

Onsite Design Manual

**FOR ONSITE DRAINAGE, SEWER, WATER, STORMWATER
QUALITY AND EROSION AND SEDIMENT CONTROL**



MAY 1st, 2020

MEMORANDUM

DATE: May 1st, 2020
TO: Engineers, Architects and Developers
SUBJECT: **City of Sacramento - Department of Utilities Onsite Design Manual**

The Department of Utilities (DOU) hereby establishes the Onsite Design Manual, which provides the DOU's minimum design standards and guidelines for the planning, design and approval of:

- Drainage, sewer and water service connections to City systems,
- Private onsite grading and drainage systems,
- Stormwater quality treatment and Low Impact Development (LID) methods,
- Erosion and Sediment Control (ESC) methods.

The designer is responsible for using the most current version of the Onsite Design Manual posted on the City's website.

For questions related to any items addressed in this manual please call (916) 808-1400 and ask to speak with an engineer in the Development Review Section.

CITY OF SACRAMENTO:

Approved by: *William Busath*
William Busath (May 20, 2020 11:46 PDT)
William O. Busath, Director of Utilities

Approved by: *Tony Bertrand*
Tony Bertrand (May 20, 2020 10:48 PDT)
Tony Bertrand, Engineering and Water Resources Division Manager

Department of Utilities Onsite Design Manual

for Onsite Drainage, Sewer, Water, Stormwater Quality Treatment and Erosion and Sediment Control

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1. Purpose

For properties within the City of Sacramento, this on-site design manual provides the Department of Utilities (DOU) minimum design standards and guidelines for the planning, design and approval of:

- Drainage, sewer and water service connections to City systems,
- Private onsite grading and drainage systems,
- Stormwater quality treatment and Low Impact Development (LID) methods,
- Erosion and Sediment Control (ESC) methods.

These standards and guidelines may be amended periodically. It is the designer's responsibility to check the City Department of Utilities website for amendments and to use the latest version of this manual. The design of public improvements are required to comply with the City's Design and Procedures Manual (DPM). Both the Onsite Design Manual and Utilities sections of the DPM can be found online here: <https://www.cityofsacramento.org/Utilities/Development-Standards>

Compliance with these standards does not relieve a designer from the responsibility to apply conservative and sound professional judgment. Designers are expected to consider related issues, such as environmental impact, maintenance of pedestrian and vehicular traffic patterns, constructability, system maintenance, and sustainability principles in addition to any building code requirements.

Additional information concerning the requirements for and design of the items specified in this manual may be obtained from the Department of Utilities, Development Services Section, telephone (916) 808-7890.

The City recognizes there are occasions when it may be necessary to vary from the standards and guidelines outlined herein. Designers shall complete and submit a variance request for all proposed deviations from these standards (refer to Plate 9-3 "Variance Request Form" in Section 9 of the DPM).

2. Civil Plan Package

Commercial projects shall submit an onsite civil plan set, stamped and signed by a Licensed Civil Engineer in the State of California for approval of water, sewer and drainage service connections to the City's systems; in addition to onsite grading, drainage system and stormwater quality treatment methods (including ESC).

The typical civil plan set shall include:

1. Title sheet with City standard general notes, project address, site plan, vicinity map, official City benchmark, utility contacts, flood zone information, building square footage, site acreage, total disturbed area, increase in impervious area, sheet index and a state issued WDID number (if applicable, see Section 8 below).
2. Topographic sheet with elevations tied to an official City of Sacramento benchmark, showing property lines, right-of-way lines, easements and existing utilities. Adjacent off-site topography shall also be shown to the extent necessary to determine the impacts to surface drainage paths.
3. Grading sheet showing existing and proposed elevations, grade breaks, finished floor elevations and overland flow release arrows; pavement information, including curbs, gutters and sidewalks; and surface stormwater quality features. Cross sections showing existing and proposed grading, fences, walls, property lines, right-of-way, easements, drainage flow arrows, utilities, dimensions, and finished pavement sections and base information.
4. Drainage and sewer sheet detailing on-site drainage and sewer pipe systems, including slope/length/size, pipe material and bedding information. Location of service connections, invert and rim elevations of drainage inlets, manholes, cleanouts and other structures (including any subsurface stormwater quality features). Details of any structures not per City standard.
5. Water sheet showing on-site fire, domestic and irrigation systems. Include City standard general water notes, location of service connections, meters and backflow prevention devices.
6. Erosion and Sediment Control Plan with City standard erosion and sediment control notes, location of best management practices selected, and associated details.

The items listed above may be combined into common plan sheets, provided the sheets remain clear and legible. For a copy of all City standard general notes referenced above, see **Figure 7**.

The onsite Civil plan set addresses permitting requirements within the property. Any work within the public right-of-way (such as water, sewer or drainage taps) must be approved either through an encroachment permit or offsite improvement plans.

3. Drainage Services and Onsite Drainage Requirements

The Department of Utilities is responsible for operating and maintaining the public drainage system within the City of Sacramento, which includes a combined sewer system (CSS) and separated stormwater system.

Most of the City service area is ultimately pumped into nearby rivers, creeks and channels which are maintained by others. See **Figure 1** for a map showing the sump locations, and boundaries of the combined and separated drainage system basins.

All onsite drainage systems shall be privately owned and maintained, including the portion of the private storm drain line located within the public right-of-way; see City Code Section 13.08.020 and 13.08.210. Private drainage systems proposed to connect to the City's drainage system shall be designed and constructed to meet the requirements of this manual; in addition to the standards specified in Section 11 of the DPM.

At the discretion of the DOU, projects reviewed and approved by the California Division of State Architects (DSA) or California Office of Statewide Health Planning and Development (OSHPD), may not be subject to the following sections of this manual:

- Section 3.5 Finished Floor Requirements
- Section 3.6 Drain Pipe Requirements

All onsite drainage systems shall be separate from private sewer systems, with separate drainage connections to City mains, including systems in the CSS; see City Code Section 13.08.220.

Certain projects (as determined by the DOU) may require the submittal of grading certification letters prepared by the engineer of record or licensed land surveyor; stating that the site has been graded as specified per the approved plans and/or listing the variances that occur. In these cases, a letter shall be submitted to the City building inspector certifying pad elevations prior to footing inspection and then a final grading certification shall be submitted prior to the project's final inspection. Or if no building is involved, a final grading certification letter shall be submitted to the DOU engineer that approved the plans, once grading work is complete. When required by the DOU, a note specifying this requirement shall be placed on the approved grading plan sheets, see item 14 in Section 3.3 below.

3.1 Drainage Study Requirements

An onsite drainage study is required when a site contributes drainage to the City's storm drain system or CSS, and:

1. Mitigation is required (Section 3.2.1), and/or
2. Onsite drainage system analysis is required (Section 3.6)

If public drainage mains are being designed, see Plate 11-3 "Drainage Design Report Alternatives" of the DPM for guidance on when an offsite drainage study will be required and Section 11.3.5 of the DPM for requirements related to the offsite drainage study for public mains. If a drainage study for public mains

is required, it may also include the onsite project drainage design, eliminating the requirement for a separate onsite drainage study.

For onsite drainage studies, the designer may use either a static or dynamic analysis for mitigation sizing and drainage system design as described in the Sections 3.1.1, 3.1.2 and 3.1.3. The same method (either static or dynamic) must be used for the project's entire drainage analysis. Any required drainage design study shall be completed and approved prior to the approval of onsite plans and shall demonstrate conformance with mitigation (Section 3.2.1), finished floor (Section 3.5) and drain pipe criteria (Section 3.6).

