision improvement agreement. The bonds shall be in a form approved by the City Attorney.
 5. The Developer has provided all City required insurance documents. The insurance documents shall be reviewed by the Central Services Management Office.
 6. The Developer has provided any required dedications outside the boundary of the subdivision via separate documents (grant deed, legal descriptions, and plats).
 7. Other supporting documents required by the Conditions of Approval and mitigation measures for the project.
 8. The project applicant shall submit the following map sets with all owner's certificates completed (wet signed, stamped, and notarized) for City approval.
 - a. County Recorder Copy – one (1) complete map (mylar) set satisfying the requirements of the County Recorder. All Mylar sheets shall be archival quality prints capable of reproducing clear and legible copies and shall be polyester 4 mil film with emulsion surface and matte surface up.

- b. Consulting Land Surveyor and Developer Copies - other sets as required.
9. After the map has been filed with the Sonoma County Recorder's Office, the following shall be provided to the City of Healdsburg:
- a. The Consulting Land Surveyor shall provide to the City Engineer an electronic file of the map sheet(s) and the supplemental information sheet in .PDF and current AutoCAD .DWG or City approved compatible format.
 - b. One (1) copy of the recorded mylar map set with book and page numbers.

SECTION 3

STREET DESIGN

3.01 GENERAL:

For purposes of geometric and structural design, streets shall be classified according to the following. The following Standards for street cross section and geometrics may be superseded by an approved Specific Plan, approved Tentative Map, or other discretionary approval granted by the Planning Commission or City Council. Any other deviation from the following standard shall require the written approval of the City Engineer.

| Class | *Face-of-Curb Radius @ Intersection (Feet) | **Traffic Index | Standard Street Section (feet) | ***Minimum Centerline Radius for Horizontal Curve (Feet) |
|--------------|---|------------------------|---------------------------------------|---|
| Arterial | 35 | 9 | 0.45 AC 1.9 AB | 800 |
| Collector | 30 | 8 | 0.4 AC 1.7 AB | 600 |
| Residential | 20 | 7 | 0.35 AC 1.5 AB | 250 |
| Industrial | 35 | 9 | 0.45 AC 1.9 AB | 250 |
| Hillside | 20 | 7 | 0.35 AC 1.5 AB | 100 |

- * At intersections of different street classes, the larger face-of-curb radius shall prevail unless otherwise approved by the City Engineer.
- ** The traffic index may be increased at the discretion of the City Engineer if traffic warrants a higher value.
- *** Actual design of horizontal curves shall be based on the design speed of the street as determined by the City Engineer. Deviations may be approved by the City Engineer especially in steep terrain, however all streets shall be appropriately signed and posted for the actual design speed based on good engineering practice.

Regardless of traffic index and/or actual "R" value tests of subgrade, no street structural section (public or private) shall be less than what is noted in the above table. No street structural section in alleys, private driveways with public easements, or other public locations as determined by the City Engineer shall have a street structural section less than 3-inches of AC over 15-inches of AB. Aggregate base section may be comprised of an equivalent section of aggregate base and aggregate sub-base. Full depth asphalt concrete sections may be considered for approval by the City Engineer on a case-by-case basis.

3.02 GEOMETRICS:

- A. All street centerlines shall intersect within 5 degrees of a right angle.
- B. There shall be a minimum of 200 feet (centerline to centerline) between intersections.
- C. Cul-de-sac radius shall be 45 feet with on-street parking and 40 feet without on-street parking (as measured from the face of curb) with an additional 7 feet of right-of-way behind the face of curb.
- D. Curb line radii shall be tabulated in a box shown on the construction plans.
- E. Gutter flow line grades shall have a minimum slope of 0.004 feet per foot and maximum as determined by the City Engineer.
- F. Cross slope for new streets shall be 2 percent as shown on the standard details unless a deviation has been previously approved by the City Engineer.
- G. The minimum vertical curve length allowable at the intersection of two grades shall be 100 feet. The actual design of the vertical curve shall be based on the design speed of the street and stopping sight distance as determined by the City Engineer. However, vertical curves may be omitted where the algebraic difference in grades does not exceed 1.0 percent and the design speed is 45 miles per hour or less.
- H. The minimum stopping sight distance over any segment of the roadway on all streets shall conform to the Caltrans Highway Design Manual unless specific approval is received from the City Engineer.
- I. Property lines at intersection corners shall run diagonally from curb return to curb return. The diagonal line joining the curb returns shall be a minimum distance of 11.5 feet from the apex of the curb radius at the corner.

3.03 APPURTENANCES:

A. Driveway Approaches:

- 1. No driveway approach shall be permitted within 2.5 feet of a property line (measured at the face of curb from the top of the driveway transition). Special consideration may be given to major and minor street driveway configurations of an unusual nature such as a shared driveway.
- 2. The width of driveway approaches, as measured at the face of curb and not including the transitions at each side of the driveway, shall be as follows:
 - a. Commercial driveway approach widths shall be a minimum of 20 feet wide to a maximum of 40 feet wide.
 - b. Residential driveway approach widths shall be 20 feet wide standard. Driveway approach widths may be reduced to a minimum of 12 feet for a single car garage or increased to a maximum of 28 feet for a 3-car garage. Deviations on driveway approach widths may be considered for approval by the City Engineer on a case-by-case basis only if extraordinary circumstances exist.
- 3. The minimum distance between driveway approaches serving the same parcel shall not be less than 20 feet as measured at the face of curb from the top of the transition.
- 4. Not more than 40 percent of the frontage of any parcel shall be devoted to driveways approaches. Lots fronting on a cul-de-sac and commercial lots with 1 driveway access are exempt from this requirement.

