

TOWN OF FLORENCE

Engineering Design Standards and Policies Manual

Revised September 2023



Table of Contents

I.	INTRODUCTION.....	6
	INTENT	6
	POLICIES RELATED TO DEVELOPMENT IMPROVEMENTS.....	6
	B. STORM DRAINAGE POLICY.....	7
	D. SEWER LINE EXTENSION POLICY.....	7
	E. SITE DEVELOPMENT POLICY.....	8
	F. ORDER OF PRECEDENCE.....	8
	G. DEFINITIONS AND ABBREVIATIONS.....	8
II.	CONSTRUCTION PLAN REQUIREMENTS	9
	2.1 GENERAL COMMENTS.....	9
	2.2 PLAN SUBMITTAL SEQUENCE.....	9
	2.3 REDLINE COMMENTS.....	9
	2.4 APPROVAL OF PLANS	9
	2.5 BASIC PLAN REQUIREMENTS	9
	A. GENERAL SUBMITTAL STANDARDS.....	10
	2.6 COVER SHEET	10
	A. COVER SHEET INFORMATION	11
	2.7 DETAIL SHEET	11
	A. DETAIL SHEET REQUIRED INFORMATION	11
	2.8 REPORTS AND OTHER DOCUMENTS	12
	2.9 TRAFFIC CONTROL PLANS	12
	2.10 PLAN VIEW ONLY SHEETS.....	12
	2.11 PLAN AND PROFILE SHEETS.....	13
	2.12 GENERAL CONSTRUCTION NOTES	13
	2.13 STREET CONSTRUCTION NOTES.....	15
	2.14 GRADING AND DRAINAGE CONSTRUCTION NOTES.....	16
	2.15 WATER MAIN CONSTRUCTION NOTES	16
	2.16 SEWER CONSTRUCTION NOTES	18
III.	STREET DESIGN AND CONSTRUCTION	20
	3.1 GENERAL COMMENTS.....	20
	3.2 DEFINITIONS.....	20

3.3 STREET CLASSIFICATION.....	21
3.4 STREET NAMES.....	21
3.5 GENERAL TECHNICAL INFORMOATION.....	22
3.6 DESIGN STANDARDS	22
3.7 CONSTRUCTION	26
3.8 STREET STRUCTURAL SECTION (AGGREGATE BASE, ASPHALT BASE COURSE AND ASPHALT SURFACE COURSE).....	26
3.9 STREET WIDENING	27
3.10 PARTIAL STREET AND HALF-STREET IMPROVEMENTS.....	28
3.11 PUBLIC ALLEYS.....	28
3.12 TURNING LANES.....	28
3.13 DECELERATION LANES.....	28
3.14 MEDIANS.....	28
3.15 CURB AND GUTTER	29
3.16 SIDEWALKS.....	30
3.17 DRIVEWAYS.....	31
3.18 STREETLIGHTS	32
IV. STORM DRAINAGE FACILITES.....	33
4.1 GENERAL INFORMATION	33
4.2	TOWN CODE
.....	33
4.3	TOWN STANDARDS
.....	33
4.4	AVAILABILITY OF STORM DRAIN
.....	34
4.5	DESIGN STANDARDS AND GUIDELINES
.....	35
4.6	DRAINAGE REPORTS
.....	37
4.7	REVIEW
.....	38
4.8 General Notes	39
V. WATER ENGINEERING STANDARDS	41
5.1 GENERAL INFORMATION	41
5.2 GENERAL REQUIREMENTS	41

5.3 WATER DEMAND.....	41
5.4 PIPE SIZING.....	42
5.5 PIPE MATERIAL.....	42
5.6INSTALLATION DEPTH	43
5.7 PIPE LOCATIONS.....	43
5.8LOOPING	43
5.9DEFLECTION/VERTICAL REALIGNMENT	43
5.10BACKFLOW PREVENTION	43
5.11WATER SERVICES	44
A.SERVICES.....	44
B.CORP STOPS.....	44
C.STANDARD WATER METERS (2 INCHES AND SMALLER).....	45
D.LARGE WATER METERS (LARGER THAN TWO INCHES).....	45
5.12FIRE HYDRANTS	46
5.13VALVES	47
A. GENERAL REQUIREMENTS.....	47
B.SMALL VALVES (LESS THAN 12 INCHES).....	47
C.LARGE VALVES (LARGER THAN 16 INCHES).....	47
D.PRVS.....	47
E. ARVS.....	48
F. EASMENTS.....	48
5.14WATER CONSTRUCTION REQUIREMENTS	48
VI. WASTEWATER COLLECTION AND TREATMENT SYSTEMS.....	49
6.1 GENERAL INFORMATION.....	49
6.2 SEWER SERVICE AGREEMENT.....	49
6.3 AVAILALABILITY OF TOWN OF FLORENCE SEWER.....	49
6.4 TOWN STANDARDS.....	49

6.5 FEDERAL, STATE, AND COUNTY REGULATIONS	49
6.6 DESIGN STANDARDS AND GUIDLEINES.....	50
6.7 PIPE SLOPES.....	52
6.8 MANHOLES.....	53
6.9 SEWER SERVICES	54
6.10 FORCE MAINS.....	55
6.11 WASTEWATER LIFT STATIONS.....	56
6.12 WASTEWATER MONITORING APPURTENANCES	57
6.13 WASTEWATER SYSTEM MATERIALS.....	58
6.14 WASTEWATER CONSTRUCTION AND TESTING	58
6.15 SEWER INSPECTION REQUIREMENTS (NEW LINES)	59
6.16 FINAL SEWER PLAN REQUIREMENTS	59
6.17 GENERAL NOTES.....	60
VII. SITE DEVELOPMENT	61
7.1 SITE PLAN	61
7.2 SITE DEVELOPMENT	61
7.3 PUBLIC RIGHT-OF-WAY AND EASMENT DEDICATION.....	61
VIII. SUBDIVISION PLATS	63
8.1 GENERAL INFORMATION	63
8.2 PRELIMINARY PLATS.....	63
8.3 FINAL PLATS	64
A. GENERAL REQUIREMENTS	64
B. LANGUAGE	66
8.4 PLATS TO BE RECORDED	69
8.5 AMENDED PLATS.....	69
IX. AS BUILTS	70
9.1 "AS BUILT REQUIREMENTS"	70
9.2 SUBMITTALS.....	70
9.3 MINIMUM REQUIREMENTS	70

I. INTRODUCTION

PURPOSE

The purpose of the Engineering Design Standards and Policies Manual is to provide the technical professional both general information and specific design standards for the planning and design of public and private infrastructure within the Town of Florence (The Town). Design concepts and specific technical data are outlined in these standards; however, they are not intended to supersede sound engineering judgment. Engineers are encouraged to apply professional reasoning when applying these standards based on specific field conditions. All plans are to be prepared with these concepts in mind and will be reviewed accordingly. When professional opinion dictates that these design standards are being deviated from, the engineer is encouraged to discuss these deviations with the Town’s professional staff. No attempt has been made in these standards to establish a complete set of design criteria; however, certain standards must be followed to provide consistency for the sake of construction, maintenance, repair, and replacement.

SECTIONS

This document is divided into individual sections and specifically designated areas, which cover general and specific elements of the design and development review process. It begins with general information followed by specific technical details. Updates will be published and made available periodically. The Town Engineer may provide a “Memorandum of Clarification” to all standards holders on an as-required basis.

INTENT

These Design Standards and Policies are intended to be used in conjunction with the specifications of the Land Development, Unified Development Ordinance, Subdivision, Zoning, Floodplain, Grading, Landscaping and other appropriate ordinances of the Town of Florence and such other agencies as may have jurisdiction.

POLICIES RELATED TO DEVELOPMENT IMPROVEMENTS

The following sections outline the Town’s policies related to various improvements associated with the development process. These sections are by nature general in scope. Reference should be made to the appropriate sections within the balance of these standards for specific details.

A. STREET IMPROVEMENT POLICY

- 1) All developments within the Town shall provide an interior street system adequate to ensure that all parcels and/or facilities within the development shall have reasonable access to the public street system. Further, they shall provide access into the development for public service and/or emergency operations. Such facilities shall be of sufficient width and structural strength as to provide safe and unrestricted access and conform to any approved or adopted master plans. Development shall also incorporate existing and future Town streets to facilitate connectivity, progression, and the smooth flow of traffic.

- 2) When the development occurs adjacent to a collector street or above, it is the Town's policy that it shall be the responsibility of the developer to install improvements along their frontage to the ultimate grade and alignment for the said street. This may include removal and replacement of the existing street surface to the centerline if that structure is inadequate to meet the current design standards. These improvements may include, roadway widening, aggregate base materials, asphaltic concrete, street lighting, landscaping, irrigation, burial of overhead utilities, will be required, at the sole or substantial expense of the developer.
- 3) New development shall limit access points from collector streets, and severely limit access from arterial streets. All development adjacent to state highways shall be coordinated with ADOT when Development occurs adjacent to said highway(s)

B. STORM DRAINAGE POLICY

- 1) It is the Town's policy that all developments within the Town shall provide sufficient retention to reduce the amount and rate of runoff that affects its downstream neighbors. Such retention facilities shall be separate and distinct tracts within the development and shall be planned for accordingly.
- 2) All developments shall provide adequate drainage facilities to convey both off-site and on-site runoff, around or through the project in such a manner as to ensure that the structures will be free from flooding and that there is reasonable access for emergency and public service vehicles. Stormwater conveyed across private property shall occur in such a fashion that the impact on landscaping and private improvements is minimal. The developer shall install storm sewers, channels and/or other physical improvements necessary to achieve this result. Water shall be conveyed in the Public Right-Of-Way where possible.

C. WATER LINE EXTENSION POLICY

It is the Town's policy that all development within the Town shall have an adequate and secure source of potable water and fire protection. To that end, the Town has developed a comprehensive program for supplying municipal water. Therefore, all subdivisions shall be serviced by the Town of Florence Water Department, or the designated provider for the area to which the subdivision pertains. Further, the developer shall extend said system to and through the development as necessary to ensure adequate supply to the development. If deemed necessary and appropriate, the developer shall extend the water distribution system to the extremities of the project to ensure that additional distant potential users shall have reasonable access to the potable water source. At times, the Town may require upsizing based on regional needs. The extension of all water mains and service connections shall be constructed in strict accordance with plans and specifications to be approved by the Public Works Department. All extensions and service connections shall be, and remain the property of, the Public Works Department after acceptance by the town. Main extensions and service connections shall be maintained by the Department up to, and including, the consumer's meter and shall be operated by the Department as part of the distribution system. The Department shall exercise complete control over the extensions, and upon completion, the person responsible for the construction of the extension shall relinquish all right to or interest in the ownership of the extensions.

D. SEWER LINE EXTENSION POLICY

In new subdivisions and developments where public sewers are authorized by the Public Works Director, the public sewers shall be constructed at the developer's expense in accordance with plans approved by the Public Works Director. Detailed plans and specifications for public sewer extensions must be approved by the Public Works Director prior to construction. The costs for the preparation of plans and specifications, the staking of the location of the new public sewers, the cost of inspecting the construction, the cost of acquiring rights-of-way and easements and preparation of as-built plans shall be assumed by the developer. The town will perform the inspection during construction. The ownership of the public sewer lines, pumping stations, treatment facilities and equipment and other appurtenances to the sewer system maintained, or accepted for maintenance, by the Water and Wastewater Division shall be vested in the Division, and in no case shall the owner of any premises have the right to claim any part except where otherwise provided in town code. At times, there may be sewer extensions for areas beyond the present town trunk lines. All sewer in these circumstances shall adhere to Town Code § 51.056

E. SITE DEVELOPMENT POLICY

It is the Town's policy that all development within the Town shall be designed and constructed in such manner as to provide a safe and pleasant environment for the current and future citizens of Florence. To that end, the appropriate standards have been established for site development to include: Public and/or private access for general and special uses; water and sewage systems; on-site and off-site drainage; irrigation; landscaping; storm retention; street lighting and public utilities as may be required. The development of the project shall consider the pedestrian component and how to safely maneuver through and across the site. The structures themselves are to be constructed in accordance with the Subdivision and/or Zoning Ordinance, the current adopted International Building Code, Unified Development Ordinance, Standard Specifications, and these standards, as appropriate.

F. ORDER OF PRECEDENCE

It is not intended by these standards to repeal, abrogate, annul, or in any way impair or interfere with existing provisions of other laws or ordinances except those specifically repealed with private agreement, or with restrictive covenants running with the land to which the Town is a party. Where these standards impose a greater restriction on land, buildings, or structures than is imposed or required by such existing provisions of law, ordinance, contract or deed, the provisions of these standards shall prevail.

G. DEFINITIONS AND ABBREVIATIONS

The words, abbreviations, or phrases used in these standards may be found in the Maricopa Association of Governments (MAG)

II. CONSTRUCTION PLAN REQUIREMENTS

2.1 GENERAL COMMENTS

A. This chapter contains information to assist the consultant in the preparation of all construction plans and documents to be submitted to the Town of Florence for review and approval.

C. Any deviation from the Town’s “Engineering Design Standards and Policies Manual” requires prior approval by the Town Engineer.

D. All construction plans for Grading and Drainage, Streets, Water, Sewer and Storm Drains shall be prepared per the standards set forth in these guidelines by the appropriate Arizona licensed professional engineer.

E. If any plan submitted is not in compliance with these guidelines, or has in the plan reviewer’s opinion excessive corrections and major deficiencies, the review may not continue and the plans will be returned to the owner. Any plan submitted for review, even if discontinued, will be counted as a plan review submittal.

2.2 PLAN SUBMITTAL SEQUENCE

Each submittal will require digital sets of plans that include design of: Water, Sewer, Streets, Drainage & Grading and Storm Drains, SWPPP; also) reports are required for Water, Sewer, Soils, Drainage/Storm Drains and a SWPPP. plans will be required for commercial and all other development plans with off-site improvements along perimeter streets. Redlined plans, in addition to revised sets are required for all subsequent submittals.

2.3 REDLINE COMMENTS

All plan review and Town redline comments must be corrected or clarified. If there is a discrepancy concerning a redline comment, please call Plan Review staff. The redline set of plans shall be returned to the Town with subsequent plan submittals. Changes made to the plans or report, other than corrections noted in the Town’s redlines, shall be identified with clouding. Failure to identify additional changes shall result in return of plans and an additional review shall be required.

2.4 APPROVAL OF PLANS

When in the opinion of the reviewer, the plans meet the requirements for approval; final plans may be submitted for signature. Prior to Town of Florence signature, all other reviewing agencies shall have signed the cover sheet. If an agency does not sign the cover, a letter of their approval shall accompany the cover sheet and the letter date and signing party will be noted on the cover sheet. In addition, One (1) digital set of plans, a Construction Permit Fee Schedule and a Notice of Intent, as applicable, shall be submitted.

2.5 BASIC PLAN REQUIREMENTS

A. GENERAL SUBMITTAL STANDARDS

- 1) Incomplete submittal may result in rejection (e.g. nonconformance with this manual). The rejection of plans may count as a review. The next submittal may require payment of additional review fees.
- 2) Plans shall be prepared on a 22" x 34" sheet size, with a minimum 2" left border and minimum ½" border on all other sides.
- 3) Plans submitted to the Town for review shall be blue-line or black-line prints.
- 4) Plans submitted for review shall be accompanied by an approved site plan, or preliminary plat, as applicable.
- 5) Plans submitted for review shall have the appropriate professional (State of Arizona) seal, signature, and date on each sheet in accordance with the requirements of the Arizona State Board of Technical Registration.
- 6) Plan layout, graphics, and call-outs must be clearly presented in an uncluttered manner acceptable to the reviewer.
- 7) Call-outs shall be boxed numeric style call-outs. Each number shall relate to the same topic for the entire set of plans and narrative call-outs shall be grouped and clearly shown on every page that the call-out is used. Stationing and offset shall accompany every applicable call-out number.
- 8) Plans shall provide cross-referencing between all sheets which have details, detail call-outs, notes, etc.
- 9) Plans shall reference the next sheet it continues on to.
- 10) Plans shall be oriented with north to the top or right side of each sheet whenever possible.
- 11) All improvement plans submitted for review shall be drawn to a typical engineering scale (1:20, 1:40,).
- 12) All plans shall depict a bar scale, so that half-size plans remain true to scale.
- 13) All lettering and numbering shall be minimum font size 10 and in have clear, easy to read font..
- 14) Plans shall be of a quality and letter size to be easily read when reduced by 50%. Plans submitted, which in the opinion of Town staff, that cannot produce usable 50% reductions will not be accepted for review.
- 15) Plans shall be drawn with the drafting symbols presented in Maricopa Association of Governments Uniform Standard Details for Public Works Construction.
- 16) Master Utility Plans shall be submitted as a part of the plan set. These plans shall be drawn at a scale of 1:100, or 1:200, and include offsite and on-site infrastructure. A Master Plan is required for water, sewer, transportation and drainage. (These plans will also be updated with the "As-Built Drawings.")
- 17) Plans shall show new utilities in bold (e.g. water, sewer, storm drain, grading and drainage, or paving). Existing and future infrastructure shall be shown lighter (smaller pen width or dashed).
- 18) The Town of Florence requires that all "Preliminary – Not For Recording or Construction" statements be removed from all plans, plats, maps or dedication prior to plan approval or recording.
- 19) As-Built Plans submitted to the Town for approval shall be complete digital (PDF) plan sets.

2.6 COVER SHEET

A separate cover sheet and index sheet is required for construction plan sets that have more than one type of improvement. These may include paving, grading and drainage, water, sewer, street lighting, traffic signals and landscaping. A separate plan submittal will be required for each type of improvement

An individual cover sheet with the following information is required for each type of single improvement plan:

A. COVER SHEET INFORMATION

- 1) Project name and description
- 2) Town Name: Below the title include the words "Florence, Arizona."
- 3) Vicinity Map inset showing the project's location within the Town limits
- 4) Sheet Index - to show which sheet covers a specific area of the project.
- 5) Legend – for line types, symbols, non-standard abbreviations, etc.
- 6) Zoning as it currently exists on the property.
- 7) Developer's name, address, and telephone number
- 8) Consultant's name, address, and telephone number
- 9) Engineering approval signature block
- 10) Other agency approvals as required. (e.g. State and/or County Health Departments, Fire District, Flood Control District).
- 11) Engineer's seal, signature and date (This is to be affixed on each sheet.)
- 12) Town of Florence, General Construction Notes (Section 2.12). Notes may be put on a separate sheet.
- 13) Legal Description: Provide project property legal description. When a legal description is not feasible, list the township, range, section and location.
- 14) Project Benchmark: The most recent reference Survey Datum with translation formulas (supplied by the Town) shall be used. Town benchmarks listed shall indicate benchmark number, location and most recent elevation datum. (In areas that have been Master Planned and are partially developed using a different elevation datum, the Town Engineer may approve a project datum.) If a project datum is approved, an equation to Town datum shall be provided on each sheet of the plans. Also list any State of Arizona, United States Geological Survey, Government Land Office and County benchmarks if they are within or adjacent to the project.
- 15) Estimate of Quantities (for work in public rights-of-way or easements) with construction items shown in units. If the project is to be developed in phases, the estimate of quantities shall indicate quantities for each phase. A detailed, certified cost estimate shall be submitted for approval by the Town.
- 16) Utility system ownership approval area. If a letter of conditional approval is received, submit a copy to the Development Services Department and note person and date in the approval area.