An onsite drainage study shall include the following (at a minimum):

- A written description of the project.
- Reference to the City drainage basin that contains the project and regional study if applicable.
- Elevation datum used in study and for all referenced information.
- 10 and 100-year event tailwater elevations and sources.
- Summary of proposed drainage improvements.
- Attached excerpts of studies and other information that may be referenced.
- Summary of the methods used for the drainage study.
- Copies of calculations, spread sheets or computer models.
- An exhibit that:
 - Depicts existing and proposed impervious areas.
 - Shows proposed detention methods and locations including the volume of storage provided.
 - Depicts the onsite drainage system and connection points to the City system; including drainage inlet and manhole locations; and pipe lengths, sizes, slopes and invert elevations.
 - Denotes the elevation and location of the controlling overland release point(s) on the City drainage system. See Section 11.1.3 of the DPM for a definition of overland release point.
 - Depicts onsite drainage shed areas, includes overland release arrows to the public right-of-way and calls out drainage shed breakpoint elevations.
 - Denotes finished floor elevations for all proposed buildings.

3.1.1 Onsite Project Storage Method (Static Analysis)

Projects required to provide drainage mitigation (see Section 3.2.1), not performing a dynamic analysis, shall use the following procedure to size the detention volume and outlet orifice:

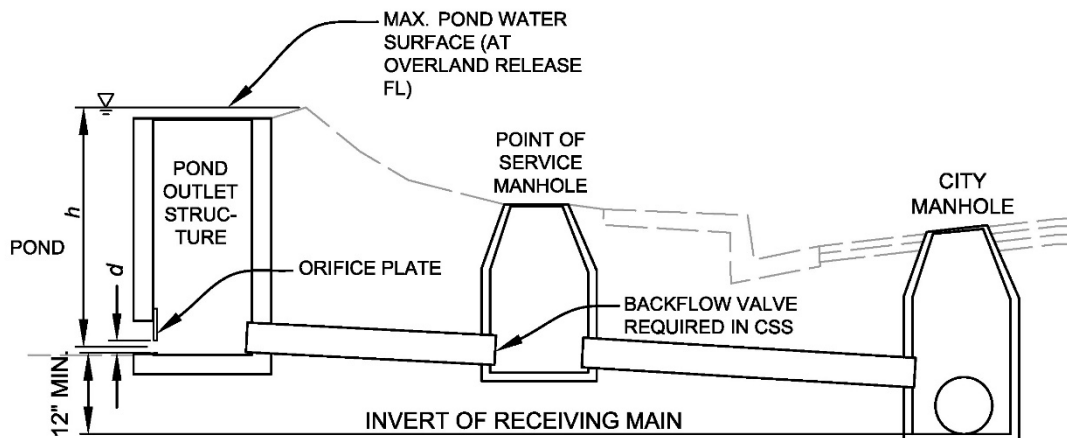
1. If required by the DOU, the designer must calculate and replace the volume of storage removed by the project at and below the existing 100-year event hydraulic grade line (HGL) of the City's drainage system, in addition to mitigating for increased imperviousness.
2. To mitigate for increased imperviousness, determine which City drainage basin the project resides in (**Figure 1**) and the associated storage required per acre of increased imperviousness for the 100-year event (as specified in **Figure 10**).
3. Determine the additional acreage of impervious surface resulting from the project. All surfaces shall be considered completely pervious or impervious. Impervious surfaces generally include

roof-tops and traditional pavement. Green roofs, pervious pavement, gravel, pavers with pervious base and joints shall be considered entirely pervious.

4. Multiply the additional impervious area by the 100-year event storage required per acre. If required, add to the flood replacement volume determined in step 1. The storage volume shall be completely contained at least one-foot above the Invert elevation of the receiving City main.
5. If a portion of the 100-year event detention volume is being stored within vehicular and/or pedestrian access surfaces, calculate the 10-year event storage volume and ensure it is completely contained within underground pipes and/or designated detention facilities. To determine the 10-year event storage volume, multiply the additional impervious area by the 10-year event storage required per acre for the basin (as specified in **Figure 10**).
6. Determine the orifice diameter (d) in inches for metering the stored discharge to the City drainage system (see Equation 3-1 and Figure 3-1):
7. Calculate the maximum head (h) in feet upstream of the orifice, by subtracting the elevation at the center of the orifice from the overland release flow line elevation for the project site (see Figure 3-1),
8. Determine orifice flow (Q) in CFS, by multiplying the Nominal Capacity of the City drainage basin (as specified in **Figure 10**) by the entire area draining to the detention pond,
9. Determine the orifice diameter in inches using Equation 3-1.

Equation 3-1 $d = 6.17 \sqrt{\frac{Q}{\sqrt{h}}}$

Figure 3-1 Onsite Project Storage Discharge



3.1.2 Rational Method (Static Analysis)

Projects required to provide calculations sizing the onsite drainage system pipes (see Section 3.6), not performing a dynamic analysis, shall use the rational method as specified below; only a 10-year event storm analysis is required.

The 10-year event starting HGL elevation shall be obtained as follows:

- For gravity flow situations without onsite detention, the starting HGL shall be obtained from a previously approved City storm drain master plan that includes the project site. If an approved master plan does not exist, assume the HGL is 0.5-feet above the most downstream adjacent City drainage inlet grate elevation. If there is no gutter, assume the HGL is the lowest adjacent street or alley surface elevation fronting the project site.
- For projects that include onsite dry detention areas, assume the starting HGL for each pipe segment connected to a detention facility is the invert elevation at the segments point of connection to the facility. For onsite detention areas that include a permanent pool, the starting HGL for each pipe segment connected to the pool, is the permanent pool water surface elevation.

Drainage studies utilizing the rational method shall demonstrate all proposed private “drainage pipe” meets the criteria specified in Section 3.6 of this manual, and shall include:

1. Applicable runoff for drainage shed areas using Equations 3-2 & 3-3, and
2. 10-year event HGL throughout the analyzed system utilizing Manning’s equation

$$\text{Equation 3-2} \quad Q = CiA_s$$

$$\text{Equation 3-3} \quad i = at^b$$

Where:

Q = Peak flow rate to a particular node (CFS)

C = Runoff coefficient (unit-less, Refer to Table 3-1)

i = Rainfall intensity (inches/hour)

A_s = Shed area draining to a particular Node (acres)

a = Rainfall intensity coefficient = 8.10 (10-year event) and 14.465 (100 -year event)

b = Rainfall intensity coefficient = -0.573 (10-year event) and -0.602 (100-year event)

t = Time of concentration (minutes) = Inlet Time + Time thru pipe/channel to a particular Node (Refer to Table 3-1 for Inlet Time)

Designer shall use an area weighted average of pervious and impervious areas for calculating the C factor and Inlet Time.

Table 3-1 Runoff Coefficients and Inlet Times

Imperviousness/ Land Use	Runoff Coefficient C	Inlet Time t _i
Proposed/Existing Development		
Impervious areas	0.95	5
Pervious areas	0.40	10

3.1.3 Onsite Computer Model (Dynamic Analysis)

Projects may use a computer dynamic model for sizing onsite detention and/or drainage pipe. The model results shall demonstrate that finished floor elevations meet the requirements specified in Section 3.5 and that any proposed drainage pipe meets the criteria specified in Section 3.6.

The onsite computer dynamic model shall be setup in accordance with the Level Two – Dynamic Modeling criteria specified in Section 11.3.5.6 of the DPM.