5. All unused driveway approaches shall be removed and replaced with curb, gutter, and sidewalk.
- B. Parking: For all single-family properties, 1 on-street parking space, 24 feet in length or 20 feet in length with a 4-foot buffer (20 feet on end spaces) per the CA MUTCD measured along the curb, shall be provided within reasonable proximity of each single-family lot. There is a required no parking area within either 15 or 20 feet on the approach side of an intersection per the California Vehicle Code.
- C. Valley Gutters: No valley gutters shall be allowed within the public right-of-way or public easement without written approval from the City Engineer.
- D. Sidewalks, Curbs and Gutters:
 1. Sidewalks shall be a minimum of 5 feet wide. Where the sidewalk abuts the curb, the curb is included in the 5-foot minimum width. Wider and/or separated sidewalks may be required. In these cases, increased sections and reinforcement shall be determined by the City Engineer.
 2. Sidewalk, curb, and gutter shall be of the design as shown on the Public Works Standard Details or as required by the City Engineer.
 3. Curb ramps shall be installed at all street crossings and curb returns and shall comply with all applicable State and Federal laws and regulations.
- E. Survey Monuments and Benchmarks: Survey monuments and benchmarks shall be tied to the NAD83 and NAVD88 datums. Survey monuments and benchmarks shall be installed at the centerline of the street and in accordance with the Public Works Standard Details. The brass disc shall be stamped with and clearly show the registration number of the Consulting Land Surveyor who prepared the final or parcel map. Monuments or benchmarks shall be offset 5 feet along the street centerline where obstructions, such as manholes or valve boxes, prevent standard installation as described below:
 1. Monuments shall be required at all street intersections, at the beginning and end of all centerline curves and as required by the City Engineer. Horizontal accuracy standards between monuments shall have a maximum allowable error of 0.03 feet for distances up to 500 feet and 1:20,000 linear error of precision for distances greater than 500 feet.
 2. A minimum of 1 benchmark shall be required to be established in all minor and major subdivisions as follows:
 - a. Benchmarks information shall be added to a street centerline monument at a location specified by the City Engineer and may be required outside of the boundary of the subdivision.
 - b. The elevation of the benchmarks shall be established in accordance with the following:
 - National Geodetic Survey's 2nd Order, Class 2 survey (maximum allowable error in feet = $0.05 \times M^{1/2}$ where M is the length of the circuit expressed in miles).
 - Referenced to a minimum of 2 existing City Benchmarks.
 - Tied to the NAVD88 datum.
 - Recorded to the nearest 0.01 feet.
 - c. The Consulting Land Surveyor shall prepare and submit to the City Engineer a survey report identifying the type of equipment and methodology used to

complete the survey, as well as the location and elevation of the existing City benchmarks referenced. The survey report shall be signed and stamped by the Consulting Land Surveyor.

F. Signing and Barricades:

1. Street names shall require approval by the City Engineer. The City Engineer shall consult and obtain concurrence from other City Departments including the Fire and Police Departments prior to approving new street names. Street signs and poles shall be installed in accordance with the Public Works Standard Details.
2. Street name signs, stop signs, and all striping shall be paid for and installed by the Developer.
3. All regulatory and warning signs shown on the construction plans or required by the City Engineer to control traffic shall be furnished and installed by the Developer at their sole expense.
4. Permanent barricades shall be installed where improvements cover only a portion of the ultimate development or as directed by the City Engineer. The barricade shall be constructed, erected, painted, and signed in accordance with the Public Works Standard Details.

- G. Easements: Unless otherwise provided for herein, public service, drainage, landscaping, and fence easements shall be a minimum of ten feet in width or as required to meet specific City/Utility Company needs. These easements shall be dedicated along the boundary of all public right-of-way unless specifically exempted by the City Engineer.

SECTION 4

STORM DRAIN COLLECTION SYSTEM AND EROSION CONTROL PLAN

4.01 GENERAL:

These standards are intended to ensure that all local, state and federal watercourse and surface water laws are complied with and that runoff from storms up to the 100-year return frequency are conveyed in a manner which protects the public safety and prevents flood related damage to public and private improvements.

Where a development project increases (i.e., post-project flow exceeds pre-project flow) or negatively affects the historical storm water flow (i.e., re-directs or concentrates storm water flow) of the area, the Developer will be required to mitigate said impacts in accordance with these Public Works Standards. At a minimum, all additional drainage created by the development project will be required to be properly routed to an approved public drainage facility.

Where, in the sole opinion of the City Engineer, the storm water increase is measurable and the existing downstream storm drainage system may not be sufficiently sized to carry the post-project design flow, the Consulting Engineer is required to prepare a storm water routing analysis, acceptable to the City Engineer. In the event that storm waters cannot be contained within acceptable public rights-of-way, the Developer will be required to replace the downstream constrictions. If, in the sole opinion of the City Engineer, no reasonable improvement of the downstream system can be identified and the project site is suitable, the Developer may attenuate the increased discharge through the construction of detention facilities. Where detention facilities are allowed, the facility design shall include access for normal maintenance, additional capacity for debris build-up during maintenance cycles, a maintenance plan and a funding mechanism for the long-term maintenance and replacement of the facility.

Containment of floodwaters within the public storm drain system is required at all times. Floodwaters shall be confined within the street curbs or other approved right-of-way by grading, levees or alternative means acceptable to the City Engineer.

The diversion of natural drainage shall be allowed only within the limits of the proposed improvement. All natural drainage must leave the improved area at its original horizontal and vertical alignment unless a special agreement, approved by the City Engineer, has been executed with the adjoining property owners.

Where required by the City Engineer, the Consulting Engineer shall prepare and submit the following information for review:

4.02 COLLECTION SYSTEM DESIGN: All collection system components are required to be designed for a 50-year design life. Storm drainage design calculations shall be completed in accordance with the latest edition of the Sonoma Water Flood Management Design Manual, except as modified herein.

- A. **Design Storm:** The following design storm events shall be used in drainage calculations for the design of all waterway classifications (e.g., major, secondary, and minor waterways) for both private and public drainage improvements. These shall be considered minimum requirements only and shall be increased by the Consulting Engineer when circumstances warrant:

1. 25 Year Event – Shall be contained and conveyed within all underground drainage pipes. All storm water conveyance structures shall be designed to function without surcharging.

2. 100 Year Event – Shall be contained and conveyed within the street curbs, open channels and creeks. In those areas where the failure of a drainage inlet would allow storm water to break out of the approved drainage facility (e.g., the street, open channel, etc.), a secondary routing analysis shall be performed. Based on this analysis, additional improvements such as overland relief channels, redundant inlets, etc. shall be required to adequately contain and convey the drainage.

B. Hydrology Maps:

1. Watershed: A topographic map of the overall watershed showing the following criteria:
 - a. Relationship between the proposed development (on-site areas) and the remainder of the watershed (off-site areas).
 - b. Acreage of each sub-area within the on-site and off-site areas.
 - c. Runoff coefficients of each sub-area within the on-site and off-site areas.
2. Project Site: A map of the proposed development showing the following:
 - a. All applicable existing and proposed storm drainage improvements.
 - b. Time of concentration at each hydraulic structure.
 - c. The magnitude and direction (indicated by arrows) of flow in each pipe and flow to each structure contributed by its tributary area. All flow rates shall be expressed in cubic feet per second (cfs).
 - d. Elevation of all pipe inverts and the top of structure elevation at each structure.
 - e. Slopes of all storm water pipes and open channels.