2.7 DETAIL SHEET

A separate detail sheet may be provided at the discretion of the Consultant or when required by the Town.

A. DETAIL SHEET REQUIRED INFORMATION

- 1) A typical cross section shall be shown for each street in the street construction plans. The information required on a typical section is:
 - a) Dimensions
 - b) Street centerline and right-of-way line
 - c) MAG and Florence Standard Details and Specification

- d) Existing and proposed utilities
 - e) Landscaped areas
 - 2) Special construction details as required shall be provided. Typically this would include:
 - a) Modification or relocation detail for existing structures.
 - b) Special construction required where utility locations conflict.
 - c) Typical Trench Detail and Pavement Replacement
 - d) Others determined by the Consultant and/or the Town as needed to clarify construction.
- Presentation of Design and Construction Information.

2.8 REPORTS AND OTHER DOCUMENTS

Reports and other submitted documents shall include the following:

- 1) All reports and documents shall have the appropriate (State of Arizona) professional seal, signature, and date.
- 2) All reports and documents shall be provided on 8-1/2" x 11" format. Only typed reports are allowed. Larger size exhibits may be included, provided they are secured inside.

2.9 TRAFFIC CONTROL PLANS

After plans are approved, the Town Engineer shall stipulate, review, and approve all traffic control plans for construction. An approved traffic control plan shall be required prior to any traffic control device installation within the Public Right-of-Way.

2.10 PLAN VIEW ONLY SHEETS

- 1) Plan view only sets are allowed for:
 - a) Grading and Drainage plans with supplemental cross sections as needed to explain drainage
 - b) Signing and striping plans
 - c) Street Light plans
 - d) Traffic Signal plans
- 2) The following information is required
 - a) Existing topography (minimum of 2' elevation contours).
 - b) Spot elevations to adequately show drainage.
 - c) Grade breaks shall be clearly shown.
 - d) Drainage flow arrows
 - e) Slopes as a percentage or in foot per foot change of grade.
 - f) Existing utilities – aerial and underground, including services, manholes, valves vaults, risers and miscellaneous utility items.
 - g) Existing storm drains, manholes, catch basins, retention/detention ponds and other miscellaneous drainage items
 - h) Existing irrigation facilities
 - i) Town limits where applicable
 - j) 100-year floodplain limits where applicable.
 - k) 100-year floodway limits where applicable.
 - l) Existing and proposed right-of-way, easements, view-easements, erosion setback easements and property lines. Dimensions of these shall be clearly indicated.

- m) Pinal County Tax Assessor's parcel numbers for surrounding properties.
- n) Adjacent land uses
- o) Engineer's seal (State of Arizona), signature and date shall be affixed on each sheet.

2.11 PLAN AND PROFILE SHEETS

- 1) Plan and Profile are required for construction plans for:
 - a) New streets.
 - b) New utilities regardless of if they are installed in new or existing streets.
- 2) The following information is required:
 - a) Plan view shall be prepared in accordance with Section 2.10
 - b) Profile view shall show the following:
 - i) Elevation and stationing grid clearly indicated
 - ii) Profile of existing surface over proposed construction
 - iii) Proposed construction (e.g. elevations, slopes, grade breaks)
 - iv) Utility locations, including crossings.
- 3) Double plan and profile may be permitted with approval by the Town Engineer.

2.12 GENERAL CONSTRUCTION NOTES

- 1) ALL plans for construction within Town right-of-way or easements shall have the following notes on the first or second sheet:
- 2) All work and materials within the Town shall conform to the latest editions of the Maricopa Association of Governments (MAG) Uniform Standard Specifications and Details for Public Works Construction, and supplements as amended.
- 3) The contractor is to comply with all local, state, and federal laws and regulations applicable to the construction covered by these plans.
- 4) The owner is responsible for obtaining and complying with all permits required to complete all work covered by these plans.
- 5) A Town of Florence Right-of-Way permit will be required for all construction within public easements and/or rights-of-way,
- 6) All contractors and subcontractors shall obtain a Town business license and necessary encroachment permits prior to beginning construction in the public right-of-way.
- 7) Arizona Department of Environmental Quality requirements shall be complied with.
- 8) A Storm Water Pollution Prevention Plan (SWPPP) is required for all projects that involve grading of an area that is more than 1 acre and shall be submitted to the Town for review. A Notice of Intent must be submitted to ADEQ that references the SWPPP. A Notice of Termination shall be submitted to ADEQ once 70% of disturbed land has been successfully revegetated after project completion. The Town shall receive notification when the NOI and NOT have been submitted to ADEQ.
- 9) The contractor shall keep suitable equipment on hand at the job site for maintenance and dust control and shall control dust as directed by the appropriate agencies, including the Town.
 - a) Any areas where work will not resume within 14 days will require stabilization with SurfaceLoc or an approved equal shall be applied at a rate of .5 gal/sy. THIS APPLIES TO DISTURBANCES OF 1 ACRE OR MORE AND SITES THAT REQUIRE A SWPPP.
 - b) Dust control stabilization shall be tested by the Maricopa County Fugitive Dust Control Methods Section 2, 3 and 4.

- 10) FODS Trackout Control System or an approved equal shall be used on sites that have a SWPPP.
 - a) Sites not required to have a SWPPP shall use a standard gravel pad trackout mat constructed of washed gravel, rock, or crushed rock 1" or more in diameter installed at a minimum depth of 3".
- 11) All required SWPPPs shall include pre-approved industry standard Best Management Practices (BMP's) for keeping silt and erosion debris on the graded areas of the site, off the sidewalk and street, and out of all catch basins and storm water infrastructure.
- 12) The Town's review of all AZPDES submittals including NOI, NOT & SWPPP is intended as Review Only and does not constitute approval of the methods or plans for cleaning the storm water and protecting the waters of the United States. The Contractor is solely responsible for ensuring that all requirements of the Clean Water Act are strictly enforced.
- 13) Any work performed without the approval of the Town Engineer and/or all work and materials not in conformance with the specifications is subject to removal and replacement at the contractor's expense.
- 14) Contractor shall be responsible for submitting to the Town for approval, a traffic control plan as needed to perform construction activities. Contractor must notify the school districts and Emergency Services Providers forty-eight (48) hours before restricting traffic on any Town street. The contractor shall comply with the provisions for traffic controls and barricading as specified in the latest edition of the Manual on Uniform Traffic Control Devices.
- 15) All obstructions in right-of-way shall be removed before any construction is permitted.
- 16) The contractor shall make no claim against the owner, the engineer or surveyor regarding the inaccuracy of construction stakes set forth by the engineer or surveyor, unless all survey stakes set by the engineer or surveyor are maintained intact and can be verified as to their origin. If, in the opinion of the engineer, the stakes are not maintained intact and cannot be verified as to their origin, any remedial work required to correct any item shall be performed at the sole expense of the responsible contractor or subcontractor.
- 17) It is the contractor's responsibility to locate all underground pipelines, telephone, and electrical conduits and structures in advance of any construction and will observe all possible precautions to avoid any damage to such. The Engineer of Record and/or owner will not guarantee any locations as shown on these plans or those omitted from same. Should any location or elevation differ from that shown on these plans, the contractor shall contact the owner's agent.
- 18) The contractor is required to contact Blue Stake two working days 48 hours prior to commencement of construction: 1-800-STAKE-IT.
- 19) At least two (2), but not more than five (5) working days prior to excavating in the vicinity of any utility, the contractor shall contact the utility's locating service for field assistance.
- 20) For any construction adjacent to or crossing existing sewer lines, the contractor shall complete a before and after video inspection. The video inspection shall occur from the next adjacent upstream and downstream manholes beyond all construction activity. If evidence of debris is found, additional video inspection as determined by the Town shall be completed. The Town may waive this requirement if a determination is made that the construction activities will not impact any existing sewer lines.
- 21) The contractor is responsible for any damage to utilities and/or facilities caused during their construction operations.
- 22) All abandoned utility lines shall be removed. Abandonment in place shall not be allowed without the approval of the Town Engineer.

- 23) Trench backfill in existing pavement shall be performed with ½ sack mix CLSM per MAG 728-1.
- 24) The developer shall arrange for the required utility relocations and bear the costs of the relocations. The developer shall provide utility companies and districts with advance notice of the proposed construction giving sufficient time for utility review. The utility companies may require their own inspections.
- 25) The contractor shall notify the engineer and Town of Florence at least 2 working days (48 hours) in advance of construction for inspection.
- 26) All utility testing shall be successfully completed prior to placement of ABC, to avoid reconstruction of the road section in the event a utility must be repaired or reconstructed.
- 27) Water, sewer, reclaimed and storm line testing will not be accepted unless testing occurs after all utilities including gas, cable, and power are complete. Water and Sewer lines may be pre-tested before all utilities are complete if the contractor so desires.
- 28) Any quantities shown on plans are not verified by the Town of Florence.
- 29) Revisions to the original plans must be approved by the engineer of record and the Town of Florence, prior to construction. Any such changes shall be documented on As-Built plans.
- 30) All work and materials which do not conform to the approved plans and specifications are subject to removal and replacement at the contractor's expense.
- 31) Backfilling shall not be started until all lines are approved by the Town Engineer, Town Representative or Town Inspector.
- 32) Inspection shall be performed by a qualified representative of an engineer licensed in the State of Arizona. The degree of inspection will be determined at the pre-construction conference. Inspection must meet all requirements set forth by ADEQ, the State of Arizona, and the Town of Florence. Inspection shall be performed and certified by the Engineer of Record. The Town of Florence will complete oversight inspection only. The Engineer of Record is to provide all certifications and other documentation prior to acceptance by the Town.
- 33) All plans signed by the Town are null and void one year from date of signature if construction has not started. The plans shall be brought up to current standards and may be required to be resubmitted for Town approval.
- 34) As-built drawings, certified by the owner's engineer, shall be submitted to and accepted by the Town Engineer before final acceptance of the work (see As-Built requirements), and prior to issuance of a building "Certificate of Occupancy" (see As-Built requirements, Chapter 9). As built drawings shall include a PDF set and .dwg files for the design.
- 35) The contractor and/or developer shall warrant all work for a minimum of a 1 year period from the date of final acceptance by the Town of Florence.
- 36) This set of plans has been reviewed for compliance with Town requirements prior to issuance of construction permits and shall be kept at the construction site. Such review shall not prevent the Town from requiring correction of errors in plans which are found to be in violation of any law or ordinance.
- 37) The ACCEPTANCE of the completed right-of-way improvements within a new subdivision will not be given until all deficiencies are corrected, test reports meeting MAG Specifications for compaction and materials are submitted, the warranty bond is posted, and other data including As-Built drawings are provided to the Town Engineer.

2.13 STREET CONSTRUCTION NOTES

- 1) Exact point of matching termination and overlay of existing street pavement shall be confirmed in the field by the Town.
- 2) Driveway locations shall be confirmed or approved by the Town prior to curb construction. The developer shall be responsible for coordinating the locations for driveways to avoid conflict with utility services. When a Driveway intersects a sidewalk, it shall be constructed to ensure ADA compliance. All Driveways shall be constructed using AA Class Concrete
- 3) Curb, gutter, sidewalk, and pavement shall be swept clean of dirt and debris. New sidewalk shall be cleaned and kept clean during construction if pedestrian traffic is allowed on the sidewalk.
- 4) Base course shall not be placed until subgrade has been approved by the Town.
- 5) No ABC placement or paving construction shall be started until all underground utilities within the roadway prism are completed, tested and accepted by the Town. Acceptance to start ABC or paving does not include receipt of ADEQ Approval to Operate, however, it does include Town review and acceptance of all pipe testing and soils compaction testing procedures and results.
- 6) Pavement course shall not be placed until base course has been approved by the Town Engineer.
- 7) Backfill compaction shall be Type I per M.A.G 601, unless otherwise noted.
- 8) All A.C. shall follow M.A.G Specifications, unless another specification is approved by the Town. Mix design shall be submitted prior to start of construction.
- 9) All survey monuments and boxes and utility appurtenances manholes, valve boxes, etc. shall be protected from chip seal operations. All frames, covers, valve boxes, manholes, etc. shall be adjusted to finished asphalt or curb grades after placement of surface course and prior to chip seal by the contractor.
- 10) Frames, covers, valve boxes and manholes shall be adjusted to grade after paving is finished and concrete collared per MAG Standard Detail 391.1.
- 11) No chip seal operation shall be considered complete or acceptable for payment until access to all such items has been restored.

2.14 GRADING AND DRAINAGE CONTRUCTION NOTES

Plans for Grading and Drainage construction shall have the following notes shown on the Cover, Note or Detail Sheet.

- 1) An on-site grading and drainage permit is required.
- 2) A separate encroachment permit is necessary for any off-site construction.
- 3) Staking pad and/or finished floor elevations are the responsibility of the owner or his engineer. Building within a critical drainage area (FEMA Zones A, AO, AH, A1-A33, and A99) is not permitted without a floodplain use permit.
- 4) The owner's engineer shall submit certifications of constructed building pad elevations prior to the Town's acceptance of project.
- 5) Detention basins shall not be constructed over existing or new utilities, unless approved by the Town Engineer .
- 6) Contractor can grade finished lots up to 0.2 feet with no additional plan revisions. Any lots greater than 0.2 feet will require a request for information that shall be submitted to the Town Engineer.

2.15 WATER MAIN CONSTRUCTION NOTES

Plans for water construction within the Town right-of-way or easements shall have the following notes shown on the Cover, Note or Detail Sheet:

- 1) Arizona Department of Environmental Quality requirements shall be complied with.
- 2) All materials used in installation of water mains shall be pursuant to AAC R18-4-504, AAC R18-4-119, ASTM and AWWA standards. All components that come into contact with potable water will be NSF-61 certified and bear the NSF-PW seal.
- 3) PVC and Ductile Iron Pipe to be installed per manufacturer's requirements. All Ductile Iron Pipe shall be poly-wrapped per the manufacturer's requirements.
- 4) All materials used in the installation of ductile iron pipe shall be pursuant to ACC R-18-4-504.
- 5) All lines and appurtenances shall be provided with 14-gauge, single-strand, direct bury copper wire. Tracer wire shall be:
 - a) be blue
 - b) be protected from crimping and other damage.
 - c) be located on the top of the pipe and terminate at hydrants into Copperhead Industries Cobra Access point or an approved equal in yellow mounted on the flange.
 - d) pass a continuity test conducted by the contractor and witnessed by the Engineer of Record and the Town.
- 6) Water – Sewer separation shall be pursuant to AAC R-18-5-502. Ductile Iron Pipe with restrained joints is required when separation requirements cannot be met. Concrete encasement will not be allowed, unless specifically approved by the Town.
- 7) Water mains shall be subject to a pressure and leakage test in accordance with MAG 610 and AWWA C-600 Standards, except test pressure shall be a minimum of 200 psi or 150% of the working pressure in the pipe whichever is greater, unless determined otherwise by the Town. The working pressure will be based on the lowest elevation/highest pressure point in the main, whichever is greater.
- 8) Water mains shall be disinfected in accordance with ADEQ Engineering Bulletin No. 8, "Disinfection of Water Systems".
- 9) All valves and fittings shall be pressure rated to match the required pressure ratings of the pipelines where installed.
- 10) Contractor will expose any lines being tied into to verify location.
- 11) Backfilling shall not be done until lines are inspected and approved by the Town.
- 12) Back flow prevention assemblies shall be furnished and installed by the contractor according to MAG and Town of Florence supplements.
- 13) All water service connections shall be extended a sufficient distance across right-of-way to clear all facilities to be installed in public utility easements paralleling street right-of-way.
- 14) The Town utilities department staff shall be present when tying a main into the existing system.
- 15) Only Town employees are authorized to operate the water valves and fire hydrants on their water system.
- 16) All service lines shall be Municipex tubing. The minimum size service shall be one inch. Service lines shall be continuous under pavement without a connection or extension.
- 17) All taps shall use all bronze double strap service saddle.
- 18) All water meter setters shall be a Mueller or another approved town model.
- 19) Meters shall be installed by the Town of Florence.

- 20) All taps shall terminate with an angle meter valve within the box set 6 inches behind the sidewalk and 8 inches below the back of the sidewalk. The meter box shall be set flush to finish grade.
- 21) Location of all water valves must always be referenced during construction and made available to the Public Works Department. Only Town employees are authorized to operate the valves and fire hydrant connections to the Town's water system.

2.16 SEWER CONSTRUCTION NOTES

Plans for sewer construction within the Town right-of-way or easements shall have the following notes shown on the Cover, Note or Detail Sheet.