3.2 Drainage Service Requirements

Each lot or parcel connecting to the City's separate drainage system or CSS shall have its own separate drainage service connection; except for special cases where a common service is authorized by the DOU director. If a common drainage service is authorized, appropriate private drainage easements must be dedicated/granted and a maintenance agreement (specifying future maintenance requirements and cost sharing), which has been reviewed and approved by the DOU, must be recorded prior to approval of plans that allow construction of the service.

Drainage services connected to the City's separate drainage system or CSS shall not cross property lines unless appropriate private drainage easements have been dedicated/granted.

If easements (for common drainage services or drainage services crossing property lines) can't be dedicated/granted due to common property ownership, a conveyance of easement agreement with the City or note on the final map regarding future easements is required.

Drainage services shall gravity flow to the City system. If a force main is required for the private onsite piping, the force main must discharge to a point of service manhole or other structure up stream of the point of service allowing for gravity flow to the City's drainage system. For a definition of the drainage point of service see item 3 in Section 3.8 below.

Drainage services within the public right-of-way or City easements shall not run parallel with the public right-of-way or City easement boundary. Perpendicular crossings of City easements may be allowed on a case by case basis; however, a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe) for any services crossing City mains is required.

Unused drainage services shall be abandoned per the requirements of the City Standard Specifications. City manhole penetrations shall be plugged with concrete and abandoned pipe shall either be removed or filled with concrete or controlled density backfill (CDF).

Swimming pools shall have no permanent connection to the City's drainage system and may only discharge dechlorinated water if granted permission from the DOU director; per City Code Section 13.04.510.

No new permanent groundwater dewatering to the City's separated drainage system or CSS shall be allowed. Temporary groundwater dewatering may be allowed during construction; authorized either through an approval letter from the DOU or the execution of a Memorandum of Understanding (MOU), see City Code Sections 13.08.110 & 13.16.070.

- All groundwater discharges to the separated drainage system must also obtain an individual National Pollutant Discharge Elimination System (NPDES) permit from the California Regional Water Quality Board.

- All groundwater discharges to the separated sewer system or CSS must also be permitted by the Sacramento Regional Sanitation Sewer District.

For additional information related to ground water discharges, see Sections 9.2.10 & 11.2.7 of the DPM.

3.2.1 Mitigation Required

All stormwater and surface runoff drainage impacts resulting from any improvement or development (adding more than 500 square feet of increased imperviousness and/or removing more than 100 cubic feet of flood volume when fully built-out) must be fully mitigated to ensure the improvement or development does not negatively affect the function of the separated stormwater system or CSS; see City Code Section 13.08.145. To sufficiently demonstrate compliance with this requirement, a drainage design study is required.

If the project site is located in a basin with a City approved drainage master plan, that mitigated for planned development (e.g. basin that contains a regional pond), the project may add impervious area up to the percentage allotted and remove 100-year event storage to the extent accounted for in the master plan without mitigating. All additional impervious area and flood storage removal must be mitigated, in which case a drainage study as described in Section 3.1 is required.

Impervious area credit can be given for sites that were partially or completely demolished in preparation for the specific project requesting the credit; or:

- In the separated drainage system - If the demolition occurred within the last three years,
- In the Combined Sewer System – If the demolition occurred after July 1990.

Sufficient evidence such as photographs, aerial imagery, building permits, etc. shall be presented for projects requesting credit.

Projects in the CSS may also mitigate their drainage impacts as specified in Section 9.4.5 of the DPM.

3.3 Grading/Drainage Plans Shall Include the Following (at a minimum)

1. The nature and extent of all street and/or alley improvements along the entire frontage of the proposed project site. These improvements include curb, gutter, sidewalk, pavement, gutter drains, roadside ditches, etc.
2. Public water, storm drain, and sanitary sewer lines and/or facilities located adjacent to or passing through the project site.
3. The locations and sizes of all onsite drainage inlets, manholes, and structures including their invert and surface elevations.
4. The layout of connecting pipes including their size, length, invert elevations, slope, material, and bedding material.
5. The location of the point of service manhole (or cleanout), see Section 3.8, including its size and invert/rim elevations.
6. The pipe size and location of any roof drainage discharge points or connections to the onsite drainage system.

7. The direction and rate of fall of all onsite areas indicated by existing and proposed elevations, including elevations in neighboring properties sufficient to accurately depict the existing drainage pattern across property lines. All elevations shall be tied to an official City of Sacramento Benchmark.
8. Onsite pavement information (including curbs, gutters and sidewalks), specifying the surface material, grade breaks and slope.
9. Specifications for any stormwater quality features used.
10. Any existing or proposed easements (public or private).
11. Cross sections across property lines showing existing and proposed grading, fences, walls, property lines, right-of-way, easements, drainage flow arrows, utilities, dimensions and finished pavement section and base information.
12. Finished Floor Elevations and overland flow release arrows (see Section 3.5 Finished Floor Requirements below).
13. Drainage service tap notes for connection to the City drainage system, see Section 3.9 below.
14. On specific projects, when required by the DOU, a note shall be placed on the grading plan sheet, requiring commercial projects to submit a grading certification letter:
 - Certifying pad elevations prior to footing inspection and then a final grading certification prior to the project's final inspection (submitted to City building inspector),
 - Or if no building is involved a final grading certification letter submitted after all grading work has been completed (submitted to the DOU engineer that approved the plans).

If offsite plans are required, the proposed drainage system shall be depicted as follows:

1. The offsite plans will show in bold and be used for the construction of any required public drainage facilities and any proposed drainage service connections from the tap on the City manhole (or main see Section 3.9 Drainage Service Taps to City System) to the point of service manhole (or cleanout see Section 3.8 Point of Service Manholes and Cleanouts). Onsite piping (including the point of service manhole or cleanout) shall be shown as screened out (light grey).
2. The onsite plans will show in bold and be used for the construction of the point of service manhole (or cleanout) and everything upstream. Any proposed service connections from the City main to the point of service manhole (or cleanout) shall be shown as screened out.

3.4 Paved Area and Surface Drainage Requirements

1. A minimum slope of 1.0 percent (12 inches per 100 feet) for asphalt concrete (A.C.) and 0.5 percent (6 inches per 100 feet) for cement is required.
2. A maximum paved area of 6,000 square feet and 200 feet of depth (measured normal to the sidewalk) is permitted to sheet drain over a public sidewalk or onto a paved alley. An onsite drainage system connected to the public storm drain system is required for any paved area exceeding these criteria.
3. No paved area surface drainage may flow onto an unimproved alley.
4. No existing surface drainage flow from neighboring properties shall be blocked by the development of a property, see City Code Section 15.88.120.

5. A property shall not surface drain or have a piped drainage system that crosses property lines without the dedication of appropriate private drainage easements.
6. Any increase in impervious area must be mitigated per the requirements of Section 3.2.1.

3.5 Finished Floor Requirements

Finished floor elevations shall meet the following requirements (see Plate 11-2 of the DPM):

- Greenfield Development (projects with new or extended public road(s)): The finished floor of new structures shall be at least 12-inches above the highest adjacent 100-year event HGL of the City's drainage system and at least 18-inches above the controlling overland release point in the public right-of-way. See Section 11.1.3 of the DPM for a definition of overland release point.
- Infill Development (projects without new or extended public road(s)): The finished floor of new structures shall be at least 6-inches above the highest adjacent 100-year event HGL of the City's drainage system and at least 12-inches above the controlling overland release point in the public right-of-way.

The 100-year event HGL can be obtained from a City drainage masterplan for the appropriate basin, or if none exists the HGL can be assumed to be one-foot above the most downstream adjacent City drainage inlet. If there is no adjacent City drainage system, assume the 100-year event HGL is one-foot above the lowest adjacent street or alley surface elevation fronting the project site.