C. Storm Water Runoff Calculations: The Rational Method for calculating storm runoff discharge shall be used in accordance with the Sonoma Water Flood Management Design Manual.:

D. Profile of Hydraulic Grade Line: The hydraulic grade line shall be calculated and plotted for the design storm for all underground drainage pipes and open channels. All computations, including a narrative of the design, shall be clearly documented and submitted to the City Engineer for approval.

E. Storm Drain Pipes: Public piping systems shall be designed in accordance with the following:

1. Size: The minimum inside diameter shall be 15 inches.
2. Vertical Alignment: All pipes shall be designed to be self-cleaning with a minimum flow velocity of 2.5 feet per second at the design flow.
3. Horizontal Alignment: Storm drainage pipes shall be parallel with the centerline of the street, with the outside face of pipe 1.5 feet behind the face of curb (see Public Works Standard Detail ST01). Where the sidewalk is wider than 5 feet, separated from the curb or where no sidewalk is required, the centerline of the storm drainage pipe shall be maintained at 18 inches behind the face of curb. Although deflection into and out of curb inlets may be necessary, unnecessary meandering and angular changes shall be avoided. Pipe curvature shall not exceed manufacturer's recommendations.

4. Connections: All connections or junction points of storm drainage pipes shall be made at an approved drainage structure. No blind connections shall be allowed. Connections shall not be made adverse to the direction of flow. At intersections of pipes, the downstream pipe shall have a crown elevation that is less than or equal to the crowns of all upstream connecting pipes. Pipe diameters shall not decrease in the downstream direction.
5. Materials: Pipes within the City right-of-way and easements shall be Class III reinforced concrete pipe (RCP) unless otherwise approved. HDPE storm drainpipe is allowed to be constructed per manufacturer recommendations outside of City of Healdsburg fire hazard zones and not allowed within City of Healdsburg fire hazard zones. Where circumstances dictate (see cover requirements below), a higher-class RCP shall be specified on the construction plans.
6. RCP Cover Requirements: The following chart lists the minimum allowable classes of RCP. For use in this chart, cover is defined as the distance from the inside top of pipe to either the top of curb or finished grade, whichever is applicable.

| <u>Cover in Feet</u> | <u>Minimum Class, RCP</u> |
|----------------------|---------------------------|
| Less than 2.5* | Class IV (2000 D) |
| 2.5 - 7.9 | Class III (1500 D) |
| 8.0 - 11.9 | Class IV (2000 D) |
| 12.0 - 17.0 | Class V (3000 D) |

*All storm drainpipe alignments shall be designed such that the top of pipe lies at least 6 inches below street sub grade. If, for sound engineering reasons, the above requirements cannot be met, RCP Class V pipe shall be used. If necessary, the pipe shall be encased in concrete or provided with a concrete cover as required by the City Engineer.

- F. Open Channels: The term open channel shall include creeks, channels, ditches, swales, etc. Drainage shall not be conveyed through a development in open channels without the written approval of the City Engineer. Open channels shall be designed in accordance with the following:
 1. Size: All open channels shall have a minimum depth of 6 inches. Rock lined or concrete lined channels should be used where the longitudinal slope of the channel exceeds 5%. Soil stabilization fabric is required for all rock lined channels. Side slopes shall be as follows:
 - a. Concrete lined channels = 1 foot horizontal to 1 foot vertical or flatter.
 - b. Rock lined channels = 2 feet horizontal to 1 foot vertical or flatter.
 - c. Earthen channels = 2 feet horizontal to 1 foot vertical or flatter.
 2. Vertical Alignment: Open channels shall be designed such that velocities are within the following limits:
 - a. Unlined channels = 2 to 5 feet per second.
 - b. Lined channels = 2 to 12 feet per second.

Profiles of the existing channel for a minimum of 100 feet upstream and downstream of the development shall be shown on the construction plans to establish an average profile grade.

3. Connections: All open channels shall terminate in an approved drainage structure, unless otherwise approved.
 4. Freeboard: A minimum freeboard of 3 inches shall be provided in shallow, minor swales and ditches. A minimum of 12 inches of freeboard shall be provided in creeks and major drainage ways.
 5. Materials: Where flow velocity, stability of underlying soils and/or risk to adjacent properties warrant, open channels shall be lined with finished concrete, rock rip-rap, or other lining approved by the City Engineer. Concrete lined channels shall conform to the Public Works Standard Details. Rock rip-rap lined channels shall be No. 1 Backing, Method B Placement per State of California Standard Specifications Section 72-2.
- G. Drainage Structures: Pipe diameters shall not decrease in the downstream direction. The inverts of all pipes into and out of each drainage structure shall be labeled on the profile view of the subject Utility Plan.
1. Curb Inlets: Curb inlets shall conform to the Public Works Standard Details.
 - a. Location: Curb inlets shall be located at junction points and changes in the pipe slope or pipe size.
 - b. Connections: At the curb inlet, the invert of all upstream pipes shall be a minimum of 0.1 feet above the invert of the downstream pipe
 - c. Spacing Requirements: Spacing of approved points of access to the storm drain shall not exceed 300 feet. Curb inlets and manholes shall both be included to satisfy this maximum spacing requirement. Curb inlets shall be designed and spaced such that they intercept and fully contain the 25-year storm event. At a minimum, curb inlets shall be required at all points where any of the following criteria is met:
 - Length of gutter flow exceeds 750 feet.
 - Gutter runoff exceeds 3.0 cfs.
 - Water depth in gutter reaches 0.4 feet at the face of curb or within 0.1 feet of the top of curbs having less than a 6-inch-high face.
 - d. Special Conditions: Drainage structures shall be sized in accordance with the manufacturer's recommendations.
 - Streets steeper than 5 percent grade may require the installation of gallery inlets.
 - Isolated low points may require the installation of multiple curb inlets side by side (e.g., double draining curb inlets).
 2. Manholes: Manholes shall conform to the Public Works Standard Details.
 - a. Location: Manholes shall be located at junction points and changes in grade or pipe size.
 - b. Connections: At all manholes, the invert of all upstream pipes shall be a minimum of 0.1 feet above the invert of the downstream pipe. Drop manholes shall not be allowed unless otherwise approved by the City Engineer.
 3. Field Drains, Drop Inlets and Area Drains: Shall conform to the manufacturer's recommendations. Field drain tops shall be solid aluminum or galvanized diamond plate with the edges and corners rounded and bolted down. Side openings 12 inches

and taller, shall be fitted with guard rods in accordance with the manufacturer's recommendations. Where grated tops are required, the grate shall be bolted down.