- 1) Sewer and Water separation shall be pursuant to AAC R-18-5-502C. Ductile Iron Pipe with restrained joints is required when separation requirements cannot be met. Concrete encasement will not be allowed, unless specifically approved by the Town.
- 2) Arizona Department of Environmental Quality requirements will apply in accordance with AAC R 18-9-E301 – more specifically where they pertain to maximum allowable sewer line/pressure sewer line exfiltration–infiltration rates.
- 3) All lines and appurtenances shall be provided with 14-gauge, single-strand, direct bury copper wire. Trace wire shall:
 - a) be green
 - b) be protected from crimping and other damage.
 - c) be located on the top of the pipe and brought to the surface at all appurtenances and connect to existing wire.
 - d) pass a continuity test conducted by the contractor, and witnessed by the Engineer of Record and the Town
- 4) PVC sewer pipe & fittings shall be installed pursuant to ASTM D2321 and ASTM D3034-00.
- 5) Sewer manhole construction shall be pursuant to AAC R-9-E301.D.3.c.
- 6) Sewer manholes shall adhere to the standards outlined in Section [6.8](#)
- 7) Ductile Iron Pipe, when used, shall be cement or epoxy lined for sewage use and shall be poly-wrapped per the manufacturer's requirements.
- 8) The Town of Florence is not liable for delays nor damages to installation of new utilities or relocation.
- 9) Building service lines/laterals shall be constructed of SDR-35 PVC pipe per the IBC, IRC and IPC. ABS plastic pipe is not allowed by the Town for building service lines/laterals.
- 10) The service pipeline shall have a disconnect cleanout installed on the public side of the P.U.E. at the building property line. The disconnect cleanout shall be a 4-inch diameter PVC SDR-35 Elder Valve Tee fitting. The riser pipe shall also be of 4" PVC SDR-35 pipe. The riser pipe shall be topped with a threaded brass flush cap 6" below the final grade surface enclosed within ductile iron valve box at the finished surface grade.
- 11) Sewer laterals are required to be tested to the specifications of the Town's Standards and Details.
- 12) The entire length of the sewer pipeline shall be tested for deflection using a 5% mandrel. Sewer line deflection tests shall be done on 100% of all PVC lines according to manufacturer's recommendations.
- 13) Sewer line low pressure air tests shall be done on 100% of all lines pursuant to ASTM designation F1417-92 Reapproved 1998.

- 14) All manholes shall be tested using the “Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test” published by the American Society for Testing and Materials. Sewer manhole testing pursuant to AAC R-9-E301.D.3.f shall be done on 100% of all manholes.
- 15) Exfiltration testing or vacuum testing in accordance with ASTM designation C1244-93. Reapproved 2000 may be used.
- 16) After all infrastructure construction is completed, including paving, all sewer lines and manholes shall be cleaned to Town’s satisfaction, at no cost to Town. Dirt and debris will not be permitted to be flushed into the existing mains.
- 17) A 2” x 4” stake (painted green) shall be set one foot behind each sewer service. All 2” x 4” stakes marking sewer services shall be firmly set into the ground at the elevation of the flow line and shall extend 2 feet above the ground surface.
- 18) The Town will not accept sewer lines with less than 5 feet of cover, unless approved by the Town Engineer.
- 19) Prior to final acceptance, the contractor shall be responsible for providing the Engineer of Record with a video, along with a printed report, of all of the main line installed. The video and report will be reviewed and deemed acceptable by the Engineer of Record before submittal to the Town. The Town shall review and accept this submittal prior to project release. The video work shall be performed after all other underground infrastructure has been completed and after all sewer lines have been thoroughly cleaned and flushed with verification of the cleaning and flushing procedure by the Engineer of Record and the Town. Video inspection and report shall include standing water depth measurements and both vertical and horizontal alignment certifications. The discovery of any flaws in the materials, pipe slope, or construction of the pipeline at the Town’s sole discretion must be fixed at no cost to the Town before the Town will give final approval of construction.

III. STREET DESIGN AND CONSTRUCTION

3.1 GENERAL COMMENTS

This section describes the minimum geometric requirements to be used in the preparation of construction plans that involve public street improvements. The requirements described herein are primarily based on safety and operational considerations; therefore, standards that provide a greater degree of safety or a better operation of the transportation system may be used within reasonable economic limits. Standards that provide a lesser degree of safety, pavement life cycle or reduced operational capacity may not be used without approval from the Town Engineer.

While every effort has been made to ensure the accuracy and completeness of these guidelines, the Town of Florence shall not be held responsible for any errors or omissions. It shall be the sole responsibility of the design engineer to ensure a proper design and the accuracy and completeness of construction documents containing his or her signature.

3.2 DEFINITIONS

For the purposes of these guidelines, the following definitions are used:

Developer: The individual, firm, corporation, partnership, association, syndicate, trust, or other legal entity that files the application and initiates proceedings for the development and/or subdivision of land in accordance with the City Code and said developer need not be the owner of record of said land.

Easement: A grant by the owner for the use of specified land by the public, a corporation, or persons, for specific uses and purposes and so designated and recorded in the county recorder's office.

Median: A raised, or flush area designed to separate and control vehicular movement.

Multi-Use Path: A path physically separated from motorized vehicular traffic by an open space or barrier. Multi-Use Paths may only be used by non-motorized users such as cyclists, pedestrians, skaters, and wheelchair users.

Pedestrian Way: A public walk dedicated entirely through a block from street to street and/or providing access to a school, park, recreation area or shopping center.

Right-of-Way: Any land which by deed, conveyance, agreement, easement, dedication, usage, zoning condition, process of law or other means is reserved for or dedicated to the general public for street, highway, alley, public utility, or pedestrian walkway purposes and accepted by the City.

Street: Any existing or proposed street, avenue, boulevard, road, bridge, viaduct, or easement for public vehicular access or a street shown in a plat duly filed and recorded in the county recorder's office. A street includes all land within the street right-of-way whether improved or unimproved and includes such improvements as pavement, shoulders, curbs, gutters, sidewalks, parking spaces, bridges, viaducts and traffic-control devices.

Interstate: reference to I-10 outside the Town limits

Freeway: reference to the future North-South Corridor

Principal Major Arterial: proposed six-lane facilities along the one-mile grid system serving major local and regional traffic. Examples include SR 79, SR 287, Hunt Highway, Felix Road, Attaway Rd. and others.

Minor Arterial: designed to serve similar mobility needs as Major Arterials but are four (4)-lane facilities. Examples include Butte Road, Adamsville Road, Merrill Ranch Parkway and the Old Florence-Kelvin Highway.

Major Collector: these roadways can be configured as a four (4)-lane road or a two (2)-lane road with center turn lane. Examples include Diversion Dam Road, Main Street, and Price Road.

Minor Collector: represents two (2)-lane roads with no center turn lane that typically facilitate connection between internal neighborhoods and adjacent arterial roadways. Examples include Ranch view Road, and Bowling Road.

Local Streets: local streets provide access directly to residential properties and are not designed to accommodate through traffic. Examples include Orlando Street, Brady Street, and other

Private street: A street not owned or maintained by the Town.

Public street: A street owned and maintained by the Town.

Commercial driveway: Access for retail, office, high density residential or government/community service building.

Industrial driveway: Access for large industrial, office park, mixed use, or warehouse developments which may also accommodate heavy truck movements.

Residential driveway: Access to single-family residence from local or collector street only. Access from an arterial street is not allowed in the Town unless approved by the Town Engineer.

Parking lot access way: Access to and circulation among parking areas within an integral apartment or townhouse complex.

3.3 STREET CLASSIFICATION

Street classifications are determined by location and/or intended use. The Town uses the classifications found in [Town of Florence Transportation Planning Study \(February 2020\)](#) to classify roadways.

3.4 STREET NAMES

Street names shall be consistent with the natural alignment and extension of existing streets. New street names shall not duplicate in whole or in part, or be confusing with existing street names. The Town Council reserves the right to modify street names to conform to Town standards.

3.5 GENERAL TECHNICAL INFORMOATION

- 1) Street Name Signs
 - a) All new developments shall provide for street name signs and posts at all intersections. The developer shall install these signs and posts at public street intersections
 - b) Private streets shall be signed by the developer as approved by the Town's Development Services Department
- 2) Survey Monuments
 - a) All developments shall provide survey monuments at section corners, street centerline intersections, street centerline alignment changes (P.C.'s, P.T.'s or P.I. if it is within street pavement). For new building construction, the Town Engineer may not require, with prior written approval, replacement of monuments for areas outside the right-of-way.
 - b) All section corners, ¼ corners, and center of section shall be a brass cap in a hand hole per MAG Std. Det. 120, Type "A". Engineering may also require Type "A" monuments at certain intersections.
 - c) All existing monumentation shall be preserved both horizontally and vertically.
- 3) Barricades and Delineators
 - a) All traffic control devices shall be in accordance with the latest Manual on Uniform Traffic Control Devices (MUTCD) prepared by the U.S. Department of Transportation, Town of Florence Traffic Control Manual, and MAG Standards.
 - b) All new developments shall provide for barricades at all dead ends. Temporary dead ends and incomplete streets require a MAG Std. Det. 130, Type "A" Barricade. Barricades shall be constructed with red and white reflectorized stripes using engineer grade reflective sheeting.
 - c) Barricades installed with phased construction may be relocated within the same development.
 - d) Delineators are required to guide traffic at all necessary locations (such as pavement tapers). Minimum spacing between delineators is the same as the speed limit (in Miles Per Hour) for the roadway.
- 4) Signage and Striping
 - a) All signage and striping shall be per the latest MUTCD and approved by the Town Engineer.
- 5) Conduits, Sleeves or Carrier Pipes
 - a) Projects that have parkway landscaping with irrigation lines under public streets shall install conduit sleeves for the irrigation line(s) prior to the paving improvements. All parkway landscaping shall be as directed and approved by the Florence Planning Division.

3.6 DESIGN STANDARDS

- 1) Street design will be in accordance with the following criteria, subject to the approval of the City Engineer. Geometric design standards not specifically included in this Standard will conform to the latest Policy on Geometric Design of Highways and Streets, published by the American Association of State Highway and Transportation Officials (A.A.S.H.T.O.).
- 2) Street Right-Of-Way Requirements

- a) Right-of-way widths in excess of the standard widths may be required in special circumstances such as when:
 - i) Cut or fill slopes cannot be confined within the standard width;
 - ii) Minimum sight distance lines on horizontal curves are not within standards;
 - iii) Minimum sight distances at intersections are not within the standards;
 - iv) Auxiliary lanes are to be provided.
- 3) Arterial Streets
 - a) All developments shall provide for public arterial and collector streets at their normal alignments, or as approved by the Town Engineer.
 - b) Interior streets shall not intersect arterial streets other than at the $\frac{1}{4}$ and $\frac{1}{2}$ mile points of the arterial or as approved by the City Engineer.
 - c) Single-family residential developments shall not have direct access to an arterial street, unless approved by the Town Engineer.
- 4) Intersections
 - a) Design to Minimize Conflict
 - i) To minimize conflicts and provide for anticipated traffic movements, each intersection must be evaluated with regard to its individual characteristics, and designed based on the following factors:
 - ii) Traffic factors such as capacities, turning movements, vehicle size and operating characteristics, vehicle speed, pedestrian movements, transit operations, and accident history.
 - iii) Physical factors such as topography, existing conditions, channelization requirements.
 - iv) Human factors such as driving habits, reaction to surprises, decision and reaction time, and natural paths of movement.
 - b) Angle of intersection: A 90-degree angle of intersection is required, unless waived by the Town Engineer. A right-angle intersection provides the shortest crossing distance for intersecting traffic streams. It also provides the most favorable condition for drivers to judge the relative position and speed of intersecting vehicles.
 - c) Alignment and Profile
 - i) Intersections occurring on horizontal or crest vertical curves are undesirable. When there is flexibility in the selection of intersection locations, vertical or horizontal curvature should be avoided. A line or grade change is frequently warranted when major intersections are involved. If a curve is unavoidable, it should be as flat as site conditions permit. Where the grade of the through roadway is steep, flattening through the intersections is desirable as a safety measure.
 - d) Sight Visibility
 - i) Sight Visibility Triangles – Clear lines of sight will be maintained along all streets, alleys and driveways to assure the safety of motorists and pedestrians.
 - ii) Lines of Sight – Lines of sight will not be obscured between twenty-four (24) inches and six (6) feet through a triangular area adjacent to a driveway, an alley, or a street, where such access ways intersect with another street in a T-configuration. The sight visibility triangle, or sight triangle, consists of three (3) sides that are formed by two (2) intersecting access ways and a line connecting the two (2)
 - e) Sight Distance

- i) Adequate sight distance shall be provided at all intersections, alleys and driveways.
 - ii) The determination of whether an object constitutes a sight obstruction shall consider both the horizontal and vertical alignment of both intersecting roadways, as well as the height and position of the object.
 - iii) The sight distance required varies according to traffic speeds on the through road. A designer shall provide the sight distance based on the latest AASHTO Policy on Geometric Design of Highways and Streets and submit it with the plans.
 - iv) Sight distance triangles should be included and illustrated on the paving and landscaping plans at intersections of Collector and Arterial Roads
- 5) Street Cross Slopes
- a) Typical Street Cross-Slope – Undivided streets should have a normal crown that is a two-way cross-slope with the cross-section high point on the street centerline. Divided streets should have cross-slope on each pavement section. The high point of each slope on each pavement section shall occur on the edge of the pavement nearest to the median. Unusual conditions may cause cross-slope requirements to vary, but normally, the desirable cross-slope is 2%, with a maximum cross-slope of 3% and a minimum cross-slope of 1%. Any deviation from the desirable cross-slope shall be approved by the Town Engineer.
 - b) Cross-Slopes in Street Dip Sections – Dip sections that cross the street to accommodate storm drainage runoff are discouraged and must be approved by the Town Engineer. When permitted, the pavement through the dip section should be installed with cut-off walls, in accordance with MAG Standard Detail 552. Transitions back to normal street cross-slopes will be needed at both ends of the dip section.
- 6) Longitudinal Slope
- a) The minimum street and gutter slope for public streets is 0.002 feet/feet (0.2%). Slopes less than the minimum need approval by the Town Engineer.
 - b) Projects that have any area with less than the approved minimum gutter slope shall provide construction staking on the actual gutter alignment (not offset) at a spacing not to exceed 25-feet and have the grades verified by a Town of Florence Engineering Inspector immediately preceding the concrete pour.
 - c) Grade breaks and grade changes shall be clearly noted and stationed on the Grading and Drainage plan and the profile views.
 - d) All streets and gutter lines shall be water tested in the presence of and to the satisfaction of the Town's Inspector.
- 7) Compound Curves
- a) Compound curves (two curves with different radii in same direction) should be avoided. However, if site conditions make the use of a compound curve unavoidable, the shorter radius shall be at least 2/3 the length of the longer radius when the shorter radius is 1,000 feet or less. Compound curves are not permitted when design speeds require the shorter radius to be greater than 1,000 feet.
- 8) Special Tangent Sections in Compound Curves
- a) On two-lane roads, tangent sections are needed between two curves in the same direction. If the pavement cross-sections throughout the curves do not have superelevation, then the minimum lengths for tangent sections are per Table 3-1

TABLE 3-1: TANGENT SECTIONS (CURVES IN SAME DIRECTION)

Arterial	660'
Collector (major)	500'
Collector (minor)	400'
Local	250'

9) Tangent Sections Between Reverse Curves

- a) Tangent section shall be provided between two curves that curve in the opposite direction. Abrupt reversals in alignment should be avoided when possible. The distance between reverse curves should be at least the sum of the superelevation runout length and the tangent runout lengths. The required minimum lengths for tangent sections between reverse curves without superelevation are provided in Table 3-2

TABLE 3-2: MINIMUM TANGENT SECTIONS (REVERSE CURVES)

Arterial	300'
Collector (major)	250'
Collector (minor)	200'
Local	100'

10) Tangent Sections Approaching Intersections

- a) A tangent section shall be provided between a street intersection and a curve unless otherwise approved by the Town. The minimum tangent length is shown in Table 3-3

TABLE 3-3: TANGENT SECTIONS AT INTERSECTIONS

Arterial	300'
Collector (major)	250'
Collector (minor)	200'
Local	100'

- 11) Superelevation of roadways is discouraged but may be approved in unusual circumstances may require the use of superelevation. The City Engineer must approve the use and design of superelevated roadways. Roadway drainage must be considered in superelevated conditions.

12) Side Slopes

- a) Side slopes should be designed for functional effectiveness, ease of maintenance and pleasing appearance.
- b) For areas within ten feet (10') from back of curb, slopes of 4:1 or flatter shall be provided.

13) Pavement Tapers

- a) Projects are required to provide sufficient pavement tapers at all necessary locations (such as the beginning or end of a project) to properly guide traffic.
- b) The pavement section for tapers shall be per these guidelines.
- c) Pavement tapers shall be constructed with a thickened edge per MAG Standard Detail 201, Type "A".

- d) Taper Length Formulas: Taper length for merging traffic situations are calculated per AASHTO and MUTCD standards.
- e) If existing conditions are determined to be substandard, the Town Engineer may require that the developer shall sawcut and remove any existing pavement tapers when extending or installing new pavement improvements.

14) Vertical Alignment

- a) Vertical curves shall be designed to provide adequate sight distance, public safety and effective street drainage. Refer to AASHTO’s “A Policy on Geometric Design of Highways and Streets” for sight distance requirements.
- b) Roadways with a longitudinal grade break or grade change of greater than 1.0% shall be required to design and construct a vertical curve along said section of roadway.
- c) Roadways shall be designed to eliminate undulations. In the case where an existing paved roadway undulates, it shall be removed full width and reconstructed to a new grade acceptable to the City Engineer and the entire cost paid for by the Developer.
- d) Vertical curves are required when there is grade change equal to or greater than the percentages listed in Table 3-4. All sections of a street’s vertical alignment must meet passing and stopping sight distance requirements for design speed established for the street. Refer to the AASHTO publication, “A Policy on Geometric Design of Highways and Streets” for vertical alignment design.

TABLE 3-4 VERTICAL CURVE REQUIREMENTS

Street Classification	Required When Grade Change is this % (Algebraic Difference of the Two Grades)
Arterial	One (1) %
Collector (Major)	Two (2) %
Collector (Minor)	Two (2)%
Local	Two (2)%

- 15) When horizontal and vertical curves are combined, the horizontal curve needs to lead or follow the vertical curve, and not be introduced near the top of a crest vertical curve or near the bottom of a sag vertical curve.

3.7 CONSTRUCTION

- 1) A Right-of-Way Permit is required for all work within the Town Right-of-Way.
- 2) All contractors working within the Town Right-of-Way shall have a Town of Florence Business License.
- 3) All work within the Town Right-of-Way shall be inspected and approved by the Town’s Engineering Department.
- 4) All newly constructed public ways shall be kept barricaded and access denied to the public until such public way is accepted by the Town and all traffic control devices are installed to the approval of the Town.