All onsite drainage sheds (excluding landscape) shall be designed such that, if all drainage inlets are plugged, the overland flow will cascade downstream to release to a public right-of-way or drainage easement on a neighboring property (a four-inch minimum difference is required between high and low breakpoints of each shed area). Overland flow release arrows shall be plotted on the plans. Finished floors shall be set a minimum of four-inches above the highest adjacent drainage shed breakpoint elevation in addition to the requirements specified above.

See Section 11.7 of the DPM for specifics related to overland release requirements within the public right-of-way.

3.6 Drain Pipe Requirements

1. Private "drainage pipe" shall be sized at a minimum, to keep the 10-year event HGL below vehicular and/or pedestrian access surfaces. Projects over two acres are required to submit a drainage study that sizes the onsite drainage system (see Section 3.1 for drainage study requirements).
2. The minimum diameter of drainage pipe shall be 6-inches, with three exceptions:
 - When through sidewalk drains (per City Standard Drawing T-31 or T-32) are allowed,
 - For landscape areas and roof downspouts,
 - When smaller pipes are required to restrict flows for onsite detention purposes.
3. From the drainage point of service to the connection on the City drainage system, the depth of cover measured from top of the drainage pipe to ground surface shall be a minimum of 4-feet.

If a drainage pipe cannot meet this requirement the cover may be reduced to the maximum achievable.

4. Drainage pipe that has less than 1.5-feet of cover, shall be either:
 - Polyvinyl chloride (PVC) C900 pipe with controlled density backfill (CDF),
 - Reinforced concrete or ductile iron pipe.

In no case shall drainage pipe have less than 6 inches of cover and/or extend within the top 2-inches of subgrade in paved areas. Drainage pipe in landscaped areas, that will not support heavy equipment, are not subject to any depth of cover requirement.

5. Drainage pipe shall have a uniform slope and be placed on a firm bed of earth with uniform support throughout the entire length of pipe as specified in plumbing code. When performing a static analysis (as specified in Section 3.1.2), all pipe sections (other than oversized pipe specifically used for detention purposes) shall be designed for gravity flow situations, regardless of if their flow is ultimately restricted for detention purposes. The slope shall be set such that the flow velocity is not less than 2 feet per second or more than 10 feet per second, when the pipes are 80% full, with a friction coefficient (n) of 0.015 (required for all pipe types to account for minor losses). When performing a dynamic analysis (see Section 3.1.3) exceptions to the flow velocity requirements may be allowable, as determined by the DOU.

The minimum and maximum pipe slopes are as follows:

Table 3.1 – Minimum Drainage Pipe Slope

Pipe Diameter (Inches)	Minimum Slope (Velocity*=2 fps)	Maximum Slope (Velocity*=10 fps)
4	0.01	0.215
6	0.005	0.125
8	0.0035	0.085
10	0.0025	0.063
12	0.0020	0.050
15	0.0015	0.037
18	0.0012	0.029
21	0.001	0.024
24	0.0008	0.020

*Velocity is for pipes flowing 80% full with a friction coefficient (n) of 0.015

6. Drainage pipe material in private storm drain systems shall comply with the approved drainage pipe material specified in Section 26-4 of the City of Sacramento Standard Specifications, with two exceptions:
 - Landscaped areas with drainage pipe less than 6-inches in diameter may use single wall corrugated drainage pipe or other approved alternative pipe material.
 - Oversized drainage pipe used for detention purposes may be either high-density polyethylene (HDPE) or aluminized steel type 2 or polymer coated corrugated metal pipe (CMP).

7. All 6-inch and larger drainage pipe (excluding fusion welded solid wall HDPE) shall have elastomeric gasket joints, providing a water tight seal. All joints shall meet the standards listed in Section 10-19 of the City Standard Specifications.
8. Drainage inlets, manholes or cleanouts are required at all drainage pipe angle points, and wherever a connection to the drainage system occurs. Manholes shall comply with the requirements specified in Section 11.5 of the DPM.

3.7 Drain Inlets

1. Public drainage inlets installed in City streets or alleys shall meet the requirements specified in Section 11.6 of the DPM.
2. All drainage inlets used in private storm drainage systems shall be constructed to allow cleaning of the drain line entering and/or exiting the inlets. The minimum interior dimensions of the inlets (used in paved areas) for various depths to the flowline of all pipes entering or exiting the inlets shall be as indicated on the following table:

Table 3.2 – Drainage Inlet Depth to Width Dimensions

Depth to Flowline, Z (feet) *	Minimum Inside Dimension, D (Inches) **
$Z \leq 2.0$	12
$2.0 < Z \leq 3.0$	18
$3.0 < Z \leq 5.0$	24
$5.0 < Z \leq 7.0$	30
$Z > 7.0$	36

* Dimension Z is measured from the surface grade to the flowline of the pipe.

** Dimension D is measured parallel and perpendicular to the longitudinal axis of all pipes entering or exiting the drainage inlet.

3. The maximum spacing of drainage inlets shall not exceed 400 feet. The maximum paved surface area permitted to be tributary to each drainage inlet is 40,000 square feet. The drainage inlets to be used shall be specified on the grading and drainage plan submitted for building permits.
4. Onsite privately-owned drain inlets shall be Type I drain inlets per **Figure 4** of the appendix or approved equal (excluding landscape drainage inlets).
5. Single drainage inlets discharging into the City's CSS shall have a trap and sump as detailed in **Figure 5** of the appendix, to prevent odorous sewer gases from escaping through the drainage inlet.

3.8 Point of Service Manholes and Cleanouts

1. A point of service manhole or cleanout (installed within five feet of the point of service) is required on all drainage connections to the City system; see City Code Section 13.08.200.
2. Drainage services 8 inch in diameter and smaller or drainage systems with a single drainage inlet may use a point of service cleanout, while all other sizes and situations require a manhole to be installed per the requirements of City Standard Drawing S-70 (or S-90 for projects connecting to the CSS). Cleanouts shall be the same size as the service (for services 8" and smaller in

diameter, otherwise an 8" cleanout is required), and installed per the requirements of City Standard Drawing S-265.

3. The drainage point of service is defined as:
 - Back of curb for public right-of-way with a separated landscaping strip, otherwise the back of sidewalk. Cleanouts or manholes are to be installed in the landscape strip or, if none exists, at the back of sidewalk (property side),
 - For alleys; the edge of the public right-of-way. Cleanouts are to be installed just within the alley edge, manholes just outside the alley edge,
 - For City drainage mains in easements; on the main. Manholes and cleanouts shall be installed just outside of the easement boundary.

3.9 Drainage Service Taps to City System

Drainage service taps to the City's separated drainage system shall all be made to a City manhole regardless of the drainage service size. If there is not an existing City manhole at the tap location, a new City manhole (meeting the specifications of Section 11.6.2 of the DPM) shall be installed at the developer's/owners' expense.

All drainage service taps in the CSS shall be to a City manhole with one exception; if there is no existing manhole to tap and the tap is smaller than 8-inch in diameter and not "size on size" (e.g. 6-inch service tap to 6-inch City main), a direct tap by City crews may be allowed for a fee on a case by case basis. All tap fees (for taps to be installed by City crews) must be paid at the 3rd floor public counter at 300 Richards Blvd., a minimum of two weeks prior to the tap installation date. All direct taps shall be perpendicular to City mains from the tap to the point of service.

Drainage service taps to City drainage inlets are strictly prohibited.

All taps to the City drainage system shall be the same size or larger than the largest diameter pipe entering the point of service manhole or cleanout; except in cases where oversized pipe is being used for onsite detention or a smaller pipe downstream of the point of service is being used to restrict flows. The minimum diameter drainage tap to the City drainage system shall be 4-inch.