4. Culverts: Shall be designed on an individual basis to the satisfaction of the City Engineer. A flared inlet or equivalent shall be installed on the upstream end of all culverts. Where appropriate, a rock rip-rap apron shall be installed using No. 1 Backing, Method B Placement per State of California Standard Specifications Section 72-2. CMP outfalls are not allowed unless special approval is allowed by the City Engineer. Refer to city standard detail SD03.
 5. Headwalls, Wingwalls, Endwalls, etc.: Shall be considered on an individual basis, and in general, designed in accordance with Section 51 of the Caltrans Standard Specifications.
 6. Drainage Pump Stations: Shall not be permitted.
 7. Sidewalk Drains: Shall conform to the Public Works Standard Details. Storm water drainage, concentrated in a roof downspout, ditch, swale, pipe, other storm drain facility, or by the addition of significant hard surface area shall not be allowed to directly drain across the public sidewalk. A minimum of 2 sidewalk drains shall be required on each lot to convey the on-site drainage under the sidewalk to the street.
- H. Right-of-Way / Easements: Drainage pipes and channels which convey drainage from any public land or facility shall not be allowed on private property unless they lie within a dedicated public easement.
1. Minimum Easement Width: All pipes and channels shall be centered within their easements, unless otherwise approved.
 - a. Underground Pipes: The minimum required easement width shall be the greater of the following:
 - 10 feet; or
 - A width equal to the required trench width (per the standard detail for trench backfill) plus 2 additional feet for every foot of depth of the pipe (as measured from the bottom of the pipe to finished grade).
 - If a service road is required by the City Engineer, a width necessary for the service road.
 - b. Open Channels: The minimum required easement width shall be of sufficient width to contain the open channel, plus an additional 5 feet on each side. If a service road is required by the City Engineer, the easement shall have a width sufficient for the open channel and the service road.
 - I. Special Conditions: Service Roads - Where determined necessary by the City Engineer, a 20-foot-wide service road shall be provided as follows:
 1. At changes of alignment, easement boundary lines shall have a radius sufficient to provide turning room for vehicles operating on the service road.
 2. Where the road abuts a slope steeper than 3 feet horizontal to 1 foot vertical, easement boundary lines shall be a minimum of 5 feet from the toe of the slope.
 3. The 20-foot-wide service road shall be graded for vehicular traffic and cleared of trees, shrubbery, and other obstructions for its full width, unless otherwise approved by the City Engineer.

4. The service road shall have a minimum 15-foot-wide paved surface centered within the easement, with a minimum structural section of 2 inches of asphalt concrete over 6 inches of cl 2 aggregate base compacted to 95%, subject to the approval of the city engineer.

4.03 EROSION AND SEDIMENT CONTROL PLAN):

Storm water quality shall be addressed, and adverse impacts to water quality caused by a project shall be mitigated to the extent practicable or as required by law and all City of Healdsburg stormwater regulations including the Urban Storm Water Quality Management and Discharge Control Ordinance, Grading and erosion Control Ordinance, and all requirements in the city of Healdsburg MS4 permit. In order to minimize impacts to receiving waters, all projects, regardless of size, shall prepare an erosion and sediment control Plan for approval. The erosion and sediment control plan shall include both all required construction components. All projects with a land disturbance of greater than or equal to one acre, or smaller projects that are part of a larger common plan of development or sale that disturb one acre or more, are subject to waste discharge requirements from the State Water Resources Control Board (SWRCB). These projects must provide evidence of coverage through the state of California Stormwater Multiple Applications and Report Tracking System. The evidence of coverage must include a completed Notice of Intent and a completed SWPPP, permit forms, SWPPP requirements, and fee information are posted on the SWRCB website ([Construction Stormwater Program | California State Water Resources Control Board](#)).

The following discussion references guidelines on Best Management Practices (BMPs) published by the California Stormwater Quality Association (CASQA) and the Caltrans Construction Site BMP Manual.

- A. Erosion and Sediment Control Plan: All proposed projects shall submit an erosion and sediment control plan for approval which includes the following:
 1. Site plan showing existing vegetation, existing water resources, proposed areas of land disturbance, and BMPs for construction and post-construction activity. The plan shall, at a minimum, include the following categories of BMP's:
 - a. Runoff control.
 - b. Erosion control.
 - c. Sediment control.
 - d. Good housekeeping practices (construction site waste management, spill prevention and control, control of discharge from vehicle maintenance and washing).
- B. Minimum Construction BMPs: At a minimum, the following BMPs for sediment control, erosion control, runoff control, and good housekeeping practices shall be included in the erosion and sediment control plan:
 1. Disturbed areas shall be stabilized between October 15th and April 15th using suitable construction practices such as seeding, mulching, sod stabilization, vegetative buffer strips, etc.
 2. Protect downstream areas using vegetative buffer strips, sediment barriers, dikes, etc.
 3. Require fencing around all sensitive areas not to be disturbed such as tree drip lines, wetlands areas, etc.
 4. Use sediment controls and filtration to remove silt from water generated by runoff and dewatering operations.

5. Use proper material storage, disposal, vehicle cleaning, fueling and maintenance practices.

Additional specific BMPs may be required by the City Engineer.

4.04 Post Construction BMPs:

All land development projects that create or replace 10,000 square feet or more of impervious surface area are required to comply with the City's current National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Order No. R1-2015-0030 NPDES No. CA 0025054 (MS4 Permit), or most current version. LID must also comply with the *Regional Storm Water Low Impact Development Technical Design Manual* dated May 2017 revised December 2020 (Regional LID Manual), or most current version, unless authorized to be compliant with a previous version.

SECTION 5

SANITARY SEWER SYSTEM

5.01 GENERAL:

These standards are intended to ensure that the development of new sewer system or the re-use of existing sewer systems are adequate for a 50-year design life and sized to serve the entire tributary area at the build out densities conforming to the City's General Plan.

5.02 COLLECTION SYSTEM DESIGN:

Engineering calculations to support the sewer system design shall be submitted to the City Engineer for review with applicable development projects, as follows:

- Map indicating service area within the sewer system including any future contributing development with projected land use, zoning, and any physical features contributing to the sewer system design.
- Sanitary sewer waste volumes either existing or proposed within the service area of the system.
- Size and slope of each pipe segment.
- Invert elevations of each pipe and appurtenant structure. Rim elevations for each structure shall be shown on the construction plans.