3.8 STREET STRUCTURAL SECTION (AGGREGATE BASE, ASPHALT BASE COURSE AND ASPHALT SURFACE COURSE)

- 1) Flexible Pavement

- a) Asphalt concrete, base course and subgrade shall conform to MAG standards. All street sections shall be designed to conform the requirements outlined in Chapter 10 of the Maricopa County Department of Transportation's Roadway Design Guidelines.
- 2) Rigid Pavement
 - a) Rigid pavements, such as Portland cement concrete, are generally not used for Town streets. If rigid pavements are used, each design must be approved by the Town Engineer on an individual basis.
- 3) Decorative Pavement
 - a) The use of decorative concrete must be approved by the Town Engineer. Decorative concrete will not be placed in arterial through lanes. When approved, it shall be constructed in accordance with MAG Standard Specifications Sections 340 and 725 (Class A concrete) with a minimum thickness of 8 inches.
 - b) The use of interlocking paving blocks must be approved by the Town Engineer. When approved, they shall be installed in accordance with the manufacturer's guidelines. In addition, a minimum of 25 paving blocks of the type installed must be deposited free of charge at the Town's maintenance yard for future Town maintenance operations.
- 4) Miscellaneous Pavement Standards
 - a) For cases where the full depth of base course cannot be constructed due to insufficient cover over existing facilities, the Town reserves the authority to approve equivalent alternate designs if justified.
 - b) The minimum pavement cross-sectional requirement for temporary turnarounds, which are constructed at project phase lines, is 6 inches of aggregate base course over 6 inches of subgrade; see MAG Standard Specifications Sections 301, 310 and 702. If the temporary turnaround is constructed at a project boundary, a surface course of 2 inches of asphaltic concrete is required in addition to the base and subgrade noted above; see MAG Standard Specifications Sections 321 and 710, without lime.
 - c) Temporary pavement cross-sections shall consist of 2 inches of asphaltic concrete over 6 inches of aggregate base course over 6 inches of subgrade, see the same MAG Standard Specifications Sections noted above.
 - d) The edge of the temporary pavement and the perimeter of a paved temporary turnaround shall be constructed with a thickened edge per MAG Standard Detail 201, Type "A".

3.9 STREET WIDENING

- 1) Projects widening existing pavement are required to sawcut and remove a two-foot (2') minimum section of the existing pavement continuous along the edge of the existing pavement.
- 2) Projects that are required to widen existing pavement shall provide on the plan and profile sheets as a minimum, existing elevation, grades at the centerline, sawcut line and gutter line at fifty-foot (50') intervals, unless a smaller interval is required by the Town Engineer.
- 3) Also show on the plan sheets the existing cross-slope from the existing centerline of the street to the sawcut line and from the sawcut line to the lip of proposed gutter at the same fifty-foot (50') intervals. The existing and proposed cross-slopes are to be within one to three percent (1%-3%) with a desired two percent (2%). The existing pavement must be sawcut to a line that achieves the one to three percent (1%-3%) or rebuilt from the street centerline.

- 4) When existing paving has been installed without surface course, the developing project shall install surface course to the centerline. The surface course shall be tapered beyond the centerline to provide a smooth transition. The Town Engineer shall assess the amount of tapering required to make a smooth transition to the existing pavement.
- 5) The developer's Engineer will be required to investigate existing pavement for composition, structural capacity and stability. If after the developer's Engineer's investigation, the Town determines the existing pavement section is below current standards, the developer's Engineer shall call out a sawcut at the construction centerline and replacement of the existing pavement with new pavement per Town standards.

3.10 PARTIAL STREET AND HALF-STREET IMPROVEMENTS

- 1) Generally, a developer is required to construct the full street cross-section for the streets internal to the development and a portion of the streets surrounding the development. For partial or half street designs, twenty-four feet (24') minimum width from face of curb to the edge of the asphaltic pavement and a striping plan is required.
- 2) All streets: Pavement tapers shall be constructed to provide transitions between newly constructed and existing roadway sections as deemed necessary by the Town Engineer.

3.11 PUBLIC ALLEYS

- 1) Residential alleys are not permitted unless approved by the Town Engineer.
- 2) All alleys are to be a minimum of twenty-four feet (24') wide. Surfacing is to be two inches (2") of Asphalt Concrete (AC) on six inches (6") of aggregate base course (ABC).
- 3) Alleys used as a means of secondary access, are required to be surfaced with a minimum of six inches (6") of aggregate base course (ABC) and a double chip seal layer.

3.12 TURNING LANES

A separate turning lane allows separation of conflicting traffic movements and removes turning vehicles from the intersection area. Right turn lanes shall be provided on major arterial streets at all street intersections, and at driveways where warranted. For left turn lanes at signalized intersections, dual turn lanes should be considered when the turn volume exceeds 200 vehicles per hour, the opposing through volume exceeds 1,000 vehicles per hour, or the delay to left turning vehicles exceeds 45 seconds. Abrupt reduction of alignment and sight distance standards should be avoided.

- 1) Chapter 6 of [the MCDOT Roadway Design](#) Manual should be used to design minimum turn lane lengths.

3.13 DECELERATION LANES

- 1) Deceleration lanes may be required on streets in conjunction with driveways and may require additional right-of-way. The location and lane length shall be determined on a case-by-case basis and shall be approved by the Town Engineer

3.14 MEDIANS

- 1) Median design shall follow the guidelines shall follow the Guidelines outlined in Chapter 5 Section 7 of the Florence Transportation Planning Study (February 2020).

- 2) Median Landscaping
 - a) Plants prohibited in Chapter 9 of the [MCDOT Roadway Design](#) manual shall not be planted in medians
 - b) Landscaping within a median shall be approved by the Town Engineer

3.15 CURB AND GUTTER

- 1) Vertical Curb
 - a) Vertical curb is required for all streets except Local Residential and the designated special area: Rural Area. However, where drainage report requires vertical curb, it shall prevail within Local Residential.
 - b) The vertical height of the curb shall be six-inch (6”) on Arterial or Collector streets unless otherwise approved.
 - c) Installation shall be per MAG Standard Detail 220, Type A or MAG Standard Detail 222, Type A.
 - d) Vertical curbs shall be 6” at all medians and edge of roads with landscaping, equipment or vertical structures.
 - e) Vertical curb may be required for adequate drainage control, as required by the Town Engineer.
- 2) Roll Curb
 - a) Roll curbing may be allowed for public local residential streets where vertical curb is not required (curb returns, drainage control, etc.) and is to be constructed in accordance with MAG Standard Detail 220, Type C or D.
- 3) Ribbon Curb
 - a) Ribbon curb may be allowed by the Town Engineer for public streets if deemed necessary. The installation of the ribbon curb is to be per MAG Standard Detail 220, Type B. Transition from vertical curb and gutter or roll curbing to ribbon curb shall be with a curb termination. Installation of the curb termination is to be per MAG Standard Detail 222.
- 4) Curb Returns
 - a) All curb returns shall be constructed with vertical curb. Curb returns shall have a minimum drop of two-tenths of a foot (.20’) around the return. Maximum drops shall not exceed 5% along the face of the curb at the sidewalk ramp. See Table 3-5 for minimum back of curb radii for curb returns at intersections.

**TABLE 3-5
MINIMUM CURB RETURN RADII AT INTERSECTIONS**

	Parkway	Arterial	Collector	Local
Parkway	35	35	30	30
Arterial	35	35	30	30
Collector	30	30	30	25
Local	**	**	25	25

**Not allowed without written approval from the City Engineer

- 5) Curb Removal and Replacement
 - a) If existing curb and gutter must be removed and replaced, the existing asphalt pavement must be sawcut and removed to a minimum width of two feet (2') from the lip of the new gutter. Replacement of asphalt pavement shall match existing asphalt and base thickness at a minimum.
 - b) Any section of the work deficient in depth or not conforming to the plans or specifications shall be removed and replaced prior to the placement of finished pavement by the Contractor at no additional cost to the Contracting Agency. Replacement or reconstruction shall be from joint to joint. Concrete work that does not comply with tolerance requirements of Section 340.3.9, Tolerances, shall be removed and replaced. Remove and replace gutters that exceed the ponding tolerance. Grinding shall only be allowed if approved by the Engineer.
- 6) Valley Gutters
 - a) Valley gutter and aprons, where required, are to be installed per MAG Standard Detail 240. Valley gutters are to have a minimum drop across the intersection of 0.005 (0.5%) or may be matched to existing slope. Valley gutters and aprons shall be constructed with Class "A" concrete.
 - b) Maximum allowable cross slope is 8.33%. If there is a greater slope than that, increase the width of the gutter to meet maximum slope constraints.
 - c) Asphalt valley gutters are not allowed on public streets.
 - d) Transverse valley gutters are prohibited unless approved by the Town Engineer.
 - e) Valley gutters may only be used across collector and local residential streets. Exceptions may be approved by the Town Engineer.

3.16 SIDEWALKS

- 1) Construction Standard
 - a) Parkway, Arterial, Collector and Local Street classifications shall comply with MAG Standard Detail 230 except as otherwise approved by the Town.
 - b) All sidewalks shall conform to ADAAG Guidelines.
 - c) A meandering sidewalk is preferred where ROW allows; to create a more aesthetic feel to the community.
- 2) Sidewalk Width
 - a) All street classifications require a minimum of five-foot (5') wide sidewalks.
 - b) Principal Arterial and Parkway Street classifications require six-foot (6') wide sidewalks.
 - c) Sidewalks on both sides of the street may be waived if one 10-foot sidewalk is placed instead.
 - d) Width Transitions shall occur either in the curb return area or across a driveway. All transitions shall meet ADA guidelines
- 3) Location
 - a) Sidewalks along Collector and Arterial streets shall be detached at a linear distance of 5 feet for Collector Streets or 6 feet for Arterial Streets. Otherwise, sidewalks may be widened to a minimum width of 8 feet for Collector or 9 feet for Arterial streets.
 - b) Sidewalks along local streets may adjoin the back of the curbing.
- 4) Sidewalk Ramps

- a) Sidewalk ramps are required at all public street intersections and are to be designed and constructed per ADAAG Guidelines.
 - b) Existing Curb Installation
 - i) The installation of a sidewalk ramp in an existing curb shall be made by completely removing the existing curb and gutter. The existing asphalt pavement shall be removed and replaced as noted in the section on Curb and Gutter (Chapter 3.10.E). The sidewalk ramp will be constructed per MAG Standard Detail 234.
 - c) Tee Intersections
 - i) Sidewalk ramps shall be installed on the perpendicular side of the street at the tee intersections and shall be aligned with one of the curbs returns on the opposite side of the street. Where roll curb is constructed, the sidewalk ramp shall be per MAG Detail 238-4.
 - d) Existing Intersections
 - i) Projects that adjoin or include an existing public street intersection in which sidewalk ramp(s) are not existing, are required to install the necessary ramp(s) in order to comply with ADA requirements.
- 5) Multi Use Paths
- a) Bikeways, bike lanes, and bike paths will be designed in accordance with the Arizona Department of Transportation publication, Arizona Bicycle Facilities Planning and Design Guidelines, AASHTO Guide for the Development of Bicycle Facilities and Town of Florence policy.
 - b) Bike lanes shall be a minimum of 6 feet (6') when within the paved roadway
 - c) Two-way travel bike lanes are not permitted within the paved roadway.
 - d) A Multi-Use Path shall be a minimum of 8 feet (8') when created off of the roadway.
 - e) Requirements for sidewalk on both sides of a street may be waived if a Multi-Use Path is created on one side of the street.

3.17 DRIVEWAYS

- 1) All driveways within public right-of-ways shall be designed and installed per the following:
 - a) When adjoining a rolled curb, residential driveways shall follow MAG standard detail 230 in use of expansion joints.
 - b) Driveways wider than 20 feet shall not be constructed without approval from the town.
 - c) The installation of a driveway in an existing vertical curb shall be made by the complete removal of the curb and gutter. The existing asphalt pavement shall be removed and replaced as noted in the section on [Curb and Gutter](#) (Subsection 5,a)
 - d) The total width of all driveways serving a property cannot exceed 50% of the curb line frontage.
- 2) Driveway Locations are prohibited (measured to the driveway centerline):
 - a) Within 30 feet of any commercial property line except when it is a joint-use driveway serving two abutting commercial properties. If the driveway is shared, access agreements must be recorded by, the two abutting property owners.
 - b) Within 50 feet of the right-of-way line of an intersecting non-arterial street.
 - c) Within 100 feet of the right-of-way line of an intersecting arterial street.
 - d) Within 100 feet of an approved median opening location on an arterial street.
- 3) Residential Driveways
 - a) Residential properties that have frontage on a local street as well as on an arterial or collector street shall only access the local street.

- b) Residential parcels fronting only on an arterial or collector street may be given access if alternate public access is not available and is approved by the Town Engineer. When such access is allowed, the driveway must be circular or it must have a turn-around area to ensure that there is no need for backing onto the street.
- c) Driveway locations not delineated on plans shall be identified before construction. Location shall be approved by the Town's Inspector.
- d) Shall follow MAG standard Detail 250-1 or 250-2.
- e) The running slope of the driveway shall not be >10% without approval from the Town Engineer or their designee.

3.18 STREETLIGHTS

- 1) Streetlights shall be positioned a minimum of two foot (2') from the back of the sidewalk or a minimum of two and one-half feet (2.5') from the back of curb to the face of pole. Streetlight poles may be placed in the median where the median width is sufficient to maintain a minimum distance of three feet (3') or more from the back of curb to the face of pole.
- 2) Streetlight layout and design shall conform with the standards and guidelines set forth in *Town of Florence Public Street Light System Standards*
- 3) Streetlights shall be in accordance with the Development Services Lighting Guidelines.

IV. STORM DRAINAGE FACILITIES

4.1 GENERAL INFORMATION

The purpose of this chapter is to present general information, minimum specific guidelines, and provide minimum design criteria and guidance regarding the preparation of drainage reports and grading, drainage, and storm water facility plans. Storm water facilities may include the following:

- Surface and sub-surface storm drain systems
- Sub-surface retention systems
- Retention basins

The Town of Florence has adopted the Pinal County Drainage Manuals.

4.2 TOWN CODE

- 1) All development and infrastructure must comply with the Town Codes regarding floodplain management and pollution prevention. An electronic version of the [Town of Florence Municipal Code](#) can be referred to on the Town of Florence website.

4.3 TOWN STANDARDS

New land development activities may result in potentially higher storm water drainage, more frequent flooding and increased pollutants. The Town of Florence has developed standards to alleviate or reduce these potential results. The engineer should be aware of and become familiar with the various drainage standards that pertain to land development within the Town of Florence.

- 1) Retention Requirements: All new developments shall provide retention for the run-off generated by the 100 year, 2-hour storm. The area to be considered as generating run-off to be retained shall be the development itself and one-half of the right-of-way of the adjacent street(s). In some cases, adjacent arterial or collector streets are designed and constructed prior to development of the adjacent properties. In such cases, temporary storm water retention facilities are to be replaced with permanent retention areas whenever site development occurs. The permanent retention area must retain the same volume of storm water as provided with the temporary basin— although the configuration of such drainage facilities may be modified to accommodate the on-site development.
- 2) The Town of Florence permits the use of drywells to drain retention areas if there is no other convenient method available to drain the site, and where the drywells have been designated and constructed according to the standards of this manual.
 - a) ADEQ regulates water quality and the quality of storm water discharges, including those directed to drywells. Prior to drilling, installing or abandoning a drywell, permission must be obtained from ADEQ. It is the responsibility of the engineer or drywell owner to obtain the required ADEQ Drywell Registration. For additional information regarding this aspect of ADEQ, refer to the ADEQ Drywell Program.

- b) It is the owner's responsibility to maintain the drywells. Drywells that cease to drain a retention basin within a 36 hour period are to be rehabilitated or replaced with new ones, or the site may be redesigned when alternate methods of drainage are now available.
- 3) Drywell Design and Construction
- a) The Town of Florence standard drywell is the Maxwell Plus or approved equal. In areas where enhanced environmental protection is warranted (gas stations, for example), drywells should be designed to prevent groundwater contamination from spills. All drywell details shall be shown on the construction drawings.
 - b) The number of drywells used shall be such that the volume to be drained by each well shall not exceed 43,560 cubic feet in 36 hours. The engineer shall submit information substantiating the number of drywells.
 - c) Offset drywells a minimum of 20 feet from any basin surface inlet.
 - d) The rim of the drywell shall be 2 inches above the finished basin elevation.
 - e) Drywells are to remain sealed until all paving or basin landscaping is completed (or at least until new grass is stable) then unsealed and inspected.
 - f) Drywells are to have a minimum settling basin depth of 19 feet with 30 inch bolt down grates, and shall penetrate a minimum of 10 feet into highly permeable soils.
 - g) Drywells are to be spaced a minimum of 75 feet center to center.
 - h) No allowance may be taken for drywell volume in basin capacity calculations.
 - i) Drywells shall not be constructed within the street right-of-way.
 - j) The Engineering Department shall inspect each well site prior to placement of the liner and backfill to verify 10 feet penetration into sand and gravel. Where it is unclear whether sand and gravel has been penetrated, a percolation test shall be performed.
- 4) Drywell Percolation Test: When a drywell percolation test is necessary, the drywell shall be filled with clean water until the rate of inflow and the percolation rate have stabilized for a period of one hour. If the rate of inflow is greater than or equal to 0.5 cfs, the drywell shall be considered acceptable. If the rate of inflow is less than 0.5 cfs, the succeeding drywells installed shall be increased in depth or the total number of drywells shall be increased, to make up the difference.
- 5) Flood Zone requirements
- a) All finished floor elevations shall be shown on the grading and drainage plans to be a minimum of 14 inches above the outfall of the lot.
 - b) The operator of a construction site is responsible to meet the requirements of ADEQ under the AZPDES permit
- 6) Storm Water Pollution Prevention Plan (SWPPP) requirements
- a) Submit a Notice of Intent (NOI) to ADEQ for authorization
 - b) Prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) and keep a copy on site
 - c) Include an electronic copy of the NOI and SWPPP with the erosion and sediment control plan submittal to the Town
 - d) Submit copy of ADEQ and NOI to Development Services Department

4.4 AVAILABILITY OF STORM DRAIN

The existing Town of Florence storm drain system is limited. Due to the limited Town storm drain system, developments are required to retain their own runoff plus the runoff from adjacent half streets

onsite. New developments may also be required to install a new storm drain system to serve their development.

After research of utility information, improvement plans and master plans, questions pertaining to the availability of Florence storm drains and their expansion or extension should be directed to the Town Engineer.