Drainage service taps and pipe (from the tap to the point of service) shall have a minimum horizontal separation (measured from edge of pipe to edge of pipe) of 3-feet from parallel drainage, sewer and water service pipes and 5-feet from parallel City mains. Drainage services shall pass below any water mains or water service pipes when crossings occur. Upstream of the point of service, separation of private service lines is governed by plumbing code; however, separation from parallel City mains shall remain at a minimum of 5 feet. Services crossing City mains shall have a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe).

All taps to manholes must have at least 1-foot of manhole wall between connection openings into the manhole to protect the integrity of the manhole.

All taps to the City drainage system shall be approved either through an encroachment permit or offsite plan set. During construction, the tap installation shall be coordinated through the assigned Public Works inspector.

Taps and manholes shall be installed by a private contractor, except for the case in the CSS when a direct tap by City crews is allowed. For direct taps by City crews, the private contractor shall provide all excavation and expose the City main for tapping per City Standard Specification requirements. City crews will perform the tap on the main and install an Insert-A-Tee. The private contractor will then provide and install the drainage service line, backfill the trench and provide surface restoration.

3.10 Detention & Retention

Onsite detention or retention is required when the construction of a project (without mitigation) will result in additional drainage runoff to the public right-of-way or drainage system that was not accounted for in an approved City drainage master plan, see Section 3.2.1.

The onsite detention volume shall be sized, and outflows shall be restricted as required, per an approved drainage study, see Section 3.1. Required detention volumes may be reduced by implementing LID features, see Section 7.2 below.

The 10-year event detention volume must be completely contained within underground pipes and designated detention facilities. Flood water from storms in excess of the 10-year event may be temporarily stored in parking lots, walkways, planters and other onsite areas. If flood water depth in parking areas and/or walkways is expected to exceed 6-inches, warning signs shall be placed along the boundaries of the storage area, warning of the potential flood hazard.

Onsite retention ponds shall be sized per an approved drainage study. They shall only be allowed where a soil study (by a licensed geotechnical engineer in the state of California) has been provided and the soil is shown to allow a maximum draw down time of 48 hours. The soil study shall also demonstrate there are no groundwater related issues.

A porosity of 40% shall be assumed for gravel used to fill onsite detention/retention basins.

Projects providing more than 250 cubic feet of onsite drainage detention volume require a maintenance agreement that includes provisions for funding all on-going maintenance in perpetuity and in a manner that is acceptable to the DOU. Maintenance agreements shall be accepted by DOU prior to approval of plans.

4. Sewer Services

The City owns and maintains the public sewer systems for about 65 percent of the geographical area of the City. The balance of the City residents and businesses are served by the Sacramento Area Sewer District (SASD). Flows conveyed by the City sewer systems are routed to the Sacramento Regional Wastewater Treatment Plant (SRWTP) for treatment and disposal via an Interceptor system consisting of large diameter pipes and pump stations. The Interceptor system and the SRWTP, located just south of the City limits, are owned and operated by the Sacramento Regional County Sanitation District (SRCSD).

The DOU is responsible for operating and maintaining the public Sewer System within the City service area, which includes a combined sewer system (CSS), and a separated sewer system in the remaining City Service Area.

See **Figure 2** for a map showing the City and SASD service areas within the City, and boundaries of the combined and separated sewer system basins.

All onsite sewer systems in the City service area shall be privately owned and maintained, including the portion of the private sewer line located within the public right-of-way; see City Code Section 13.08.020 and 13.08.150. Private sewer services which connect to the City's sewer system shall be designed and constructed to meet the requirements specified in this manual, in addition to the standards specified in Section 9 of the DPM and California Plumbing Code.

All onsite sewer systems shall be separate from private drainage systems, with separate sewer connections to City mains, including systems in the CSS area; see City Code Section 13.08.220.

Any unused septic system shall be abandoned in accordance with the County of Sacramento Environmental Management Department requirements.

4.1 Sewer Study Requirements

In the City's separated sewer system area, projects that will generate 25 or more ESDs (see Section 9.1.3 of the DPM for the definition of ESD) shall submit a sewer study to the DOU, which must be completed and approved prior to the approval of onsite plans. See Section 9.3 of the DPM for requirements related to sewer studies.

In the City's CSS, any project contributing increased sewer flows of more than 5 ESDs to a CSS main smaller than 18 inches shall evaluate the available sewage only capacity of existing CSS mains from the project's point of connection to the nearest 18-inch or larger main, including all tributary sewage flows. If any portion of the existing mains are determined (by the DOU) to have insufficient capacity to accommodate the increased sewer flow, the development shall be required to improve the undersized mains to the satisfaction of the DOU, in addition to paying the City's CSS mitigation fee. See Section 9.4.4 of the DPM.

4.2 Sewer Service Requirements

Each lot or parcel connecting to the City's separated sewer or CSS shall have a separate sewer service connection; except for special cases where a common service is authorized by the DOU director. If a common sewer service is authorized, appropriate private sewer easements must be dedicated/granted and a maintenance agreement (specifying future maintenance requirements and cost sharing) which has been reviewed and approved by the DOU must be recorded, prior to approving plans allowing construction of the service; see City Code Section 13.08.190.

Sewer services connected to the City's separated sewer or CSS shall not cross property lines unless appropriate private sewer easements have been dedicated/granted.

If easements (for common sewer services or sewer services crossing property lines) can't be dedicated/granted due to common property ownership, a conveyance of easement agreement with the City or note on the final map regarding future easements is required.

Sewer services within the public right-of-way or City easements shall not run parallel with the public right-of-way or City easement boundary; except in the case of landlocked parcels (properties not fronted by a City main) where services may be allowed to run under a City sidewalk or within the landscaping strip adjacent to the street (requires an approved revocable encroachment permit). Perpendicular crossings of City easements may be allowed on a case by case basis; however, a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe) for any services crossing City mains is required.

Sewer service taps to combined sewer mains that only convey drainage are not allowed.

Stormwater shall not be permitted to drain to the separated sewer system, per City Code Section 13.08.040.

Swimming pools shall have no permanent connection to the City's sewer system but may be allowed to discharge through a temporary connection if authorized per the requirements of City Code Section 13.04.520.

Fat, oil or grease and/or sand interceptors are required on private sewer systems serving restaurants, trash enclosures, truck docks, wash areas, parking garages or when otherwise required by the DOU; see City Code Section 13.08.100. These interceptors shall be privately owned and maintained, and installed onsite, upstream of the "service cleanout" (as defined in Section 4.5).

Sewer services in the City's sewer service area are subject to City separated sewer or CSS development fees depending on which system is serving the site; in addition to County Regional Sanitation impact fees. See City Code Section 13.08.480 and 13.08.490. Section 4.7 below provides additional information on the CSS development fees. Development fees are collected at the time of building permit issuance.

Sewer or CSS development fees may be waived upon request only if the conditions of Resolution No. 2018-0428 (Affordable Dwelling Units) are met.

Existing unused sewer services shall be abandoned. Abandoned taps to City mains or manholes shall be plugged with concrete per the requirements of the City Standard Specifications and the service pipe shall either be removed or filled with concrete or CDF. In the City's separated sewer area, sewer development fee credit is given for sewer services abandoned in preparation for a project. This credit is applied to any sewer development fees due for the project. There is no cash value for unused sewer development fee credits.

Any property in the City that contains any building or structure used for human occupancy, located within 200 feet of a City sewer main, may be required to connect to the City sewer system. See City Code Section 13.08.170.