A. Sewer Mains:

1. **Design Flow:** The design of sanitary sewer flow shall be computed using the following formula: $Q_d = Q_p (\text{Residential} + \text{Non-Residential}) + Q_i$, where:

- a. Q_d = design flow (gallons per day)
- b. $Q_p (\text{Residential})$ = The peak flow for residential service areas is defined as 2.5 times the average flow, with the average flow for the service area being computed from two basic assumptions:
 - 3.5 persons per single-family dwelling.
 - 90 gallons per person per day.
- c. $Q_p (\text{Non-Residential})$ = The peak flow for non-residential service areas are calculated as follows:

| | <u>Average Flow</u> | <u>Peak Flow</u> |
|------------------------|---------------------|--|
| | (Gal./Acre/Day) | (Gal./Acre/Day) |
| Commercial Areas | = 1500 | 4500 |
| Light Industrial Areas | = 2000 | 4000 |
| Heavy Industrial Areas | = | Sewage flow rate shall be considered on a case-by-case basis and may require special design. |

- d. Q_i = Infiltration and inflow shall be computed assuming 5,000 gallons per inch diameter mile per day for new (1990 or newer) sewer mains and laterals and 15,000 gallons per inch diameter mile per day for existing sewer mains and laterals

(older than 1990). Residential laterals shall be assumed to be a 4-inch diameter with a minimum length of 75 feet.

2. Size: The minimum inside diameter of any new sewer mains shall be as follows:
 - a. Public mains: 8 inches.
 - b. Private mains: 6 inches.
3. Capacity: Manning's Formula [$Q = A (1.49/n) R^{2/3} S^{1/2}$] shall be used to determine pipe capacity. The "n" value shall be 0.013 or the pipe manufacturer's recommendation, whichever is greater.
4. Horizontal and Vertical Alignment:
 - a. Sewer mains shall run in a straight line and at a constant slope between manholes.
 - b. Sewer mains shall run parallel with and be located 6 feet to the south or west side of the street centerline. The location of trunk sewer mains shall be determined on a case-by-case basis by the City Engineer.
 - c. Minimum slope - sewer velocity shall be equal to or greater than 2 feet per second for all sewers when flowing full.
 - d. Maximum slope - gravity sewers shall not exceed 15%. Where conditions, such as steep slopes, require sewers to be sloped greater than 15% restrained joints and trench dams shall be required.
 - e. The termination of all sewer mains (e.g., uphill end), including in cul-de-sacs, shall be at a manhole. Where the street and the underlying sewer main are planned to be extended, a mainline cleanout may be used to temporarily terminate the sewer main at the subdivision boundary.
 - f. Other utilities shall not, under any circumstances, be installed directly over and parallel to any sanitary sewer line installation.
5. Cover and Clearance Requirements:
 - a. Minimum depth of 5 feet shall be required (as measured from the top of the pipe to the finished grade).
 - b. Minimum horizontal separation shall be maintained as follows (as measured between the outside faces of the pipes), unless otherwise approved by the City Engineer:
 - Sewer mains shall be separated from water mains a minimum of 10 feet at all times.
 - Sewer mains shall be separated from storm drain mains and/or other utilities a minimum of 5 feet.
 - c. Minimum vertical clearance of 12 inches shall be maintained from the water and storm drain lines, and 6 inches clearance from all other improvements and utilities.
 - d. If conditions make it impractical to meet the minimum cover and/or clearance requirements, the following shall be required:

- The condition(s) shall be noted in the profile of the construction plans at the location of the condition.
 - Each location shall require special approval.
 - Special pipe, bedding and/or backfill shall be required as directed by the City Engineer.
6. Right-of-Way / Easements: All public sewer mains and appurtenances shall be located within the street right-of-way or utility easements dedicated and accepted for public use. All pipes shall be centered within their easements whenever possible.
- a. Minimum Easement Width - The minimum easement width shall be the greater of the following:
- 20 feet; or
 - A width equal to the required trench width (per the standard detail for trench backfill) plus 3 additional feet for every foot of depth of the pipe (as measured from the bottom of the pipe to finished grade).
 - If a service road is required by the City Engineer, a width necessary for the service road.
- B. Sewer Laterals: The lateral is that portion of the sewer system maintained by the City between the sewer main and the property line cleanout.
1. Size: Laterals shall be the following inside diameter, unless otherwise required by the California Plumbing Code:
- a. 4 inches where grade requirements can be met, and the laterals' intended use is to serve a single-family residence or other similar domestic type of use.
 - b. 6 inch or larger where the intended use is industrial, commercial, or greater than that of a single-family residential unit. The 6-inch lateral may be connected with a wye if the connection is within 300 feet of an existing manhole.
 - c. All sewer laterals 8-inch diameter and larger shall be connected to the sewer main at a manhole.
2. Cover Requirements: Laterals shall have a minimum cover of 30 inches at the face of curb (as measured from the top of pipe to the flowline of the gutter pan).
3. Connections: In all new subdivision work and/or whenever a new sewer main is installed, an appropriate lateral shall be extended to each existing property, and to each reasonably contemplated property, within the anticipated service area. Individual parcels shall be served by a single sewer lateral, unless otherwise approved by the City Engineer. All unused laterals are to be abandoned by capping the line at the public main and removing all piping and appurtenances within the public right-of-way. The following special conditions may be considered on a case-by-case basis:
- a. Multiple laterals to a single parcel: May be approved for residential and commercial properties where different types of uses or proximity to the sewer main make it advantageous for multiple buildings on an individual parcel to have separate laterals. Multiple sewer laterals shall not be permitted to industrially

zoned properties. Where multiple laterals are approved, each building shall be structurally independent and have a separate water service.

- b. **Joint-use laterals:** May be approved where more than 1 residential or commercial lot is to be served by a joint-use lateral, such as via a private street, or in special cases as allowed by the City Engineer. A maintenance declaration or agreement is required to be provided by developers/property owners for all new joint use laterals. The form and content of the maintenance declaration or agreement is subject to approval by the City Engineer.