4.5 DESIGN STANDARDS AND GUIDELINES

1) Retention volume can be determined from the following formula:

$$V = C \left(\frac{P}{12} \right) A$$

Where:

V = Storage

Volume (acre-ft)

C = Watershed Runoff Coefficient

P = NOAA Atlas 14 Midpoint 100-Year, 2-Hour Precipitation (inches)

A = Drainage Area (acres)

Watershed Runoff Coefficients can be found in [Pinal County Drainage Manual: Volume II](#)

- 2) Fifty percent of the right-of-way behind the sidewalk and fifty percent of the required landscape setback may be used for retention. The maximum allowable depth is 2.5 feet (measured from the adjacent street top of curb) and the maximum allowable side slope is 4:1.
- 3) On Lot retention may only be used in developments 20,000 square feet or greater in size provided that
 - a) The lot is graded to provide a minimum of 3 inches of freeboard above the fifty-year, twenty-four-hour storm.
 - b) Lots less than 35,000 square feet in size cannot use an Agrarian Street and must provide retention basins for street run-off.
 - c) Plats are to contain the following statement: "On lot stormwater retention is required in this subdivision. No stormwater shall discharge onto neighboring properties or streets."
- 4) Retention Basin Design requires:
 - a) A minimum 6 inches of freeboard is required between the high water surface elevation and the bottom-of-curb elevation adjacent to the basin inlet.
 - b) The maximum allowable side slope on any basin is 4:1.
 - c) Any water that enters the basin must do so in a manner that does not damage the landscaping, create scouring, or cause erosion.
 - d) The minimum pipe acceptable for use as an equalizer is 8 inches in diameter.
 - e) Headwalls are to be provided for all pipe inlets/outlets. Headwall grates are required for all pipes size 10 inches and larger.
- 5) Street capacities

- a) For major and minor arterials and collector streets, the ten-year one-hour storm event shall only inundate the equivalent of one lane of traffic per half street (bike lane and half a lane maximum for Collector streets)
 - b) For local streets, the ten-year, one-hour storm event must be contained between the two-curb faces at a maximum depth of 6 inches.
 - c) There shall be no cross street flow on any streets, except secondary collectors and local streets, for any storm up to and including the ten year, one-hour storm event.
 - d) Cross street flow on secondary collectors and local streets shall be limited to 8 inches in depth.
 - e) In all cases, the 50-year, 24-hour storm event must be contained within the street right-of-way. The one-hundred-year storm event must be contained below the finished floors of the building.
 - f) Whenever superelevation is allowed on a divided street, a storm drainage system to collect the runoff along the median curb shall be provided. In no case shall nuisance water from the higher traveled way be allowed to cross to the lower traveled way.
 - g) Scuppers are not to be used unless grade limitations mandate it. Scuppers will be built in accordance with MAG Standard Detail No. 206-1 and 206-2. Scuppers that use a metal cover (walking surface) are not allowed.
 - h) Catch basins may be curb opening type, grate opening type, or a combination curb and grate opening. All grate openings must be bicycle safe.
- 6) Design of Storm Drains shall be done by the following:
- a) Size of pipe shall be determined by the Manning Formula which is expressed as:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

Where:

n = Roughness coefficient

A = Flow area, sq ft

R = Hydraulic radius, ft

S = Friction slope, ft/ft

- b) Adjustments of pipe sizes as determined by the Manning Formula may be necessary due to hydraulic gradient considerations
- c) The minimum pipe size allowed in Town of Florence right-of-way is 18 inches.
- d) The maximum length between access openings shall not exceed five hundred feet for pipes less than 36 inches in diameter or 800 feet for pipes 36 inches in diameter or greater. Access opening may be in the form of an inlet, manhole, junction box or other approved appurtenance.
- e) Minimum cover for storm sewer pipe shall be 2 feet from finish grade of the outside top of pipe, except where approved structural correction is provided when cover requirements cannot be met.
- f) All easements shall maintain a minimum width of 12 feet. Generally, the line shall be in the center of the easement. If the proposed line is deeper than 10 feet, then a wider easement may be required by the Town

- g) Where multiple pipes are installed, edge of easement shall be 5 feet clear of outside of pipe. Where easements do not generally follow established lot lines, add 5 feet to the easement width on side toward the building.
- h) Storm sewers shall be designed to provide an average velocity when running full of not less than 3 feet per second. It is desirable that the sewer be so designed that the velocity of flow remains constant or gradually increases as flow moves downstream.
- i) When a trunk line passes through a junction, the pipe crown lines will be at the same elevation. An exception is that when the inflow and outflow pipes are of the same diameter, the outflow pipe invert elevations will be one-tenth of one foot (0.1) lower than the inflow pipe invert.
- j) The angle of an inflow trunk line pipe to the outflow trunk line pipe at a junction will not exceed 90 degrees.
- k) If a lateral pipeline enters a junction and the invert elevation is above the crown elevation of the outflow trunkline, the lateral discharge will be considered as drop inlet inflow.
- l) Storm Drain manhole covers shall be models specified and approved by the Town
- m) The engineering drawings must designate the type of pipe to be used including size and slope. Use the following as a guide for choosing pipe required in different situations.
 - i) Reinforced concrete pipe (R.C.P. 36 inch diameter or larger and R.G.R.C.P., any diameter) may be used in all situations. The engineering drawings shall designate the Class or D-load specifications as per ASTM-C-76 and when requested, the engineer shall verify his choice of pipe with load computations.
 - ii) Cast-in-place pipe (C.I.P.P.) may be used in certain situations. The engineer is required to provide evidence that soil conditions are adequate for use of this pipe, and obtain permission to use C.I.P.P. as an alternate.

4.6 DRAINAGE REPORTS

- 1) Preliminary drainage reports must be prepared for all projects, unless the project is within the boundaries of a larger project for which an approved drainage report has already been provided, and no changes are being made to the approved grading and drainage for the site. No review will be scheduled without this report. This report shall be on separate, letter size sheets with any necessary maps. Handwritten comments are not acceptable.
 - a) A watershed boundary map shall be prepared. Indicate the drainage pattern, grade breaks and slopes of all streets, parking lots, and other relevant features. If the site is subject to off-site drainage, the watershed boundaries shall be delineated and any off-site drainage shall be accounted for in the report.
 - b) Indicate any existing drainage or irrigation structures such as: tailwater or delivery ditches, natural drainage channels etc., and what will be done with them.
 - c) Indicate the retention volume required. Present a preliminary retention basin plan including size, depth and proposed method(s) of draining the basin(s).
 - d) If the development, or any part of it, is located in a mapped floodplain, indicate the steps that will be taken to comply with the Town of Florence Municipal Code
- 2) A final drainage report must be submitted with each submittal of the engineering plans. Reports shall be on letter size sheets with necessary maps neatly folded, all in a folder. Handwritten comments are not acceptable. Final drainage reports shall include all of the information contained in the preliminary drainage report, including the following:

- a) Justification of the weighted run-off coefficient (C factor) used in the calculations of run-off volume.
 - b) Pertinent cross-sections that show conformance to depth and side slope requirements in retention basins.
 - c) Calculations showing the methodology used in determining the basin(s) volume(s).
 - d) Justification of the scupper and catch basin sizes called out in the plans. Assume 25 percent blockage and size the scuppers and catch basins accordingly. If a combination open curb-grate type catch basin is used, the 25 percent blockage factor is not required, but no credit is to be given to the open curb face in capacity calculations.
 - e) Show (by engineering calculations) how water entering the basin(s) via scuppers, pipes, etc. will not cause scouring or adversely affect the landscaping.
 - f) Provide any other information necessary for clarification purposes.
- 3) A map is to accompany the final drainage report clearly delineating the different areas to be considered and labeling critical points of interest, and where inlets are to be located.
- a) Each subarea is to be analyzed for the peak flow generated by the ten-year one-hour storm event, the fifty-year twenty-four-hour storm event, and the one hundred year design storm. Engineer may assume a maximum of 15 minutes for run-off from lots for the ten-year, one-hour storm event
 - b) Indicate how each basin will drain within 36 hours and provide pertinent calculations. Supply percolation tests if required
 - c) Show how the runoff not retained from the storm events greater than the fifty-year, twenty-four hour storm (one hundred year design storm) will exit the site and not increase the risk to downstream sites.
 - d) Provide any information or calculations regarding off-site drainage affecting the site.

4.7 REVIEW

- 1) Preliminary Subdivision Review of the plans should answer the following questions:
- a) Preliminary drainage report submitted?
 - b) Are limits of watershed shown, including off-site drainage?
 - c) Are there any existing drainage structures such as waste or delivery ditches, channels, etc.?
 - d) Is it clear what will be done with them?
 - e) Has a drainage exhibit been submitted showing drainage patterns of all streets in the subdivisions?
 - f) What is required retention and volume provided in cubic feet?
 - g) What is the approximate size and depth of the basin?
 - h) What method is available for draining the basin in 36 hours?
 - i) Will subdivision be phased?
 - j) Is it clear what will be done as a temporary solution of storm run-off during phasing?
 - k) Are any special easements needed for pipes, ditches, temporary basins, etc.?
 - l) Is the one-hundred-year flood plain, if applicable, shown on plat?
 - m) Are pad and finished floor elevations shown on the Grading and Drainage Plans?
 - n) Maximum allowable grade difference between adjacent developments to be no more than 1-½ feet

*If any part of the project is located in a one-hundred-year FEMA flood zone, contact the Town's Floodplain Administrator for necessary forms and information.

- 2) Final Subdivision Review of the plans should answer the following questions:
 - a) Has final drainage report been included with the first submittal of plans?
 - b) Is a drainage exhibit showing peak street flows and drainage areas included?
 - c) Are tile sizing calculations included?
 - d) Are catch basin calculations included?
 - e) Is a detail of retention basin grading shown?
 - f) What is the required volume?
 - g) What is the calculated volume?
 - h) Are inlet and outlet structures shown?
 - i) Is irrigation system design included?
 - j) Is lot grading plan included?
 - k) Method of draining basin in 36 hours?
 - l) Is the one-hundred-year flood plain, if applicable, shown on final plat?
 - m) Do the civil and landscape plans for the basins coincide?
 - n) Are water surface elevations and relevant cross-sections shown?
 - o) Are pad and finished floor elevations shown on the Grading and Drainage Plans?
- 3) Review of commercial or industrial sites should answer the following:
 - a) Have all property lines, proposed or existing buildings, asphalt, grass, desert landscape and concrete areas been shown and the dimensions of same?
 - b) Are all existing grades shown? Either by a grid method or contour lines especially at property lines, driveways and sidewalks.
 - c) Has the finished grade of all surfaces been indicated?
 - d) Are the finished floor and pad elevation shown?
 - e) Is the direction of roof drainage shown?
 - f) Are all items of construction that will affect drainage shown?
 - g) Is the site divided into drainage areas and calculations shown for the run-off and retention of each area?
 - h) Were the correct run-off coefficients used?
 - i) What method of draining the retention area is provided?

A. Notes

- 1) All design and construction must be in accordance with the Uniform Standard Specifications and Details published by the Maricopa Association of Governments and as amended by the Town of Florence.
- 2) The developer and contractor shall notify the Town of Florence Engineering Department at least 24 hours in advance of any construction of inspection.
- 3) The developer and contractor shall avoid the placement of driveways in conflict with utility services.
- 4) The developer and contractor shall coordinate the relocation of power poles and other utilities.
- 5) Backfill and compaction within County right-of-way shall be in accordance with the latest Maricopa County Special Provisions for installation of underground utilities.
- 6) Contractor shall comply with the provision for traffic control as per the latest edition of the Manual on Uniform Traffic Control Devices Handbook.

- 7) Call the Arizona 811, Blue Stake Center (602) 263-1100, 48 hours before you dig for location of all underground utilities.
- 8) Engineer certifies that he has contacted all interested utility companies and has transferred all existing and/or proposed utility lines and related information onto these plans, and that he has also correctly plotted the existing and proposed right-of-way and easement lines.
- 9) The contractor shall be required to install a night tie in for any new water line that will affect existing service sufficient to warrant same in the opinion of the Town Inspector.
- 10) All improvements within the retention basin and/or roadway parkways shall be in accordance with the latest Town of Florence Public Works and Engineering Standards.
- 11) Contractor shall perform close circuit televising of the storm sewer system that verifies proper installation. This shall be submitted and approved by the Town of Florence prior to Final Acceptance.

V. WATER ENGINEERING STANDARDS

5.1 GENERAL INFORMATION

These standards set forth a uniform engineering approach for determining water demand and minimum criteria for design of water distribution mains. The standards are structured to accommodate designers who are preparing construction plans for private development. It is not intended to provide standards that are all encompassing, to be substituted for innovative design. Sound engineering principles that develop public water systems are not only economical to construct but are economical to operate and maintain.

5.2 GENERAL REQUIREMENTS

- 1) All new residential and commercial developments shall tie into a municipal water supply if they are within 500 feet of an existing Town of Florence water main.
- 2) New public water distribution facilities shall be designed in accordance with Town of Florence standards set forth in this chapter, associated detail drawings, Maricopa Association of Governments (MAG) Standard Specifications and Details, Arizona Department of Environmental Quality Bulletin No. 10, Arizona Administrative Code, and American Water Works Association Standards.

5.3 WATER DEMAND

- 1) The engineer of record must provide estimated demands based on the following:
 - a) Average daily flow
 - b) Maximum daily flow (2x average)
 - c) Peak hour demand – three times (3x) the average daily demand
- 2) Water main design shall be based on maximum day flows.
- 3) The system should not exceed a velocity of five (5) ft/s or a head loss of ten feet per 1000 feet (10 ft/1,000 ft), whichever is limiting.
- 4) Appurtenances (booster, reservoirs, etc.) shall be designed for the peak hour demand.
- 5) System pressures should be maintained between sixty (60) and one hundred (100) psi for maximum day flows.
- 6) All nodes shall maintain a minimum static pressure of 20 psi during a fire flow of 1000 gpm for a duration of 60 minutes.
- 7) If a proposed development does not fit one of the areas below, see the usage table in Arizona Administrative Code, Section 18:

**TABLE 5-1
AVERAGE DAILY USAGE**

Proposed Development	Average daily use
Low Density Residential Less than 5 Dwelling Units per acre	250 gal per EDU
Medium Density Residential 5 to 7 Dwelling Units Per acre	250 gal per EDU
High Density Residential Greater than 17 Dwelling Units per acre	150 gal per EDU
General Commercial Business	1000 gal per acre
Hotel/Motel	200 gal. per room
Malls/Retail Areas	1.5 gal. per sq. foot
Industrial (Does Not Include Process Water)	1000 gal per acre
Schools Without Lunch and/or Shower Facilities	75 gal. per student
With Lunch and/or Shower Facilities	125 gal. per student

5.4 PIPE SIZING

- 1) Public water main installation shall be a minimum of eight (8) inches. Six (6) inch is not standard and will only be allowed when directed by the Town Engineer in very unusual circumstances.
- 2) The minimum standards for Water Distribution pipe sizing is as follows:

Street Classification	Minimum Pipe Diameter
Cul-de-Sacs less than 500' in length	6 inch
Local Street	8 inch
Collector (mid section alignment)	12 inch
Parkways, Arterials or Section Line Streets	16 inch or as directed by the Town Engineer

5.5 PIPE MATERIAL

- 1) All pipe for water lines less than or equal to 16-inches in diameter shall be at minimum:
 - a) Class C-900 PVC
 - b) Class C-905 PVC
 - c) Class 50 DIP with external zinc coating per ISO 8179-1- Only with Town Engineer's approval
 - d) Class 51 DIP with external zinc coating per ISO 8179-1- Only with Town Engineer's approval

- 2) Material for pipes larger than 16 inches shall be approved by the Town prior to construction.
- 3) All fittings shall pressure rated to match the design pressures of the pipe (minimum of 250 psi).
- 4) Pipe shall meet all applicable American Water Works Association (AWWA) standards and specifications, including the Underwriters Laboratories, Inc.
- 5) Lot testing, per AWWA C-400, may be required at the discretion of the Town Engineer. Testing shall be performed at an independent testing lab, approved by the Town. (Cost of testing to be paid by Supplier or contractor.) Certifications and test results, for each lot to be used, shall be delivered to the Town's Inspector prior to delivery of pipe to the job site.
- 6) Restrained joints shall be in accordance with M.A.G. Standard Detail 302-1 and 302-2. EBBA Iron 'Megalugs' are the acceptable standard for restraints.

5.6 INSTALLATION DEPTH

- A. Water mains shall be installed to minimum depth measured from finished grade to top of pipe as follows:

Size	Minimum Depth
8-10 inches	36 inches
12-16 inches	48 inches
16 inches in major streets	48 inches
20 inches and greater	Special Design

5.7 PIPE LOCATIONS

- 1) As a minimum
 - a) Water mains shall be installed across the entire frontage of the property needing the water, at the property owner's expense.
 - b) The main shall be extended from the ending point of the existing water main.
 - c) Water mains may require looping (feeds from two sources) to create adequate flows.
- 2) A six (6)-foot minimum horizontal separation from any parallel underground utility is required. In all major streets and other active utility corridors, a utility conflict review will be required.

5.8 LOOPING

- 1) Project designs shall make every effort to loop water mains throughout the development to limit dead ends.

5.9 DEFLECTION/VERTICAL REALIGNMENT

- 1) Vertical realignment by means of pipe deflection shall not exceed ½ the pipe manufacturers recommendation.
- 2) Vertical realignment by means of bends and offsets shall be per M.A.G. Standard Detail 370 for water mains six inches (6") to twelve inches (12") in diameter.
- 3) Water mains larger than twelve inches (12") shall have vertical realignment detailed by the Engineer.

5.10 BACKFLOW PREVENTION

The Town of Florence is responsible for protecting the quality of the public water supply. To prevent contamination of the public water supply by backflow and cross connections, the Town shall identify premises requiring backflow prevention, and approved types of assemblies to prevent backflow

- 1) All services two inches (2") and larger shall require backflow protection.
- 2) All master metered residential, all commercial and all industrial services shall require backflow prevention.
- 3) Smaller services not in one of the preceding categories may require backflow protection as determined by the Town.
- 4) All required backflow prevention assemblies shall be owned and maintained by the property owner.
- 5) All backflow prevention assemblies shall be tested upon installation and annually thereafter by a certified tester and results of that test forwarded to Town of Florence Engineering Department or appropriate water purveyor.
- 6) All above ground backflow prevention assemblies smaller than three (3) inches shall be placed in protective cages painted a neutral (earth tone) color to blend in with its surroundings.
- 7) All above ground backflow prevention assemblies three (3) inches and larger shall be painted a neutral (earth tone) color to blend in with its surroundings.