Sewer service lines shall be placed no nearer than 50 feet to any domestic well unless:

- The well has been abandoned in accordance with the County of Sacramento Environmental Management Department requirements, or
- All sewer service lines are constructed of cast iron or ductile iron pipe.

4.3 Sewer Plans Shall Include the Following (at a minimum)

1. The nature and extent of all street and/or alley improvements along the entire frontage of the proposed project site. These improvements include curb, gutter, sidewalk, pavement, gutter drains, roadside ditches, etc.
2. Public water, storm drain and sanitary sewer lines and/or facilities located adjacent to or passing through the project site.
3. Any existing or proposed easements (public or private).
4. The layout of all onsite sewer pipes and cleanouts, including pipe size, length, invert elevations, slope and material.
5. The location of the "service cleanout" (or "service manhole"), see Section 4.5, including its size and depth.
6. Sewer tap notes for connection to the City separated sewer or CSS, see Section 4.6 below.

If offsite plans are required, the proposed sewer system shall be depicted as follows:

1. The offsite plans will show in bold and be used for the construction of any required public sewer facilities and any proposed sewer service connections from the tap on the City main (or manhole see Section 4.6 Sewer Service Taps to City System) to the "service cleanout" (or "service manhole" see Section 4.5 Service Cleanouts and Manholes). Onsite piping (including "service cleanout" or "service manhole") shall be shown as screened out (light grey).
2. The onsite plans will show in bold and be used for the construction of the "service cleanout" (or "service manhole") and everything upstream. Any proposed service connections from the City main to the "service cleanout" (or "service manhole") shall be shown as screened out.

4.4 Sewer Service Pipe Requirements

1. The minimum diameter of sewer service pipe connected to the City sewer system (separated or combined) shall be 4 inches.
2. From the “service cleanout” (or “service manhole”) to the service connection on the City system, the depth of cover measured from top of sewer service pipe to ground/finished surface shall be a minimum of 4-feet. If a service pipe cannot meet this requirement the cover may be reduced to the maximum achievable.
3. For sewer service pipe that has less than 1.5-feet of cover the pipe shall be either:
 - Acrylonitrile-Butadiene-Styrene (ABS) pipe with controlled density backfill (CDF),
 - Epoxy lined ductile iron.

In no case shall the pipe have less than 6 inches of cover and/or extend within the top 2-inches of subgrade in paved areas.

4. Sewer services shall be sized per plumbing code requirements.
5. Sewer service slopes shall meet plumbing code requirements.
6. Sewer service pipe material is typically ABS schedule 40 per ASTM D2661; however, PVC SDR 35, Clay, Cast Iron or Ductile Iron may also be used.
7. All sewer pipes shall have elastomeric gasket joints, providing a water tight seal. All joints shall meet the standards listed in Section 10-19 of the City Standard Specifications.
8. Any building containing a plumbing fixture below the ground elevation of the nearest upstream City manhole (from the sewer service connection) requires the installation of a backwater valve; see City Code Section 13.08.320.

4.5 Service Cleanouts and Manholes

1. A “service cleanout” or “service manhole” is defined as the first upstream sewer service cleanout or manhole from the service connection to the City system. A “service cleanout” or “service manhole” (installed at the standard “service cleanout” location or when not feasible within five feet of the standard “service cleanout” location) is required on all sewer connections to the City system; see City Code Section 13.08.190 and 13.08.230.
2. Sewer services 10 inch and larger require a service manhole to be installed per the requirements of City Standard Drawing S-70, while all other sizes require a “service cleanout”. “Service cleanouts” shall be the same size as the service and installed per the requirements of City Standard Drawing S-260 and S-265.
3. The standard “service cleanout” (or “service manhole”) location is defined as:
 - For public right-of-way with a separated landscaping strip, two feet towards the property from the back of curb. Otherwise, two feet towards the property from the back of sidewalk.
 - For alleys cleanouts shall be installed within the alley, two feet from the alley edge measured to the center of the cleanout. Manholes shall be installed outside the alley, two feet from the alley edge measured to the edge of the manhole,
 - For backyard or easement City sewer mains, two feet outside the easement measured from the edge of main to the center of the cleanout (or edge of the manhole).

4.6 Sewer Service Taps to City System

Size on size (e.g. 6-inch service tap to 6-inch City main) sewer service taps or taps 8 inches in diameter and larger to the City's separated sewer or CSS are required to be to a City manhole. If there is not an existing City manhole at the tap location, a new City manhole (meeting the specifications of Section 9.6.3 of the DPM) is required to be installed at the developer's/owners' expense. All other sewer taps may be direct taps to the City sewer main.

Sewer service taps and pipe (from the tap to the "service cleanout" or "service manhole") shall have a minimum horizontal separation (measured from edge of pipe to edge of pipe) of 3-feet from parallel sewer, drainage and water service pipe and 5-feet from parallel City mains. Sewer services shall pass below any water mains or water services when crossings occur. Upstream of the "service cleanout" or "service manhole", separation of private service lines is governed by plumbing code; however, separation from parallel City mains shall remain at a minimum of 5 feet. Services crossing City mains shall have a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe).

All direct taps to City mains shall be perpendicular to the main from the tap to the "service cleanout" or "service manhole".

All taps to manholes must have at least 1-foot of manhole wall between connection openings into the manhole to protect the integrity of the manhole. Any sewer tap to a manhole that is 18-inches or more above the manhole flowline requires and inside or outside drop connection as specified in Section 9.6.6 of the DPM and City Standard Drawing S-130.

All taps to the City sewer system shall be approved either through an encroachment permit or offsite plan set. During construction, the tap installation shall be coordinated through the assigned Public Works inspector. All tap fees (for taps to be installed by City crews) must be paid at the 3rd floor public counter at 300 Richards Blvd., a minimum of two weeks prior to the tap installation date.

Service taps on existing City mains shall be performed by City crews. The private contractor shall provide all excavation and expose the main for tapping per City Standard Specification requirements. The City crew will perform the tap on the main and install an Insert-A-Tee. The private contractor will then provide and install the sewer service line, backfill the trench and provide surface restoration. Taps to City manholes shall be installed by private contractor.

For sewer service taps to a City sewer main, provide the following tap note on the plans:

City crews will install a ____" sewer tap for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration and install a ____" sewer service connection to the service cleanout.

4.7 Combined Sewer System (CSS) Development Fees

Projects in the CSS that will increase sewer flows to the City system are subject to a CSS development fee; or may be allowed to construct or contribute toward the construction of a project that will mitigate the impact on the CSS; see City Code Section 13.08.490 and Section 9.4.4 of the DPM.

Projects paying the CSS development fee shall use “Plate 9-6 Sewer Generation Rates” from Section 9 of the DPM to convert facility uses (such as commercial, office, restaurant, etc.) into Equivalent Single-family Dwelling (ESD) units. One ESD is equivalent to the sewer production of a detached single-family residential dwelling.

ESD credit is given for current use; or if the site is vacant, any permitted use on the site post July 1990, when the CSS Cease and Desist order was issued. Evidence such as photographs, aerial imagery, building permits, utility bills, etc. shall be presented for lots requesting ESD credit. The DOU will determine if the evidence is sufficient to grant ESD credit. This ESD credit is applied to any ESD’s generated by the proposed project. There is no cash value for unused ESD credits.

The CSS development fee is charged at a reduced rate for the first 25 ESDs, with each additional ESD charged at the full amount. The reduced rate (first 25 ESDs) can only be applied once per project. A project is defined as all portions of a phased development or everything that was included in an entitlement application if entitlements were required.