The following connections are prohibited:

- Force sewer mains – laterals shall not be directly connected to pressurized sewer mains.
 - Building downspouts or other storm water drainage facilities shall not be connected to the sanitary sewer system.
4. **Vertical Alignment:** Minimum slope of all sewer laterals shall be 2 percent, unless otherwise approved by the City Engineer. When connected at a manhole, the lateral shall be connected within 2 feet of the invert of the manhole base.
 5. **Horizontal Alignment:** All laterals, from the property line cleanout to the point of connection with the sewer main, shall run straight and at a constant grade. No bends or fittings shall be allowed (not including fittings at the saddle or wye connection). Laterals shall be connected to the sewer main at a manhole whenever possible. At manhole connections, the lateral shall not run adverse to the direction of flow of the portion of the main that is downstream of the manhole. At non-manhole connections (i.e., connected directly to the sewer main line), the lateral shall be perpendicular to the sewer main.

All laterals shall be within the property lines extended for the property being served. Laterals shall maintain a minimum separation of 5 feet from all water services and fire hydrants, and 10 feet from all water mains. Each lateral shall be referenced to the construction plan stationing.

6. **Reuse of Existing Lateral:** When a development project constructs a new building or intensifies an existing building's use of the public sewer system, the Developer is required to prove to the satisfaction of the City Engineer that the existing sewer lateral is sufficient to serve the needs of the project in accordance with the above sewer system design criteria. This requirement can typically be satisfied through video inspection. This inspection requirement applies to all development projects (residential and non-residential).
- C. **Cleanouts:** A property line cleanout shall be provided at the back of sidewalk on each and every sewer lateral in accordance with the Public Works Standard Details, except as follows:
 1. **No existing or proposed sidewalk:** The property line cleanout shall be installed within 2 feet of the back of curb when sidewalk is not planned along the frontage of the property in question.
 2. **Easements:** The property line cleanout shall be required at the easement boundary line when the lateral is not installed within the street right-of-way.
 - D. **Sewer Manholes:** Sewer manholes shall conform to the Public Works Standard Details.

1. Location: Manholes shall be located at junction points, changes in horizontal or vertical alignment, changes in pipe size and the upstream end of the sewer main (mainline cleanouts are only allowed on a temporary basis where the sewer main is subject to future extension).
2. Connections: At the manhole, the invert of all upstream pipes shall be from 0.1 to 2.0 feet above the flow line of the manhole. Drop manholes shall not be allowed. Pipe diameters shall not decrease in the downstream direction. The invert in, invert out, and rim elevation of each manhole shall be labeled on the profile view of the construction plans.
3. Spacing Requirements: Manholes shall be spaced a maximum of 300 feet apart.
4. Special Conditions: Bolt down lids are required for manholes within 100 feet of a waterway where an overflow could discharge directly into the waterway.

E. Special Conditions:

1. Backwater Valves: If the elevation of the building pad is less than 2 feet above the next upstream manhole, a backwater valve, approved by the City Engineer, shall be required in accordance with Section 710 of the California Plumbing Code. For all new construction, it shall be the responsibility of the Consulting Engineer to identify which structures and/or properties require back water valves.
2. Force Mains: The design of sewer force mains or other unusual features or structures shall require individual study and approval by the City Engineer.
3. Wastewater Sampling Stations: Where existing or future wastewater discharges may be subject to a Wastewater Discharge Permit, a monitoring manhole shall be required at the back of the sidewalk in place of the standard property line cleanout.
4. Service Roads: Where sewer mains are installed outside of the street right-of-way, a 20-foot-wide service road shall be provided as follows:
 - a. At changes of alignment, easement boundary lines shall have a 50-foot minimum radius (measured from inside of roadway surface).
 - b. Where the road abuts a slope steeper than 3 feet horizontal to 1 foot vertical, easement boundary lines shall be a minimum of 5 feet from the toe of the slope.
 - c. The 20-foot-wide service road shall be graded for vehicular traffic and cleared of trees, shrubbery, and other obstructions for its full width, unless otherwise approved by the City Engineer.
 - d. The service road shall be a minimum 15-foot-wide paved area, with a minimum structural section of 2 inches of asphalt concrete over 6 inches of cl 2 aggregate base compacted to 95%, subject to the approval of the city engineer.

SECTION 6

WATER DISTRIBUTION SYSTEM

6.01 GENERAL:

All improvements including extensions, replacements, and repairs shall conform to the requirements of the California Plumbing Code, National Board of Fire Underwriters, American Water Works Association Standards, Title 22, Chapter 16 of the California Code of Regulations, the City Code, and these Public Works Standards.

The City's water system includes nine separate pressure zones in its distribution system. All properties are served from gravity fed tank storage. The system is complex, and the City Engineer should be contacted for design information.

6.02 DISTRIBUTION SYSTEM DESIGN:

The distribution system is required to be designed for a 50-year design life and constructed in a grid or loop system to provide for pressure equalization and redundancy.

A. WATER MAINS:

1. Sizes: The minimum inside diameter shall be 8 inches. In all cases, water mains shall be of sufficient size to meet fire flow requirements as outlined by the requirements of the City Fire Marshal.
2. Horizontal Alignment: Water mains shall run parallel with and be located 6 feet to the north or east of the street centerline. However, where the street curves, the water main shall be deflected to maintain standard alignment as follows:
 - a. In larger radii curves, the following minimum radii may be used for 20-foot lengths of the standard PVC pipe:

| <u>Pipe Diameter</u> | <u>Minimum Radius</u> |
|----------------------|-----------------------|
| 8 inches | 400 foot. |
| 12 inches | 500 foot. |

In no case shall the pipe be deflected at the joint, nor shall the radius be tighter than the manufacturer's recommended minimum radius.

- b. In smaller radii curves, standard approved fittings shall be used at all bends in the water line of 11.25 degrees and greater.
 3. Cover and Clearance Requirements: The standard depth shall be 42 inches below finished grade (measured from the top of pipe), unless otherwise approved. All state of California Department of Health Services "Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines" as well as all California Public Utilities Commission utility location and separation requirements shall be adhered to. Minimum horizontal separation shall be maintained as follows (measured between the outside faces of the pipes), unless otherwise approved by the City Engineer:
 - a. Water mains shall be separated from sewer mains a minimum of 10 feet at all times.
 - b. Water mains shall be separated from storm drain mains and/or other utilities a minimum of 5 feet.

Minimum vertical clearance of 12 inches shall be maintained from sewer and storm drain lines, and 6 inches clearance from all other improvements and utilities.

If, in the opinion of the City Engineer, conditions make it impractical to meet the minimum cover and/or clearance requirements, the condition(s) shall be noted in the profile of the construction plans at the location of the condition and special pipe, bedding and/or backfill shall be required as directed by the City Engineer.