5.11 WATER SERVICES

A.SERVICES

- 1) The Developer is responsible for the installation of all necessary water services for the development.
- 2) Water Services larger than two inches (2") on a pressurized water main shall be installed per M.A.G. Standard Detail 340.
- 3) Live taps of water mains shall be coordinated with the Town's Utilities Department. Tapping tees (sleeves) shall pass a pressure test at a minimum two hundred (200psi) for 60 minutes before the actual tap is made.
- 4) Services tapped at 12 o'clock (straight up) shall be used for air release valves.
- 5) Regular service taps at the 12 o'clock position shall be used when other tap locations are not an option and only with approval from the Town.
- 6) Individual Pressure Reducing Valves are required to be installed on the customer side of the water meter, where the static pressure exceeds 80 P.S.I. Maintenance of the pressure-reducing valve shall be the customer's responsibility.
- 7) Single water services shall not serve properties under separate ownership.
- 8) Services will be turned on by Town personnel only. It is unlawful for anyone other than an employee for the Town or someone under their direct supervision to operate valves that will activate water services.

B.CORP STOPS

- 1) Corporation stops, curb stops and angle stops shall include a ball style valve.
- 2) Corporation stops shall be MIPT inlet and compression style outlet.
- 3) Corporation stops at the main shall be secured with brass or epoxy coated double strap saddles.
- 4) No direct tapping of main lines for corporation stops will be allowed.

C. STANDARD WATER METERS (2 INCHES AND SMALLER)

- 1) The design engineer shall take care in sizing meters and services to sufficiently supply the appropriate need for water usage.
- 2) Water meters and other equipment shall be installed using clearances and other details found in M.A.G. Standard Detail 320.. The minimum box size number 2.
- 3) Meter locations shall be easily accessible from a street or traveled way.
- 4) Meter service connection locations in other than a residential subdivision must be out of traveled roadway/walk. They may be located in planter area, parking lot island, etc., and should be sufficiently above finish grade to minimize flooding.
- 5) The Town provides and installs all meters for services two inch (2") and smaller at the owner or developer's expense.
- 6) Under certain circumstances, two-inch (2") services may require compound meters.
- 7) All water services shall be type K copper tubing. Large copper tubing shall be handled so that kinks do not develop, thus causing a water restriction.
- 8) Meters shall be approved models, with electronic ECR register and "Touch Read" meter reading system.
- 9) All service line fittings shall be compression style, (Ford Quick Joint, Mueller 110 or approved equal) with the exception of corporation stop to saddle and angle stop to meter, which shall be threaded. No soldered joints will be allowed below ground.
- 10) Meter boxes shall:
 - a) Be multi-layer plastic with a vertical load rating of 25,000 pounds minimum. (Mid States Plastics, Inc. BCF Series or approved equal)
 - b) Have vertical sides for ease of adjusting.
 - c) Have a rigid flange molded in the top of the box to hold its shape and provide support in concrete or asphalt or soft or sandy soil.
 - d) Have ductile iron covers with hinged read lid.
 - e) Be concrete in areas subject to traffic loading. Under certain circumstances the above stated plastic boxes may be used with specific approval of the Town.
 - f) Be welded steel covers in areas subject to traffic loading.

D. LARGE WATER METERS (LARGER THAN TWO INCHES)

- 1) Meters and vaults for services shall be supplied by the owner/developer/ contractor.
- 2) Backflow protection is required behind the meter.
- 3) Meters for domestic use shall models as directed by the Town.
- 4) Large meters, on potable lines not combined with fire systems, three inch (3") and larger shall be installed with a minimum two inch (2") bypass with valves to allow a continued water source should the meter need to be repaired or replaced.
- 5) Meters used for a system that is a combination of domestic use and fire protection shall be or approved models with ball valves and test ports. All iron parts on meter shall be epoxy coated inside and out. Combination service shall required backflow protection behind the meter.
- 6) Water meters and other equipment shall be installed using clearances and other details found in M.A.G. Standard Detail 345-1 and 345-2.

- 7) Vaults shall be installed per M.A.G. Standard Detail 321 and include the service inlet and outlet piping.
- 8) Vaults shall have full opening aluminum covers with spring assist.
- 9) Detailed drawings or manufacturers literature with lid and door dimensions shall be presented to the Town Engineer for approval before installation

5.12 FIRE HYDRANTS

- 1) Fire hydrants approved for installation on Town are:
 - a) Mueller Super Centurion, Waterous Pacer WB-67_250 or Clow Medallion
 - i) Shall be per MAG Detail 360-1
 - ii) Concrete pad shall be installed at finished grade
 - iii) All Fire hydrants must have bronze-to-bronze seat retainer to ensure easy removal of main valve
 - iv) • All nuts and bolts of the factory hydrant to be buried below ground will be a minimum of 304 stainless steel and coated for thread gall protection.
 - v) Minimum depth of bury shall be 3 feet 6 inches, and the maximum shall be 5 feet from the breakaway flange to the shoe
 - b) Exterior Coating
 - i) • Exterior Coating: Coating shall be one of the following:
 - (1) Triglycidyl Isocyanurate (TGIC) polyester coating meeting the following:
 - (a) Hardness: ASTM D 3363
 - (b) Impact Resistance: ASTM D 2794
 - (i) Chip Resistance: ASTM D 3170
 - (2) Prime coated with an epoxy and finish coated with a two-part polyurethane top coat meeting the following:
 - (a) Corrosion Resistance: ASTM B 117-02
 - (3) Coating shall be a semi-gloss, bright chrome safety yellow in color with high color retention.
 - (4) Coating shall be fade and UV resistant, rust resistant, resistant to abrasions and chipping and have flexibility qualities.
 - c) Interior coating
 - i) All interior ferrous surfaces of the shoe exposed to water shall be coated with a 100% powder epoxy or liquid epoxy (6 mil. Min. DFT) that conforms to AWWA C 550-81 and NSF-61.
- 2) Mid block fire hydrants should be placed on the same side of the street as the water main.
- 3) Fire hydrants in the public rights-of-way or public properties shall be installed per M.A.G. Standard Details 360 and 362.
- 4) Maximum spacing for fire hydrants in general is 500 feet. Florence Fire District has final approval for hydrant spacing and flow requirements.
- 5) There shall be a minimum of fifteen inches (18") of clearance from the lowest nozzle to finish grade.
- 6) A maximum clear distance of 6 ft. from the centerline of the fire hydrant is required.
- 7) Place hydrant within 30 feet of a dead end water main greater than 100 feet in length to facilitate flushing and maintenance of the water main.

5.13 VALVES

5.8 GENERAL REQUIREMENTS

- 1) Water line valves shall meet or exceed the pressure classification of the water line. Valve pressure rating should be noted on the plans.
- 2) Valves must conform to Sections 630.3 and 630.5 of the MAG Uniform Standard Specifications.
- 3) Tapping sleeves and valves are to conform to Section 630.4 of the MAG Uniform Standard Specifications and be installed per MAG Standard Detail 340. All live taps shall be approved by the Town.
- 4) All valves must meet or exceed AWWA C-509 or C-515 standards.
- 5) One joint of pipe (10 feet minimum) shall be installed on all stubs after valve installation.
- 6) All valve boxes and covers shall be installed per MAG Standard Detail 391-1, Type "C".
- 7) Valves shall be located at point of curvature of the curb return at intersection and property lines in mid-block.
- 8) Valve boxes shall be labeled Type "A" or "B" per MAG Standard Detail 391.

B. SMALL VALVES (LESS THAN 12 INCHES)

- 1) Valves shall be Epoxy Coated, Resilient Seated gate valves.
- 2) Residential Areas
 - a) Space valves appropriately, so that a maximum of thirty (30) single family units would be affected during a shutdown.
 - b) Spacing shall be a maximum of eight hundred (800) feet
- 3) Commercial/Industrial Areas
 - a) Spacing shall be a maximum of six hundred (600) feet.
- 4) A valve shall be placed on each side of a major crossing, such as canals, railroads, freeways, etc.
- 5) A gate valve shall be placed between the main and each fire hydrant.

C. LARGE VALVES (LARGER THAN 16 INCHES)

- 1) Spacing shall be a maximum of one thousand (1,000)-feet.
- 2) Butterfly valves or approved equal are required on water mains larger than 16 inches in diameter.
- 3) Gate valves may be permitted depending on the application.
- 4) Butterfly valve manual operators shall be furnished with ground level position indicators.
 - a) Position indicators shall attach to the extension stem and shall indicate the relative positions, which direction to turn the operator to open and close the valve, and how many turns to close the valve from the fully open position.
- 5) Certified shop drawings shall be submitted to the Town Engineer for review and approval prior to shipment of the butterfly valves.

D. PRVS

- 1) Pressure reducing and pressure sustaining valve stations shall be of a two-stage design; i.e. a valve for normal and high flows, and a valve for low flows.

- 2) PRVs shall be installed in a vault of an approved design behind the sidewalk.
- 3) Valves and vault shall be reviewed and approved by the Town Engineer prior to ordering.

E. ARVS

- 1) Approved Air Vacuum release devices shall be installed at locations where the slope changes from positive to negative, and vice versa.
- 2) Air release devices shall be sized according to manufacturer's specifications, or the Crispin Valve Guideline.

F. EASEMENTS

- 1) All easements shall maintain a minimum width of 12 feet. Generally, the line shall be in the center of the easement. If the proposed line is deeper than 10 feet, then a wider easement may be required by the Town

5.14 WATER CONSTRUCTION REQUIREMENTS

- 1) The Contractor shall pothole all existing utilities ahead of his construction to allow for any necessary adjustments to the grade line.
- 2) No other utilities shall be installed in the same trench as the water main.
- 3) The Engineer and the Contractor shall verify the stationing, elevations and type of pipe to be matched at all field closure points.
- 4) All fittings and hydrants requiring thrust blocking (kickers) shall be wrapped in one 8 mil layer of V-Bio Enhanced Polywrap (ANSI/AWWA C105/A21.5). Care shall be taken to keep concrete separate from bolts, barrel drains, followers, etc.
- 5) All new water mains shall be disinfected and flushed following AWWA Standard C 651-99.
- 6) A fire hydrant meter must be obtained through the Town to obtain construction water. Fees and water bills shall be paid by the owner.
- 7) All new water lines shall be filled through the hydrant meter unless an alternate method is approved by the Town Engineer.
- 8) If during the construction of a waterline, the Contractor fails to or is unable to comply with a request of the Town's Inspector, and it is necessary for Town's forces to do work that is normally the Contractor's responsibility, the Town shall be justified in billing the Contractor. Each incident requiring work by Town forces shall be covered by a separate billing at the current applicable rates.

6 WASTEWATER COLLECTION AND TREATMENT SYSTEMS

6.1 GENERAL INFORMATION

The purpose of this chapter is to present a consistent engineering approach for the minimum criteria for design of a public wastewater collection system. This chapter is intended for the use in planning, design, plan preparation, and the plan review process. The information put forth in this chapter is not intended to cover all situations that arise, nor may it be a substitute for sound engineering principles.

6.2 SEWER SERVICE AGREEMENT

- 1) All sewage collection systems must obtain a General Aquifer Protection Permit from ADEQ prior to construction of sewer infrastructure. The first phase is for construction authorization. The engineer shall submit to ADEQ a Notice of Intent to Discharge for a Sewage Collection System, Sewage Collection System Capacity Assurance form (if applicable), and Sewage Treatment Facility Capacity Assurance form and applicable fee. ADEQ will review the NOI and the supplemental information to verify that the applicant has submitted all required documents. Refer to ADEQ website for further information and applicable forms.

6.3 AVAILABILITY OF TOWN OF FLORENCE SEWER

- 1) Questions pertaining to the availability of public sewer service from the Town of Florence should be directed to Development Services. Questions regarding system expansion or extension requirements to serve proposed new projects may also be directed to the Development Services.

6.4 TOWN STANDARDS

- 1) Developers are required to install, all improvements necessary to provide wastewater service to their development. This includes any sanitary sewer lines, lift stations, force mains, or other facilities, and the payment of all required development fees.
- 2) Developers must also adhere to the Town's standards for extension of the Town's wastewater system to newly developed areas and subdivisions inside the Town's service area.
- 3) Developers must adhere to any Town codes and ordinances that apply to the development of the Municipal Wastewater System. An electronic version of the [Town of Florence Municipal Code](#) can be found on the Town of Florence website.

6.5 FEDERAL, STATE, AND COUNTY REGULATIONS

- 1) EPA: The U.S. Environmental Protection Agency (EPA) requires the Town to develop and implement a program to control discharges that might harm the Publicly Owned Treatment Works (POTW). The program establishes local discharge limits for nonresidential users, and provides a permitting process based on the users' discharges and types of businesses. Specific information may be obtained by calling the Development Services Department.

- 2) ADEQ: Engineering Bulletin No. 10, "Guidelines for the Construction of Wastewater Systems" published by the Arizona Department of Environmental Quality (ADEQ), and Arizona Administrative Code, "Title 18 – Environmental Quality," contain specific requirements for submittals, approvals, and notifications when extension of a public sanitary sewer line is proposed.
- 3) All development must also adhere to any Pinal County regulations regarding sanitary sewer.

6.6 DESIGN STANDARDS AND GUIDELINES

- 1) All public sanitary sewer systems are to be of a gravity flow design, unless other factors dictate the use of a force main and lift station.
- 2) Developments that need to construct force mains and lift stations facilities shall address the facilities compatibility with the Town's Wastewater Collection System Master Plan and Utility Systems Evaluation Report.
- 3) Waste Water System Analysis: This section describes the measurement standards for gravity sewer lines that are to be used to evaluate the suitability of wastewater collection system improvements and additions.
 - a) The Manning Coefficient shall be 0.013 for gravity mains. The Town may choose to use a lower Manning's Coefficient if, in the Town's discretion, doing so would eliminate the need for a lift station.
 - b) The flow depth/diameter (d/D) ratio for sewer mains are as follows:
 - i) $d/D=0.5$ for sewer line less than 12 inches.
 - ii) $d/D=0.75$ for sewer line 12 inches and greater. This maximum d/D Ratio applies to the ultimate or buildout peak flow.
 - c) Gravity sewer main velocities shall not be less than 2 feet per second with the pipe flowing half full in order to maintain cleaning velocities. [Table 6-1](#) lists the minimum slopes for maintaining self-cleaning full flow velocities with $d/D = 0.5$.
 - d) The minimum slope listed in the table is 0.0008 ft/ft, which is the minimum practical slope for gravity sewer construction. Greater slopes are desirable as long as the flow velocity does not exceed 8 feet per second, but the slopes must be at least equal to the minimum slope.
- 4) All projects involving residential, commercial/industrial subdivisions and land development projects will be required to provide a sewer system design report of the project's impact on the Town's wastewater system. The Wastewater System Design Report shall be submitted prior to the construction plans. The construction plans shall not be reviewed until the Wastewater System Design Report has been approved.
 - a) In addition to the report's analysis of the impact to the Town's wastewater system the report shall determine the development's wastewater load, and analyze the hydraulics of the proposed sanitary sewer system. The analysis shall include the effects of the peak flow to ensure correct sizing and layout of the new wastewater facilities.
 - b) The design report shall be sealed and signed in accordance with the requirements of the State of Arizona Board of Technical Registration, and submitted to the Public Works Department. Report shall be letter sized (8.5" x 11") with any larger maps included within the report shall be folded to letter size and bound or provided in a folder.
- 5) Sewer main lines installed by improvement projects which are adjacent to undeveloped parcels are required to install main line stubs from the adjoining manhole(s) to facilitate the future extension of

the public sewer system to serve future developments. Stubs from the manholes are to be extended to the right-of-way line and be 8 inches minimum in diameter

- 6) All trenching, bedding, backfill, compaction, and pavement replacement shall comply with MAG Construction Specifications and Standard Details, MAG Specification 601. All pavement replacement shall be in accordance with Town of Florence Standards.
- 7) Minimum size for sewer main lines shall be 8 inches in diameter. Sewer line sizing criteria shall comply with ADEQ requirements. Larger sewer lines may be required if warranted by the project's Wastewater System Design Report, specific sewer loads, or by the Town's Wastewater Collection System Master Plan and Utility Systems Evaluation Report.
- 8) The installation of new curvilinear sewer mains for public sanitary sewer collection systems are not permitted within the Town of Florence service area.
- 9) Public sewer mains are required to be located within dedicated public rights-of-way (ROW) or easements (PUFE, PUE). Sewer alignments should generally be parallel to property or street center line. Alignment should be straight and uniform within the street or easement.
- 10) To minimize the potential of contamination, the Engineer must design the horizontal and vertical separation of water and sanitary sewer lines, in accordance with the Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control" and MAG Specification Section 610.5 and the following:

Horizontal Locations:

- a) Minimum horizontal separation from the sewer main to any underground wet utility shall be 6 feet, outside diameter to outside diameter. Exceptions must be approved by the Town.
- b) Public sewer mains within easements are normally to be centered within a 20 foot Public Utility Easement or a 20 foot Public Utilities and Facilities Easement. When more than one public utility will occupy the easement, the public sewer main shall be offset 5 feet from the centerline of the easement.
- c) Where a raised median divides a public street, the sewer main is to be offset from the median curb. While a minimum dimension for an offset has not been established, Florence does require that the manhole ring or cover not encroach upon the median curb or gutter.
- d) Alignments within retention/detention basins shall be avoided. Where conditions dictate construction through a retention/detention area, special approval from the Town is required. The Engineer shall provide written justification for the alignment.

Vertical Locations:

- e) Sewer mains shall have a minimum 5 foot cover over top of the sewer main as measured from surface course of finished grade.
- f) Trench loading calculations shall be made available to the Town upon request.
- g) Where a sewer main crosses below an irrigation ditch, there shall be at least 2 feet of separation between the flow line of the ditch and the top of the sewer.
- h) Where cover is less than 3 feet, due to topography such as unlined canals, washes, etc., the sewer main line shall be constructed of Ductile Iron Pipe (DIP) with an approved lining. The DIP shall extend a minimum of 10 feet each side of the canal, wash, etc., and be protected from any settlement or washout. Any sewer line that crosses a wash shall be encased in concrete in accordance with MAG Standard Detail No. 402.