For the current fee rates, visit the City’s “Fees and Charges” page on the City website. In the “City Fee Database Search” field, select “Utilities” as the Department and “Combined Sewer Development Fee” as the category.

5. Water Services

The Department of Utilities is responsible for operating and maintaining the public water system within the City Service Area (roughly 95% of the geographical area of the City together with limited areas outside of the City limits). The balance of the City residents and businesses are served by various other water purveyors.

The DOU water system is fed by the Sacramento River and Fairbairn Water Treatment Plants, along with a series of wells. See **Figure 3** for a map showing the boundaries of the various water purveyors within and bordering the City.

All onsite water systems shall be privately owned and maintained, up to the point of service; see City Code Section 13.04.080. Private water services which connect to the City's water system shall be designed and constructed to meet the requirements specified in this manual, in addition to the standards specified in the City of Sacramento Design and Procedures Manual Section 13 and California Plumbing Code.

Per Fire Department requirements and to help in designing onsite private water systems the DOU offers Water Supply Tests (for a fee) and Static Pressure Determinations. These can be requested and ordered through a DOU representative at the public counter located on the 3rd floor of 300 Richards Boulevard. In addition (for a fee), the DOU can provide a hydraulic boundary condition analysis and translate the water supply test results to a more accurate location based on the projects proposed points of connection to the City system.

5.1 Water Study Requirements

As defined by conditions of approval or when otherwise required by DOU, designer shall prepare and submit a water study for improvements and/or connections to the Water System. The water study shall be performed as defined in the City Water Study Manual utilizing boundary conditions provided by DOU. See Section 13.2.3 of the DPM for requirements related to water studies.

5.2 Water Service Requirements

Each lot or parcel connecting to the City's water system shall have a separate domestic water service connection; except for cases where a common system is authorized by the DOU director.

If a common water system is authorized, appropriate private easements must be dedicated/granted and a maintenance agreement (specifying future maintenance requirements and cost sharing) which has been reviewed and approved by the DOU must be recorded, prior to DOU approval of plans allowing construction of the service; see City Code Section 13.08.190.

Common water systems shall have backflow devices installed at the point of service as follows:

- A single check valve for residential subdivisions,
- A double check valve for commercial projects.,

in addition to any metering and backflow requirements within the system.

All common water systems shall be designed per plumbing code, state regulations and fire requirements.

Water services connected to the City's water system shall not cross property lines unless appropriate private water easements have been dedicated/granted.

If easements (for common water services or water services crossing property lines) can't be dedicated/granted due to common property ownership, a conveyance of easement agreement with the City or note on the final map regarding future easements is required.

Future water services will only be authorized in certain situations, see Section 13.3.5.2 of the DPM for the specific requirements.

Water services shall not run parallel within the public right-of-way or City easements, except in the case of landlocked parcels (properties not fronted by a City main) where services may be allowed to run under a City sidewalk or within the landscaping strip adjacent to the street (requires an approved revocable encroachment permit). Perpendicular crossings of City easements may be allowed on a case by case basis; however, a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe) for any services crossing City mains is required.

A separate domestic water service tap to the City's water system may be allowed for each individual building on a lot or parcel; and/or for separate use types, such as residential and commercial in a mixed-use project. Only one tap will be allowed per use type, within a building.

Landscaped areas over 5,000 square feet are required to have a separate irrigation service tap per CA AB1881. However, irrigated areas exceeding five acres may be required to construct a well, recycled water system or provide some other water source rather than being authorized to obtain an irrigation service connection to the City's water system; see City Code Section 13.04.845.

California Senate Bill No. 7 requires submeters for all newly constructed multiunit residential structures or newly constructed mixed-use residential and commercial structures that apply for a water connection after January 1st, 2018. The submeters shall be privately owned, maintained and read; and must meet the requirements of California Plumbing Code. The DOU will not provide meters for submetering.

Irrigation services may be allowed to cross public streets if serving common areas covered under a single homeowners association or business association responsible for their operation and maintenance. Crossings shall be limited to the minimum required and installed per City Standard Drawing W-605.

Domestic and irrigation water services in the City's water service area are subject to City's water system development fees. See City Code Section 13.04.820. Standalone fire services including private fire hydrant connections are not subject to water system development fees. Development fees are collected at the time of building permit issuance.

Water development fees may be waived upon request only if the conditions of Resolution No. 87-322 (Residential Infill Lots) or Resolution No. 2018-0428 (Affordable Dwelling Units) are met. Mixed use projects that qualify for these waivers must have a separate domestic water service connection for the residential portion of the project.

Existing unused water services shall be abandoned by City crews for a fee. Water development fee credit is given for any domestic or irrigation service that is abandoned in preparation for a project. This credit is applied to any water development fees due for the project. There is no cash value for unused water development fee credits.

Prior to beginning any demolition on a site, the contractor shall contact 311 to request a City water field crew meet them onsite to determine if any existing water services need to be killed or abandoned by City crews for a fee. An abandoned service cannot be reused, it is turned off at the corporation stop at the City main, where the service line is then cut. A killed service is turned off at the curb stop or water meter and cut near the property line, it can be restored for a fee.

Any unused well shall be abandoned in accordance with the County of Sacramento Environmental Management Department requirements.

5.3 Water Plans Shall Include the Following (at a minimum)

1. The nature and extent of all street and/or alley improvements along the entire frontage of the proposed project site. These improvements include curb, gutter, sidewalk, pavement, gutter drains, roadside ditches, etc.,
2. Public water, storm drain and sanitary sewer lines and/or facilities located adjacent to or passing through the project site,
3. Any existing or proposed easements (public or private),
4. The layout of all onsite water pipes, fire hydrants, valves, including pipe size, length and material,
5. The location of water meters and backflow devices, see Section 5.5,
6. Water tap notes for connection to the City's water system and water meter installation. See **Figure 6** for sample water tap and meter notes.
7. City standard general water notes, see **Figure 8**.

If offsite plans are required, the proposed water system shall be depicted as follows:

1. The offsite plans will show in bold and have constructed any required public water facilities and any proposed water service connections from the tap on the City main to the point of service; with all onsite piping (including water meters and backflow preventers) shown as screened out (light grey). Water tap notes will be provide on the offsite plans.
2. The onsite plans will show in bold and have constructed water meters, backflow preventers and everything downstream and will show the service connection from the tap on the City main to the point of service as screened out. Water meter and backflow installation notes will be shown on the onsite plans.

5.4 Water Service Pipe Requirements

1. The DOU allows the following tap sizes to the City water system:
1", 1.5", 2", 4", 6", 8", 10" and 12"
2. Backflow devices and City water meters shall be the same size as the tap to the City main, with the following exceptions:
 - In the case where an existing 3/4" tap is to be re-used; a 1" City water meter (and 1" backflow device, if required) shall be installed. See Section 5.5 Point of Service Meters and Backflow Devices item 4 to determine if a backflow device is required.
 - In the case where a 3" City water meter is desired, a 4" tap is required and shall be downsized at the meter.
 - In the case where a 12" tap is desired, a 10" water meter and backflow device is allowed.
3. There shall be no bends in the service pipe from the tap on the City main to the meter, backflow preventer or point of service as determined by the DOU.
4. No connections may be made to water service lines between the tap on the City main and the meter, backflow preventer or point of service as determined by the DOU. Irrigation service may tee into the domestic service downstream of the water meter and backflow preventer (if one is required) with the installation of an additional approved reduced pressure principal backflow prevention device or atmospheric vacuum breaker on the irrigation service pipe within five feet of the tee.
5. Water services shall be sized per plumbing code requirements.
6. Water service pipe material:
 - For 3" and larger services: PVC-C900 or Ductile Iron;
 - For 2" and smaller services: Copper Tubing Type K, or HDPE SDR9 (CTS) pipe with an outer diameter equivalent to Type K;
 - Downstream of the City water meter, backflow preventer or point of service (as determined by the DOU), any pipe material approved per plumbing code may be used.
7. All water pipe fittings and joints up to the downstream side of the City water meter, backflow preventer or point of service (as determined by the DOU), shall be push on or mechanical and meet the requirements listed in Section 10-27 of the City Standard Specifications.
8. In no case shall the water service pipe have more than 4-feet or less than 18 inches of cover. Depth of cover is measured from top of water service pipe to ground/finished surface.