B. VALVES:

1. Intersection of Mains – A mainline valve cluster is required on all legs (i.e., 3 valves for “T” intersection and 4 valves for cross intersection).
2. Spacing – Maximum spacing of 500 feet between mainline valves. In no case shall more than 2 fire hydrants be removed from service by the shutdown of a single run of water main.
3. Special Conditions – A mainline valve shall be installed on each side of services to hospitals, schools, and major industrial sites.

C. RIGHT-OF-WAY / EASEMENTS: All public water mains and appurtenances shall be located within the street right-of-way or utility easements dedicated and accepted for public use. All pipes shall be centered within their easements whenever possible.

1. Minimum Easement Width - The minimum easement width shall be the greater of the following:
 - a. 20 feet; or
 - b. A width equal to the required trench width (per the standard detail for trench backfill) plus 3 additional feet for every foot of depth of the pipe (as measured from the bottom of the pipe to finished grade).
 - c. If a service road is required by the City Engineer, a width necessary for the service road.

D. FIRE HYDRANTS: Fire hydrants shall be installed as specified in the Public Works Standard Details. The minimum size water main serving a single fire hydrant shall be 6 inches and no more than two hydrants shall be allowed on any 8-inch line between intersecting lines.

Fire hydrants shall be located at the curb return of an intersection. If the hydrant cannot be located at an intersection, it shall be placed on a property line or where it will minimize interference with the use of the property.

The center of the fire hydrant shall be located 18 inches behind the back of sidewalk. Where the sidewalk is separated from the curb by a planter strip or where no sidewalk is planned, the center of the fire hydrant shall be located 3 feet behind the face of curb.

Fire hydrants shall not be closer than 5 feet to driveway (measured from the top of the transition), parking space or other area adjacent to vehicular traffic.

All fire hydrant caps shall be painted the appropriate color to demonstrate available fire flow.

A minimum clear space of 3 feet shall be maintained between the outer most edge of the fire hydrant (i.e., the valve stem) and all vertical obstructions (i.e., retaining walls, fences, buildings, etc.).

1. Spacing Requirements:

- a. Residential Areas – Maximum spacing of 400 feet between hydrants.
- b. Non-Residential Areas – Maximum spacing of 300 feet between hydrants.

At identified fault zones, fire hydrants shall be placed approximately 50 feet to each side of the delineated fault line. A mainline valve shall be installed immediately adjacent to each hydrant between the hydrant and the fault line.

E. WATER SERVICES: Water services shall include domestic, irrigation and dedicated fire services. The water service is that portion of the service line maintained by the City that is between the water main and the back of the water meter or the property line for dedicated fire services (up to, but not including the backflow prevention assembly).

- 1. Size: All new water service lines shall have a minimum inside diameter of 1 ½- inch and may be required to be larger based on fire flow (see table below) or other requirements. Water services larger than 1 ½- inch diameter shall require the installation of a valve on the service line at the main and shall conform to the City’s typical service sizes of 2-inch, 4-inch, 6-inch and 8-inch diameter.
- 2. Cover Requirements: Water services shall have 30 to 42 inches of coverage at the face of curb (as measured from the top of pipe to the flowline of the gutterpan).
- 3. Service Pressure: The following table is intended to assist Developers and their agents (i.e., fire system designers, Consulting Engineers, etc.) in designing the water system improvements within the public right of way for available water system pressure. Where required due to available service pressure, it shall be the responsibility of the Developer and/or Consulting Engineer to verify that domestic and fire water services conform to the following special requirements:

| Elevation difference between lowest floor of building and top of City reservoir | Elevation difference between highest floor of building and bottom of City reservoir | Special Requirements |
|---|---|---|
| More than 185 feet | | <p><u>Domestic Service</u> - install pressure reducing valve per California Plumbing Code.</p> <p><u>Fire Service</u> - design for calculated pressure based on elevation difference between bottom of City reservoir to highest portion of ceiling within the building.</p> |
| | 185 – 92 feet | <p><u>Domestic Service</u> – none.</p> <p><u>Fire Service</u> - design for calculated pressure based on elevation difference between bottom of City reservoir to highest portion of ceiling within the building.</p> |
| | 92 – 34 feet | <p><u>Domestic Service</u> - install booster system per California Plumbing Code, install double check backflow assembly per Public Works Standard WA06 and requires minimum 2-inch diameter service.</p> <p><u>Fire Service</u> - design fire system for pressure supplied</p> |

| | | |
|--|-------------------|---|
| | | by booster system. |
| | Less than 34 feet | Prohibited – no subdivision of property or building permit to construct a new building shall be allowed where there is less than 34 feet elevation difference between the highest floor of the building and the bottom of the City reservoir (i.e., less than 15 psi). |

Table of City Reservoir Elevations

| City Reservoir ⁽²⁾ | Top of Reservoir Elevation (feet ⁽¹⁾) | Bottom of Reservoir Elevation (feet ⁽¹⁾) |
|-------------------------------|---|--|
| Cadoul | 472 | 463 |
| Iverson (North, South & West) | 418 | 403 |
| Hidden Acres ⁽³⁾ | 363 | 363 |
| Latimer ⁽³⁾ | 343 | 343 |
| Panorama | 315 | 295 |
| Sunset | 543 | 526 |
| Tayman | 246 | 222 |

⁽¹⁾ All elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

⁽²⁾ To lookup which reservoir serves the property in question download the Water Service Zone Map from the City's website at www.cityofhealdsburg.org, click on "Documents for Download" in the upper left corner, click on Public Works, click on Maps.

⁽³⁾ The Hidden Acres and Latimer Reservoir service zones are served through pressure reducing valves. The top and bottom reservoir elevations are expressed as equivalent elevations based upon the pressure provided and are therefore equal.

4. **Connections:** In all new subdivision work and/or whenever a new water main is installed, an appropriately sized water line service shall be extended to each existing property, and to each reasonably contemplated property, within the anticipated service area. Where multiple meters (domestic and irrigation use) are allowed within an individual parcel, all meters are required to be manifolded off of a single water service line, appropriately sized.

Separate water meters are required for each individual parcel (including condominium and common area parcels) as follows:

- a. **Residential Properties:** Residential properties may have up to one water meter per residential dwelling unit. Where warranted, multi-family dwelling units may have an additional house water meter for landscaping, centralized laundry rooms or other common use improvements.
- b. **Non-Residential Properties:** Commercial properties and industrial properties are required to be master metered for domestic use through a single water meter. Where warranted, the City Engineer may approve an additional domestic use water meter for separate buildings within a parcel where the building is structurally independent and served by a separate sewer lateral. Properties with significant landscaping water needs are encouraged to install a separate meter for landscape water.
- c. **Mixed Use Properties:** The residential and non-residential portions of a property are required to be separately metered in accordance with the requirements of the specific uses as noted above.