- i) Sanitary sewer lines crossing less than 2 feet below a storm drain or culvert, or under large structures such as box culverts and bridges, will require additional protection such as the use of DIP or encasement. Sanitary sewer lines crossing over storm drains and culverts must be a minimum of one foot above and provide extra protection per MAG Standard Detail 404-1 through 404-3.
 - j) Sanitary sewer lines will have a minimum cover of 6 feet located in a retention area as measured from finished grade. Cover of less than 6 feet will be considered on a case-by-case basis and requires approval by the Town Engineer.
- 11) Easement Width shall comply with the following standards:
- a) Sewer mains located outside of public right-of-way shall be considered private unless designated by the Town to be public. Public sewer mains located outside of the public right-of-way shall be installed in a minimum 20 foot wide dedicated sewer line easement. The easement shall be accessible from public right-of-way, free of obstructions and accessible at all times to Town maintenance equipment. Sewer mains identified as private shall be installed within a 12 foot minimum private sewer easement.
 - b) If the sewer depth is 10 feet or less, the minimum width shall be 20 feet
 - c) If the sewer depth is greater than 10 feet, the minimum width shall be 2 times the depth (centered in easement)
 - d) Regardless of pipe size, there shall be a minimum of 2 feet between the sewer line and any property line.
 - e) Public sewers placed between private lots shall be required to provide a 30 foot wide public utility easement with the sewer line located in the center of the easement.
 - i) Easement Locations: The 20 foot public easements should generally be located or centered within a private drive or aisle of the proposed project. Installations under parking stalls, landscape areas, fences/walls, and overhangs shall be avoided unless an engineering evaluation of the necessity and feasibility is approved by the Town of Florence.
 - ii) Easement Access: When a sewer line is located within an easement that is not within a paved roadway or other paved access way, an all-weather access road shall be provided to enable the Town to access to the pipe, manholes, and other appurtenances for maintenance and repair. The access road shall have a minimum width of 15 feet and shall be paved or constructed of a minimum of six inches of stabilized decomposed granite. Each end of the access road shall be connected to a public street, private access way, or turn-around easement conforming to Town of Florence requirements.
 - iii) Easement Dedication: Public sewer line easements or right-of-way may be dedicated by a Map of Dedication, Subdivision Final Plat, or separate instrument, and conveyed to the Town. Contact the Town for the best method for a particular project. All dedicated land shall be free of environmental contamination per ASTM E-1527 current requirements.

6.7 PIPE SLOPES

- 1) Pipe slopes to generate a minimum velocity of 2 feet per second shall be as shown in TABLE 6-1

TABLE 6-1: MINIMUM SLOPES FOR CIRCULAR PIPE

Pipe Size (inches)	Minimum Slope ⁽¹⁾ (ft/ft)
8	0.0040
10	0.0025
12	0.0020
14	0.0016
15	0.0015
16	0.0014
18	0.0012
20	0.0010
21	0.0010
24	0.0008

Note:

(1) Pipe Capacity presented based on full capacity flow.

(2) Table assumes Manning's N coefficient of 0.013.

- 2) Gravity sewer main velocities shall not be less than 2 feet per second with the pipe flowing half full in order to maintain cleaning velocities. TABLE 6-1 lists the minimum slopes for maintaining self-cleaning full flow velocities with $d/D = 0.5$. The minimum slope listed in the table is 0.0008 ft/ft, which is the minimum practical slope for gravity sewer construction. Greater slopes are desirable as long as the flow velocity does not exceed 8 feet per second, but the slopes must be at least equal to the minimum slope.
- 3) Sewer mains larger than 24 inches should still have a slope no less than 0.0008.

6.8 MANHOLES

- 1) Manholes with a depth of 10 feet or less shall have a minimum diameter of 4 feet
- 2) Manholes deeper than 10 feet shall have a minimum diameter of 5 feet
- 3) Manholes in which the sewer line is greater than 10 inches in diameter shall have a manhole of at least 5 feet in diameter
- 4) Manhole lids must be 24 inch diameter for four foot manholes and must be 30 inch diameter on 5 foot manholes.
- 5) All manholes in arterial streets must have 30 inch diameter manhole frames and lids.
- 6) Except as itemized below, manholes shall be installed: at the end of each line; at all changes of grade, pipe size, or alignment; at all sewer pipe intersections; and at distances not exceeding the following:

TABLE 6-2: MANHOLE SPACING

Pipe Size (Inches)	Maximum Spacing (Feet)
8 to 10	400
12 to 21	500
24 and Larger	600

Source: ADEQ Engineering Bulletin 11

- 7) Manholes with pipeline deflections of 45 degrees or greater shall provide 0.2 feet of invert drop through the manhole. All other manholes shall provide a minimum 0.1 feet invert drop. Pipeline deflections greater than 90 degrees will not be allowed.
- 8) When pipe sizes change through a manhole, the crown of the upstream pipe(s) shall be equal to or higher than the crown of the downstream pipe.
 - a) If this causes an invert drop greater than 12 inches, match spring lines. In large trunk lines, inverts at junctions should be designed to maintain the energy gradient across the junction and prevent backflow.
- 9) Standard manholes on the Town of Florence public sewer system shall conform to MAG Standard Details 420-1, 420-2 and 424. Use only cast in place manhole bases. The manholes shall have no steps.
- 10) Manholes on boundaries of the subdivision shall have stubs with shaped inverts in appropriate directions for future connections.
- 11) Manhole covers shall be non-rocking, traffic rated, and located outside the wheel path of vehicles, bike lanes and sidewalk ramps.
- 12) Any necessary manhole within a retention/detention basin shall have its rim above the high water elevation and shall be watertight.
- 13) Manholes are required to be lined per MAG Specifications Section 625.
- 14) Sewer mains may have a maximum of 24 inches drop (flow line-to-flow line) without a drop connection. Drop manholes are to be avoided due to the increased maintenance issues, generation of odors due to the turbulence of the flow, and safety hazards for maintenance personnel. Engineers that are contemplating the use of drop structures to address grade and depth issues are required to discuss the situations with the Town staff and receive approval to proceed with a design that includes drop manholes. Approval will be based on the following:
 - a) The Town shall determine when the use of drop manhole structure(s) is appropriate. When specifically approved by the Town, the drop manhole structures shall be in accordance with MAG Standard Detail 426.
 - i) For drops up to and including 5 feet, use Type A.
 - ii) For drops greater than 5 feet, use Type B.
 - b) No sewer cleanouts are allowed on public sewer lines.

6.9 SEWER SERVICES

- 1) Final plans shall indicate the sewer service location for each proposed development.
- 2) The location shall not be changed in the field except with approval by the Town.
- 3) For single family residential developments a typical lot layout indicating the sewer service in relation to the driveway will be required.

- 4) Record Drawings shall reflect any revisions made during construction.
- 5) Sewer services under paved driveways should be avoided whenever possible.
- 6) Sewer Taps shall comply with the following:
 - a) The Engineer shall make every effort to utilize the existing sewer line that has been stubbed out to the property by previous construction.
 - b) All building line connections will be installed perpendicular to the sanitary sewer line per MAG Standard Detail 440.
- 7) Taps into manholes shall not be permitted.
- 8) Sewer lines 12 inches in diameter or larger may be tapped only with Town approval.
- 9) All taps shall be a minimum of 6 feet from the centerline of the manhole.
- 10) A 3 foot minimum separation between service taps is required.
- 11) All taps shall be stationed using the closest downstream manhole as station 0+00.
- 12) Plans shall be reviewed by the Town for backflow prevention valves which are required where finish floor elevations are below either upstream or downstream manhole rim elevations. When a backflow prevention valve is required, the owner of the property will be responsible for maintaining the backflow valve and shall be identified on the plans.
- 13) The property owner will be responsible for the sewer service line from the right of way to the service facility.
- 14) An Electronic Locator Ball and Sewer Service Curb Crossing Stamp per MAG Standard Detail 440-1 through 440-4 shall be installed on each individual sewer tap.
- 15) A single tap per lot is required and permitted. Additional taps for any one lot must specifically provide written request submitted to the Town and receive written acknowledgment of approval by the Town.
- 16) All sewer taps into existing sewer main lines shall be performed by a licensed contractor. Contractor shall obtain a right-of way permit and provide a not less than a 24-hour notification for inspection services prior to installation of the sewer tap.
- 17) Size of sewer taps shall be determined as follows:
 - a) Single family residential developments shall be 4 inch. A 4 inch diameter tap shall be provided for each platted lot. Additional taps for common areas shall be determined by the Engineer.
 - b) Multi-family developments shall have a minimum 6 inch taps.
 - c) Commercial developments shall have a 6 inch tap unless a smaller size is demonstrated to be sufficient.
 - d) Commercial/Industrial subdivisions shall provide 6 inch services to each lot.
 - e) Taps being installed into same size pipes are prohibited and will require the installation of a manhole

6.10 FORCE MAINS

- 1) Public sewer force mains to serve a land development project will be reviewed and approved on a case by case basis by the Town.
- 2) Public force mains will be located within a right-of-way, or sewer line easement. The line should be located under pavement wherever possible.
- 3) The operational flow velocity in the force main must be between 3 and 7 feet per second. The pipe diameter must be approved by the Town to verify adequate scour velocity and the Town's ability to maintain the pipe.

- 4) All pipe material used in design of the force mains must have established ASTM, ANSI, AWWA, and NSF standards of manufacture, or seals of approval, and shall be designated as pressure sanitary sewer pipe. Force mains must be identified as such, with marking tape buried one foot above the pipe.
- 5) Force mains will be constructed of restrained glass lined ductile iron pipe, or approved equal for the following conditions:
 - a) All locations where a vertical realignment is required
 - b) Drainage wash crossings
 - c) Air release assemblies
 - d) Clean-out assemblies
- 6) Air release valves designed for sewage must be provided on force mains at all peaks in elevation. Air relief valve will be installed into an approved vault.
- 7) Where a force main crosses a water main or transmission line, protection must be provided as per ADEQ Engineering Bulletin No. 10, and the Arizona Administrative Code, Title 18, Chapter 9, Water Pollution Control. At a minimum, pipe separation and extra protection shall comply with MAG Specification 610.5.5 and MAG Standard Detail 404.
- 8) The Engineer must evaluate and provide provisions for the potential for odor to develop from a force main downstream of the receiving manhole.

6.11 WASTEWATER LIFT STATIONS

- 1) The use of lift stations shall be minimized wherever possible.
- 2) Lift stations shall be designed and sized to serve a regional area to avoid having multiple lift stations serving specific development.
- 3) Lift station sites shall provide the following:
 - a) In selecting a site for a sewage lift station, consider accessibility, drainage patterns, visual impact, potential odor issues, functions, design constraints, and ultimate street section.
 - b) Consider the potential for flooding when selecting a pump station location. The station's equipment must be protected from damage and remain operable during a 100 year storm event.
 - c) Reasonable access for vector trucks, crane trucks, and other maintenance vehicles.
 - d) Visual compatibility with surrounding developments including block walls around the lift station.
 - e) Odor control equipment will be installed.
 - f) Proper separation from all future development in an effort to avoid potential site odor issues. Proper odor control devices to abate lift station odors shall also be incorporated when deemed necessary by the Town.
- 4) Lift Stations shall follow Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control," which contains minimum requirements for a wastewater lift station. Additional requirements specific to the Town must be obtained from the Town's Wastewater Division before beginning design. At a minimum, radio pathway study and test, ultra sonic sensor and a two float backup system, telemetry, dual pumps, backup power supply, three-phase power, odor control, and perimeter walls will be required. The site will also be large enough to contain all the equipment and to access and service equipment for repairs.
- 5) Lift station shall be sized so that the number of pump starts per hour does not exceed seven.
- 6) Lift Station design shall include the following as a minimum:

- a) Triple the station's minimum requirements, unless approved otherwise by the Town Engineer or Public Works Director.
 - b) Station shall have a minimum of 2 pumps and be capable of operating at the designed flow with the largest pump out of service.
 - c) Size of pumps to be the same, except as approved otherwise by the Town Public Works Director.
 - d) Pumps to be submersible (approved model by Town's Wastewater Division).
 - e) Aluminum trash rack with stainless steel rails.
 - f) Portable hoists with separate mounts for each pump and trash rack.
 - g) Provide electric winch (12 volt) with manual override.
 - h) Valve pit with shut-off and check valves.
 - i) Aeration odor control.
 - j) Aluminum access covers.
 - k) Precast or cast-in-place concrete walls. All interior walls shall be lined per Town of Florence requirements.
 - l) Electrical control unit (Town approved equal).
 - m) Controls to have hour meters, run and failure lights with rotating beacon light, HOA switch, auto dialers, and provide for alternating sequencing of pumps.
 - n) 4 inch minimum static vent.
 - o) All pump rails and hardware should be 316 stainless steel.
 - p) 6 inch DIP emergency by-pass line with valve and a quick coupling hose nozzle with cap, or flanged end with blind flange.
 - q) Emergency power source and redundant level controls that provide immediate service when required
 - r) Communication to Town's SCADA monitoring system for operations, monitoring and security.
 - s) Discharge piping by-pass system.
 - t) Equipped with visual or audible alarms if exceedingly high or low water levels are detected.
- 7) The Public Works Department has sole discretion when to require an engineer to install a flow metering structure for monitoring of the wastewater collection system capacities.

6.12 WASTEWATER MONITORING APPURTENANCES

- 1) The Public Works Department has sole discretion when to require an engineer to install a monitoring vault for testing wastewater flow and composition. Generally, properties in industrial land use/zoned areas with a projected wastewater discharge of 25,000 gallons per day will be required to install a monitoring vault.
- 2) The Public Works Department retains sole discretion as to when to require an engineer to install a monitoring manhole. Generally, commercial properties with potential mixed uses, restaurants, and developments that will use chemicals or solvents are required to install monitoring manholes.
- 3) Monitoring manholes will be constructed per MAG Standard Detail No. 429, with a straight channel, and no taps or bends for 10 feet upstream or downstream, or as approved by the Public Works Department.
- 4) Design details for monitoring manholes on sanitary sewer lines 6 inches or larger with a peak flow greater than 40 gallons per minute (gpm), must be approved by the Development Services Department.

- 5) Monitoring vaults and manholes will be located in a minimum 20 foot wide access and maintenance easement that extends from the vault/manhole/structure to the existing public wastewater system, and be designed for access at all times to monitoring crews and vehicles.

6.13 WASTEWATER SYSTEM MATERIALS

- 1) Rigid pipe material shall adhere to the following standards
 - a) Ductile Iron Pipe (DIP) with a ceramic epoxy lining only when approved by the Public Works.
 - b) Rubber Gasket Reinforced Concrete Pipe (RGRCP) with a PVC lining: shall conform to Sections 735 and 741 of the MAG Uniform Standard Specifications as amended by the Town of Florence.
 - c) RGRCP pipe is approved for constructing public sewer mains 20 inches or larger in diameter.
- 2) Flexible Pipe Material shall adhere to the following standards
 - a) Polyvinyl Chloride (PVC) pipe: shall conform to Section 745 of the MAG Uniform Standard Specifications as amended by the Town of Florence
 - b) PVC pipe is approved for public sewer mains 8 inches through 18 inches diameters only.
 - c) The use of 18 inch PVC will require that granular bedding (ABC) shall be installed and compacted to one foot above the pipe.
 - d) The installation of PVC sewer mains in excess of 18 inch diameter will be considered on a case-by-case basis. The engineer shall provide a comprehensive report that provides the justification for the installation of the larger diameter PVC main(s).
 - e) HDPE pipe requires approval of the town.

6.14 WASTEWATER CONSTRUCTION AND TESTING

- 1) Installation and Testing shall adhere to the following:
 - a) PVC pipe and fitting installation shall be in accordance with the applicable provisions of MAG Section 601 and 615
 - b) Granular material for the purpose of this section shall mean a material approved by the Town Engineer.
 - c) After trenching has been completed, a four-inch layer of granular material shall be placed on the bottom of the trench and hand leveled.
 - d) A required inspection will be made by the Town's Inspector after completion of laying of pipe but prior to haunching.
 - e) After the Town's Inspector is satisfied with the laying of pipe, the contractor will haunch the pipe with a granular material around the sides of the pipe to the spring line by hand. The granular material shall be carefully placed, fill all voids around the pipe and prevent lateral movement.
 - f) The contractor will place a second lift of granular material around the pipe to a level of at least 6 inches above the pipe.
 - g) Each layer of granular material shall be compacted to a density of 95 percent standard proctor.
 - h) A required inspection after completion of pipe bedding shall be made by the Town's Inspector. Compaction tests of the material around the pipe may be required by the Town Engineer and if required, the tests shall be paid by the contractor.
 - i) Upon completion and acceptance of backfilling and after a minimum of 20 days, but before surface course of asphalt paving, a 5 percent deflection testing device (go-no-go) will be

pulled through the entire length of the main installed. Any section failing to pass this test shall be repaired and retested at no expense to the Town.

- j) The contractor shall have a string placed through all sewer lines prior to calling for a deflection test.

TABLE 6-3: DEFLECTION LIMITS

Pipe Size	Minimum Diameter of Service (in.)	
	5%	7.5%
8"	7.49	7.29
10"	9.37	9.12
12"	11.15	10.86
15"	13.66	13.30

6.15 SEWER INSPECTION REQUIREMENTS (NEW LINES)

- 1) The contractor shall have a television inspection performed on all new sewer lines
- 2) including sewer services and a manhole pressure test per ASTM (C1244-93) prior to issuance of a conditional letter of acceptance. Air test 100 percent of sewer lines after dry utility trenching and backfill has been tested.
- 3) The contractor/developer shall warranty the work performed under these specifications in accordance with MAG Section 108.8.

6.16 FINAL SEWER PLAN REQUIREMENTS

- 1) Plans submittals shall follow all standards as outlined in Chapter II of this document.
- 2) All proposed public sewer lines must be shown in both plan and profile views on the same sheet, and pipe material called out. Sewer lines that are not public sewer lines may not require a profile.
- 3) The following items must be shown on the plans: For existing and proposed manholes:
 - a) Rim elevation to the nearest 0.10 foot.
 - b) Invert elevations.
 - c) Manhole station: Each manhole will have a unique identifier and be labeled in both plan and profile.
 - d) Dimensional ties, i.e., station and offset, from the street centerline to the manhole.
 - e) Where a proposed manhole is constructed on an existing sewer, horizontal distance from the nearest downstream manhole; the invert elevation of that manhole, and the slope of the existing sewer.
 - f) Distance from centerline to centerline of manholes.
- 4) Sewer stationing is measured horizontally along the horizontal alignment of the sewer.
- 5) All abandoned sewer taps must be capped.
- 6) Concrete encasement will be shown in both plan and profile. The beginning and ending stations of the encasement shall be called out.
- 7) Lift station plans will show all invert elevations, structural elevations, existing and finished grades, control setting elevations, structural design of the wetwell and drywell, valves and piping, surge control devices, pump suction and discharge details, and any other details necessary to provide construction of the design.

- 8) Plans and profiles of force mains will show size, invert and grade elevations, material, existing and proposed utility locations, and any other necessary details.

7 SITE DEVELOPMENT

7.1 SITE PLAN

The preliminary site plan review process and requirements are put forth in the Town's Development Review Process.

7.2 SITE DEVELOPMENT

- 1) The Town requires that all refuse shall be collected and disposed of by a private contractor. Contact the private waste companies that are licensed in the Town of Florence for any requirements.
- 2) All developments shall provide access per Florence Fire Department and these Engineering Standards. The most restrictive will apply.
 - a) Provide a minimum turning radius of 25 feet on curb returns
 - b) Provide a minimum turning diameter of 50 foot at cul-de sacs

7.3 PUBLIC RIGHT-OF-WAY AND EASMENT DEDICATION

The following requirements apply to the preparation of maps which are to be used to dedicate land to the public or to grant an easement to the public for roadway, drainage, flood control, utility line, emergency or service vehicle access, or other public uses. Some of these requirements may be waived by the Town Engineer if it is demonstrated that the requirements are not appropriate because of the size or nature of a development.

- 1) All proposed streets, right-of-ways, and easements shall be identified on both the preliminary and final subdivision plats.
- 2) The final subdivision plat shall contain a dedication for all right-of-ways and public easements. The Town Engineer shall establish required dedication language.
- 3) All easements proposed for dedication to a private utility company shall be identified on both the preliminary and final subdivision plats.
- 4) The final subdivision plat shall contain an offer of dedication for all such easements to the appropriate parties. Acceptance of such offers shall be the responsibility of each responsible party.
- 5) Vehicular non-access easements shall be shown on the subdivision plat. No driveway or vehicle gate shall be installed which would permit a vehicle to access or cross a vehicular non-access easement.
- 6) Other easements required by the General Plan, the Zoning Code or the Town Engineer shall be shown on both the preliminary and final subdivision plats.
- 7) For public right-of-way and easements not included in the Final Plat, prepare Exhibits 'A' and 'B' as follows:
 - a) Exhibit 'A': Prepare a legal description of each property on a separate sheet. A Surveyor or Engineer registered in the State of Arizona shall sign and date their fixed seal. Provide the City Engineering Department with Exhibit 'A' on acid-free paper.
 - b) Exhibit 'B': Prepare a sketch of each property on a separate sheet. Include:
 - i) Property's Legal Description from Title Report
 - ii) Construction Project Name

- iii) Project Number, if applicable
- iv) Assessor's Parcel Numbers of all adjacent property
- v) Any Plat information
- vi) Additional R/W required including sufficient dimensioning to provide a Legal Description.
- vii) A Surveyor or Engineer registered in the State of Arizona shall sign and date their fixed seal.
Provide the City Engineering Department with Exhibit 'B' on acid-free paper.
- c) Developer to pay any recording fee(s) and Right-of-Way and/or Easement acquisition costs.
- d) The Town will:
 - i) Have the documents signed and notarized.
 - ii) Have the documents recorded.

8 SUBDIVISION PLATS

8.1 GENERAL INFORMATION

This chapter describes the Town's requirements for preliminary and final plats for subdivisions and for maps dedicating land to the public and easements for public use.

- 1) No occupancy of any structure built within the development will be authorized by the Town until the infrastructure shown on the improvement plans have been completed and approved

8.2 PRELIMINARY PLATS

- 1) Preliminary Plats shall be in conformance with current Subdivision Regulations.
- 2) Requirements for the plat may come from the Town Zoning Ordinance requirements, specific zoning stipulations or Town Subdivision Regulations. The applicant is responsible for meeting these requirements.
- 3) Requirements for submittal of preliminary plats shall include the following:
 - a) A current title report, preliminary title report, status of title or condition of title no older than 6 months.
 - b) An update or owners' report to within 30 days of approval of the Final Plat.
 - c) Drawings shall be twenty-four (24) by thirty-six (36) inches.
 - d) The maximum allowable scale is one (1) inch = one hundred (100) feet.
 - e) Cover Sheet:
 - i) The subdivision's name.
 - ii) A vicinity or site location map.
 - iii) The subdivision's location as defined by its section, township, range and county.
 - iv) If the subdivision overlays a previously recorded plat, it must be indicated on the plat with record references.
 - v) Provide two separate survey ties to two section corners, or quarter section corners. Define the type of monumentation.
 - vi) The developer's name, address and phone number.
 - vii) The design professional's name, address and phone number
 - viii) The total number of lots.
 - ix) The subdivision's net and gross areas.
 - f) Each sheet shall include:
 - i) North arrow and scale.
 - ii) Sealed and signed by the design professional preparing the plat
 - g) Show any proposed phasing.
 - h) Provide ALTA Survey Map when available.
 - i) Reference all elevations to an approved Town benchmark. Show the benchmark number, description, and elevation.
 - j) Provide perimeter traverse data for the entire subdivision boundary.
 - i) For tangents this consists of bearings and distances.

- ii) For curves this consists of radii, delta angles and curve lengths.
- iii) On non-tangent curves show radial bearings.
- k) Depict Town Limit lines when they are adjacent to or near the subdivision.
- l) Note the names of all subdivisions adjacent to the subject property.
- m) Note the existing zoning classification of the subject and adjacent properties.
- n) Show existing and proposed Right-of-Way and easements.
- o) Note any abandonments.
- p) Tracts and parcels that will be dedicated to the Town must be noted. The use must also be noted along with their appropriate areas.
- q) Note existing buildings and significant structures. Any modifications must be shown.
- r) Lots
 - i) Provide lot numbers and tract and parcel labels.
 - ii) Curvilinear back lot lines are discouraged. Every effort must be made to avoid them.
- s) Streets
 - i) Show street layout including public streets, private streets and easements.
 - ii) Provide Cul-de-Sacs at all dead-end streets and alleys. Hammerheads are not permitted.
 - iii) Show curve radii for all Rights-of-Way on bubbles, Cul-de-Sacs and for street monument lines.
 - iv) Half-street cross-sections must be 24 feet to the face of curb minimum.
 - v) Create triangular corner cut-offs at all street and alley intersections.
- t) Drainage
 - i) Identify areas of the development within the FEMA 100 year flood zone.
 - ii) Note all wells, washes, canals, irrigation laterals and ditches, lakes and other water features. Any modifications must also be shown.
 - iii) Note detention areas.
- u) Utilities
 - i) Show proposed utility easements.
 - ii) Show sizes and types of all existing utility lines within and adjacent to the subdivision.
 - iii) Provide dimensional ties to street centerlines for all utility lines.
 - iv) Overhead utility lines on or adjacent to this site must be undergrounded

8.3 FINAL PLATS

- 1) The improvement plans must be fully approved, and the improvement assurance accepted prior to final plat approval.
- 2) The Engineer must provide a cost estimate of all work within the public rights-of-way for the improvement assurance bond amount.
- 3) Provide an improvement assurance bond in the amount that is determined by Development Services Department.
- 4) Drawings shall be twenty-four (24) by thirty-six (36) inches.
- 5) The maximum allowable scale is one (1) inch = one hundred (100) feet.
- 6) The height of all text and lettering shall be 0.125 inch (1/8") minimum and full density black ink.
- 7) All official seals and stamps affixed to the final plats shall be in black ink.
- 8) Any index sheet is required when the plat contains more than two (2) sheets.
- 9) Provide a key map showing all tracts, parcels and lots by number or letter.

- 10) Provide a legend and vicinity map.
- 11) Show Town limit lines if applicable.
- 12) Show the monument lines of streets adjacent to the subdivision.
- 13) Provide perimeter traverse data for the entire subdivision boundary.
 - a) For tangents this consists of bearings and distances.
 - b) For curves this consists of radii, delta angles and curve lengths.
 - c) On non-tangent curves show radial bearings.
- 14) Provide boundary closure calculations with error of closure.
- 15) Show a Basis of Bearings note with reference to appropriate recorded data.
- 16) Show street centerline and property (lot) line survey data consisting of bearings, distances, total block length, radii, delta angles and curve lengths.
- 17) Provide an ALTA Survey Map (no older than 60 days).
- 18) Show the names of all adjacent subdivisions and properties with the corresponding recording data.
- 19) Provide a description of lot, parcel and where monuments will be set.
- 20) Cover Sheet:
 - a) The subdivision's name.
 - b) A vicinity or site location map.
 - c) The subdivision's location as defined by its section, township, range and county. This information must also be included within the dedication statement.
 - d) If the subdivision overlays a previously recorded plat, it must be indicated on the plat with record references.
 - e) Provide two separate survey ties to two section corners, or quarter section corners. Define the type of monumentation.
 - f) The developer's name, address and phone number.
 - g) The design professional's name, address and phone number
 - h) The total number of lots.
 - i) The subdivision's net and gross areas.
 - j) Tract and parcel areas.
- 21) Each sheet shall include:
 - a) North arrow and scale.
 - b) Sealed and signed by the Surveyor preparing the plat (Arizona registration required).
- 22) Lots
 - a) All lots must be numbered consecutively beginning with lot no. 1.
 - b) All tracts and parcels must be lettered consecutively beginning with Tract or Parcel "A". Exception parcels must be labeled and must include the boundary traverse data and area.
 - c) Curvilinear back lot lines are discouraged. Every effort must be made to avoid them.
- 23) Streets
 - a) Street geometrics must match those shown on the approved preliminary plat.
 - b) Show street layout including public streets, private streets and easements.
 - c) Provide Cul-de-Sacs at all dead-end streets and alleys. Hammerheads are not permitted.
 - d) Show curve radii for all Rights-of-Way on bubbles, Cul-de-Sacs and for street monument lines.
 - e) Half-street cross-sections must be 24 feet to the face of curb minimum.
 - f) Create triangular corner cut-offs at all street and alley intersections.

- g) Vehicular non-access easements are required for streets abutting detention basins and for lots abutting perimeter street rights-of-way.

24) Right-of Way

- a) Show all existing and new Right-of-Way to be dedicated.
- b) Define any Rights-of-Way that expands on existing dedicated rights-of-way.
- c) The Right-of-Way dedication must also be mentioned in the dedication statement.

25) Easements

- a) Show all easements, i.e.: drainage, utility, non-access easements, etc. The easements must be specified within the dedication statement: "Easements are dedicated for the purposes shown"
- b) Cross access easements may be required for:
 - i) Pedestrian access
 - ii) Vehicular access
 - iii) Drainage

26) Show tracts or parcels that will be dedicated to the Town. The use must also be noted.

27) Abandonments

- a) Right-of-Way Abandonment:
 - i) The Town Engineer must approve the abandonment.
 - ii) The Town Attorney must approve the abandonment.
 - iii) A filing fee and appraisal fee must be paid.
 - iv) The abandonment must be in accordance with the requirements and procedures of the Public Works Department.
- b) Easement Abandonment:
 - i) Provide a letter from the utility companies agreeing to the abandonment.
 - ii) Provide a legal description, limits of the abandonment, and Pinal County recording information.
 - iii) Provide the following statement located above the mayor's approval block:
 - (1) "By acceptance of this plat, the Town of Florence agrees to the vacation or abandonment of the easements described and shown hereon."

B. LANGUAGE

1) Dedication Statement

- a) The dedication statement must be signed by the owner and all holders of Deeds of Trust if lands being dedicated are encumbered. An Acknowledgement statement by a notary public is also required.
- b) If the owner is a partnership, the Articles of Incorporation or a certified copy of a resolution by the Board of Directors authorizing the individuals signing the plat to act on its behalf is required.
- c) If a lienholder ratification may be used for trust deed holders, the following form must be used:

2) General Plat Notes

Tracts _____, _____ and _____, (include all applicable tracts) are deeded to _____ Homeowners' Association for its use and enjoyment as more fully set forth in the Declaration of Covenants, Conditions and Restrictions and said Association shall be responsible for the maintenance thereof.

Maintenance of the drainage areas within the tracts and easements shall be the responsibility of the " _____ " Homeowners' Association. Should the Association not adequately maintain them, the governing entity having jurisdiction over the area in which the tract or the easement is located, at its discretion, may enter upon and maintain the drainage areas, and charge the Homeowners' Association the cost of the maintenance.

All tracts not dedicated to the Town of Florence shall be improved in accordance with the approved plans and deeded to the Homeowners' Association after recordation of the plat."

The maintenance of landscaping within the public right-of-way to the back of curb (or edge of pavement) shall be the responsibility of the Homeowner's Association (or) the abutting lot, tract or parcel owner."

Construction within utility easements must be approved by the Town Engineer and will be limited to utilities and fences without a permanent foundation."

Structures, earthwork, or other construction is prohibited in drainage paths or detention basins, except as approved by the Town Engineer.

Fencing will be limited to wire-strand or break-away sections that cannot impede water flow or collect debris which would impede water flow.

Vegetation shall not be planted nor allowed to grow within Drainage paths, easements or retention basins which would impede the flow of water.

3) Certification Notes

This is to certify that this plat is a correct representation of all the exterior boundaries of land surveyed and the subdivision of it; That I have prepared the description of the land shown on the plat and I hereby certify to its correctness and that all lots are staked or will be staked and all monuments are set or will be set within one (1) year after recordation.

Seal and Signature of The Arizona Registered Land Surveyor

The Town Council accepts the rights-of-way dedicated herein on behalf of the Public. Approved by the Council of the Town of Florence, Arizona this __ day of _____, 20__.

The Subdivider has provided a Certificate of Assured Water Supply as required by Arizona Revised Statutes 45.576 or evidence that the area has been designated by the Arizona Department of Water Resources as having an assured water supply.”

By: _____
Mayor

Attest: _____
Town Clerk

8.4 PLATS TO BE RECORDED

- 1) All improvement plans (water, sewer, paving, grading, etc.) must be approved by the Town before the plat can be recorded.
- 2) Once approved, the plat will be signed by the appropriate Town officials to indicate the Town’s approval.

8.5 AMENDED PLATS

Any replatting or amendment to plats may be subject to changes of ordinance, Town Codes or State Statutes which may have occurred since the original plat, as determined by Town staff. One of the three following methods shall be used to amend a recorded plat. The developer shall arrange an initial contact meeting to determine the method of amendment.

- 1) Major Changes:
 - a) Return to the preliminary plat/final plat procedure - This method shall be used when there are proposed changes involving any of the following: Zoning, type of lot, number of lots (+/- 3 or more), tracts or common area facilities. Any change which substantially alters the original approved plat, as determined by Town staff, shall require a preliminary plat and final plat procedure.
- 2) Moderate Changes:
 - a) Replat procedure - This method shall be used when there are proposed changes involving any of the following: Number of lots (+/- 1 or 2), lot lines (+/- 3 feet or more) of more than three lots, roadway alignment, abandonment of public right-of-way, vacation of easement, rededication of easements or right-of-ways, third party involvement (e.g. lien holders, financial institutions, property owners association). No preliminary plat is required with this procedure
- 3) Minor Changes:
 - a) Certificate of Correction – This method shall be used when there are three or fewer minor changes proposed involving any of the following: Lot lines (+/- 2 feet or less) of 1 or 2 lots, bearing or distance changes, minor corrections to language of dedication, notes, or legal description. Certificates of correction shall be prepared by the original plat engineer or surveyor.

9 AS BUILTS

9.1 “AS BUILT REQUIREMENTS”

- 1) Right-of-Way construction permits will not be released, nor any type of construction accepted until certified “As-Built” plans have been submitted to and approved by the Town.

9.2 SUBMITTALS

- 2) One (1) set of “As-Built” electronic plans (PDF) shall be submitted to the Town for permanent record.
- 3) If the project is developed in phases, as-built plans for each phase shall be submitted once the work is complete in that phase. Letters of Completion and Acceptance will not be issued until all items out of tolerance have been corrected and all final As-BUILTS have been submitted and approved by the Town.
- 4) As-Built plans shall be signed and sealed by a State of Arizona Registered Professional Engineer or Registered Land Surveyor with the “AS-BUILT CERTIFICATION” approval block.

9.3 MINIMUM REQUIREMENTS

- 1) Street plans which include:
 - a) Stationing at all grade breaks.
 - b) Back of curb offset dimensions at all changes in alignment.
 - c) Top of curb, gutter and pavement centerline elevations at all grade breaks, curb return, valley gutters, plus any other location necessary to adequately show drainage.
 - d) Survey monument installation and accuracy certification.
- 2) Irrigation and Storm drains which include:
 - a) Street centerline stationing
 - b) Top and invert elevations for all structures.
 - c) Offset dimensions from all structures
 - d) Offset dimensions for changes in alignment and/or changes in grade.
- 3) Grading and Drainage Plans which include:
 - a) An elevation at all drainage control points (e.g. retention overflow point, tops and bottoms retention basins, drywall rims, valley gutters, curbs).
 - b) Dimensions of all retention areas.
 - i) New detention calculations if as-built conditions changed.
 - c) Finished floor or pad elevations.
 - d) Location of all existing structures (e.g. buildings).
 - e) Cross sections of all drainage swales.
- 4) Water Plans which include:
 - a) Stationing and elevations to all changes in vertical alignment (e.g. dips, bends, etc.) required to avoid conflicts with other utilities.
 - b) Offset dimensions for all fire hydrants and fittings (e.g. valves).
 - c) Dimensions for all changes in alignment (horizontally and/or vertically).

- d) Dimensions for all horizontal control points (e.g. centerline intersects, P.C., P.T.).
 - e) Station and elevations at all vertical alignment changes. Beginning and end of restrained pipe.
 - f) Centerline station and offset to each service tap; size of tap and dimension to nearest side property line.
- 5) Sewer Plans which include:
- a) Street centerline station and offset dimension from street centerline to main at manholes and all changes in alignment.
 - b) Sewer line station at centerline of each manhole.
 - c) Rim and invert elevation for each manhole.
 - d) Calculated slope between manholes.
 - e) Sewer line stationing at each service tap.
- 6) Street Lights
- a) Street Light locations shall be provided on a separate as built sheet.
 - b) The wire alignment to the lights and power supplies shall be provided on this sheet.