- d. Residential condominiums may be master metered if approved by the City Engineer. If approved, a sub-metering agreement must be entered into between the City of Healdsburg and the developer. The city will furnish the required sub-metering agreement.
5. Horizontal Alignment: All water service lines shall run straight and perpendicular to the water main. Water meter boxes shall be placed flush to the back of sidewalk and shall not be located within the curb cut or transition area of the driveway. All water service lines shall be within the property lines extended for the property being served. Water services shall maintain a minimum separation of 5 feet from all sewer laterals and 10 feet from all sewer mains.

Each water service shall be referenced to the construction plan stationing.

- F. **CATHODIC PROTECTION**: Cathodic protection may be required by the City Engineer. If required, all metallic components of the water system (i.e., water services, fire hydrants, valves, fittings, air release valve, blow off, etc.) are required to be cathodically protected in accordance with the Public Works Standard Details, except as follows:
 1. Where the City Engineer has identified that the existing public water main does not require cathodic protection, only the copper components installed will require cathodic protection.

G. SPECIAL CONDITIONS:

1. Air Release Valve: Air release valves are required at locations in the system that are one pipe diameter or more, higher in elevation than the surrounding system (i.e., over a hilltop or the upper end of a dead-end main such as in a cul-de-sac).
2. Blow-Off Device: A blow-off device is required at the termination of all water mains, including at the boundary of development where the water main is intended to be extended. Where a water main permanently terminates at the end of a cul-de-sac, a fire hydrant installed at the end of the main shall satisfy the requirement for a blow-off.
3. Water Sampling Stations: At the discretion of the City Engineer, the Developer may be required to install a water sampling station. Water sampling stations shall be installed in accordance with these Public Works Standards.
4. Backflow Protection Requirements: Backflow prevention assemblies shall be required in accordance with the City's Cross Connection Control program per the City Code. Backflow preventers are required to be placed immediately behind the water meter and shall not be closer than 5 feet from a driveway, parking space or other area adjacent to vehicular traffic.
5. Service Roads: Where water mains are installed outside of the street right-of-way, a 20-foot-wide service road shall be provided as follows:
 - a. At changes of alignment, easement boundary lines shall have a 50-foot minimum radius (measured from inside of roadway surface).
 - b. Where the road abuts a slope steeper than 3 feet horizontal to 1 foot vertical, easement boundary lines shall be a minimum of 5 feet from the toe of the slope.
 - c. The 20-foot-wide service road shall be graded for vehicular traffic and cleared of trees, shrubbery, and other obstructions for its full width.
 - d. The service road shall be a minimum 15-foot-wide, paved area, with a minimum structural section of 2 inches of asphalt concrete over 6 inches of cl 2 aggregate base compacted to 95%, subject to the approval of the city engineer.

SECTION 7

LANDSCAPE AND IRRIGATION

7.01 GENERAL:

Complete plans and specifications for all proposed landscape and irrigation improvements shall be submitted to the City Arborist for review and approval prior to beginning work. This requirement shall apply for all proposed work within the public right-of way or any other area in which the proposed improvements are intended to be the direct or indirect maintenance responsibility of the City of Healdsburg. Said plans shall be prepared by a landscape architect or irrigation designer who is registered in accordance with the provisions of the California Business and Professions Code.

7.02 IRRIGATION:

All irrigation systems shall be designed to operate efficiently and effectively and to create a suitable environment for long-term plant viability in the locally heavy soils and extreme winds. Three sets of irrigation calculations shall be supplied with the plans and specification for review by the City Arborist. Assumptions used for wind, soil permeability, evapotranspiration, system efficiency, etc. shall be clearly stated in a tabular format. The ability of the system to efficiently provide water to the landscape shall be clearly demonstrated by the designer.

The required calculations shall include, but not be limited to:

1. Precipitation rate of each system type (i.e. large area rotors, small area pop-up sprays, grid emitterline system, spot emitter system).
2. System zone calculations listing the friction losses for the longest line (zone) on the system and the heaviest line (zone) on the system include all pipe, heads, valves and appurtenances to the water meter or point of connection. On systems larger than 1.5 inches take the calculations to the city water main tap.
3. Pressure loss due to the required Reduced Pressure Principal Backflow Assembly (not less than 12 psi).

In addition to the above requirements, the system shall be designed with the following minimum safety factors. The system designer shall illustrate the ability of the system to adequately irrigate the landscape both with, and without these additional factors of safety.

1. The water service to the site, up to but excluding the meter and backflow device, shall be sized to deliver a minimum of 25 percent more water than required by all contemplated landscaping.
2. An additional head loss, above that calculated, of 5 percent shall be taken across the meter and back flow device.
3. All other line, fitting, and equipment losses shall be increased by 10 percent.
4. The irrigation controller specified shall have a minimum of 10 percent and no fewer than 2, of its stations unused and available for future use by the City.

If the calculations show that a system is marginal, then the system shall include an electric booster pump, complete with controls, power hook up and enclosure (use Cornell pumps or approved equal). This pump shall be designed, specified and installed to the satisfaction of the City Arborist.

7.03 LANDSCAPING:

The landscape design shall utilize only the highest quality plants and materials, which are properly suited for the local area. In general, the Healdsburg area has a very high-water table and

extremely heavy soils. These factors and all other local conditions shall be carefully considered and mitigated through the design. The resulting plans and specifications are expected to yield a beautiful, thriving landscape that requires an absolute minimum of maintenance effort and expense.

Local soils are extremely heavy. In many locations within the city, it is necessary to rip the soil in two directions to a minimum depth of three feet, as well as install a sub-drainage system, however this operation should not be performed within the dripline of existing trees and or vegetation. In consideration of this fact, the landscape architect shall personally investigate the site and pay particular attention to soil quality, character, and suitability, site drainage, water table and other factors pertinent to the proposed planting environment prior to submitting plans for an initial plan check. A complete soil analysis, including amendment and fertilization rates or installation is required prior to planting and following finish grading. The City Arborist, upon reviewing the initial recommendations by the landscape architect, may require project proponent to supply a soils and fertility analysis of the base site prior to the completion of the plans and/or specifications.

7.04 PARKSTRIPS (landscaped buffer between sidewalk and back of curb):

Parkstrips must be a minimum of 5 feet wide. An irrigation system is required. The type of trees must be approved by the City Arborist and shall be installed with an approved linear root barrier.