5.5 Point of Service Meters and Backflow Devices

1. Except in the case of a common water system, a City water meter, installed at the point of service (or if not feasible, up to a maximum of 5-feet away), is required on any domestic or irrigation water service per City Code Section 13.04.290. The City owns and maintains the water meter. Only one City water meter is allowed per service connection, unless a common water system is authorized (see Section 5.2). Meters installed on common water systems require appropriate easements dedicated to the City, for access and maintenance purposes.
2. The City will maintain the water service line from the tap on the City main to the City water meter or point of service, as determined by the DOU.

3. Two inch and smaller water meters shall be installed by City crews (for a fee) in meter boxes per City Standard Drawing W-505 (or W-507 if backflow assembly is being installed in a utility room). Meters larger than 2 inches shall be provided by City meter shop (for a fee) and installed by private contractor as part of the backflow assembly per City Standard Drawing W-608; except when the backflow assembly is being installed in a utility room, in which case the meter shall be installed in a meter box at the point of service per City Standard Drawing W-515.
4. Per the City's cross-connection control standards (see City Code Section 13.04.240), approved reduced pressure principal backflow prevention devices (RP's) are required on all commercial domestic water services and any irrigation water services directly connected to the City's water system. These RP's are to be installed per City Standard Drawing W-505 (services 2" or smaller) or W-608 (services 3" and larger). Four or more residential units sharing a single water service connection are considered commercial and require a RP.
5. All fire service connections shall have an approve double check valve assembly installed per City Standard Drawing W-510.
6. All backflow devices shall be installed within 5 feet of the point of service, except in the case where a building is being constructed on the property line and the device will be installed in a ground floor utility room, with the device located on the first interior wall adjacent to the property line. In this case for domestic and irrigation services the water meter must be installed within 5 feet of the point of service per City Standard Drawing W-507 (2" and smaller meters) or W-515 (3" and larger meters) with no horizontal bends between the meter and backflow device.
7. Any backflow devices placed in areas subject to vehicular paths, not protected by a concrete curb, are required to have protective bollards placed to protect the device from collision.
8. The water point of service is defined as (see City Code Section 13.04.030):
 - Back of curb, for areas with a separated landscaping strip, otherwise the back of sidewalk; meters and/or backflow devices are to be placed in the landscape strip or if none exists the back of sidewalk (property side),
 - For alleys, the edge of the public right-of-way; meters shall be installed just inside the alley edge, backflow devices just outside the alley edge,
 - For backyard or easement mains, the point of service is on the main; meters and/or backflow devices shall be installed just inside the easement boundary.

5.6 Fire Hydrants

Public fire hydrants shall be installed per the requirements of Section 13.3.7 of the DPM and City Standard Drawing W-201. Public fire hydrants leads shall have no horizontal bends from the tap on the City main to the location of the hydrant.

Existing public hydrants that are to be relocated must have their existing tap abandoned by City crews for a fee and a new tap to the City main must be taken; if any horizontal bends would be required on the existing lead to make the new location work.

Any hydrant unable to meet the minimum public hydrant separation requirement of 150 feet specified in Section 13.3.7 of the DPM must be a private hydrant. Private hydrants shall be constructed per City

Standard Drawing W-201, but are pulled back away from the point of service, toward the property (typically a minimum of three feet depending on site constraints), to visibly designate them as private. If a single private hydrant service line has any horizontal bends downstream of the point of service, a gate valve shall be installed at the point of service.

Private hydrant systems (with more than one hydrant) or single private hydrants located more than 250 feet from the City water main they are served by, must have an approved double check valve installed at the point of service per City Standard Drawing W-510.

5.7 Water Service Taps to City System

Water service taps to existing City mains shall be no larger than the size of the existing main.

Water services taps and pipes (from the tap to the point of service) shall have a minimum horizontal separation (measured from edge of pipe to edge of pipe) of 3-feet from parallel water, sewer and drainage services and 5-feet from parallel City mains. Water services shall pass above any sewer or drainage mains or services when crossings occur. Downstream of the point of service, separation of service lines is governed by plumbing code; however, separation from parallel City mains shall remain at a minimum 5 feet. Services crossing City mains shall have a minimum of 1-foot vertical separation (measured from edge of pipe to edge of pipe).

All direct taps to City mains shall be perpendicular to the main from the tap to the water meter, backflow preventer or point of service as determined by the DOU.

All taps to the City water system shall be approved either through an encroachment permit or offsite plan set. During construction, the tap installation shall be coordinated through the assigned Public Works inspector. All tap fees (for taps to be installed by City crews) must be paid at the 3rd floor public counter at 300 Richards Blvd., a minimum of two weeks prior to the tap installation date.

Service taps on existing City mains shall be performed by City crews; the private contractor shall provide all excavation and expose the City main for tapping per City Standard Specification requirements and City Standard Drawing W-404. The City crew will perform a hot tap on the main and:

- (for services 2" and smaller) Provide and install the service pipe from the main to the meter location and provide a water meter box for contractor installation.
- (for services 4" and larger) Install a gate valve at the tap on the main, the contractor will provide and install the standpipe and valve box; and service pipe to the meter, backflow preventer or point of service (as determined by the DOU).

The contractor will backfill the trench and provide surface restoration.

6. Private Facility Separation Requirements

All private onsite underground facilities shall maintain a minimum five-foot horizontal separation and one-foot vertical separation (measured edge to edge) from any DOU facility.

Private underground facilities shall not run parallel with City owned facilities within City alleys, City easements or the asphalt Section of City streets; except in the case of landlocked parcels (properties not fronted by a City main) where services may be allowed to run under a City sidewalk or within the landscaping strip adjacent to the street (requires an approved revocable encroachment permit).

Per City Code Section 13.08.240 nothing other than basic landscaping (no trees) or asphalt may be constructed over a DOU facility or anywhere within an associated easement unless approved by the DOU director upon execution of a hold harmless agreement approved by the City attorney.

7. Stormwater Quality Requirements

Development projects in the City of Sacramento shall comply with the City's stormwater quality standards. Stormwater quality measures, design, construction and maintenance shall be in accordance with the latest edition of the "*Stormwater Quality Design Manual for the Sacramento Region*" (SQDM), which can be downloaded at <http://www.beriverfriendly.net/Newdevelopment/>.

See Section 7.1 below for information about when permanent post construction stormwater quality measures are required. Projects that trigger permanent post construction stormwater quality measures are also required to implement Low Impact Development (LID) measures and may also trigger Hydromodification Management Plan (HMP) requirements, see chapter 5 of the SQDM and Section 7.2 and 7.3 below for more information. In addition, Trash Control Measures are now required on most project, see Section 7.4 below.

All applicable stormwater quality measures, including LID, HMP and Trash Control Measures, shall be shown on the appropriate grading and drainage plan sheets. See Section 2 items 3 and 4 and Section 3.3 above for more information on what is to be included on those plan sheets.

All stormwater quality facilities shall include provisions for funding all on-going maintenance in perpetuity and in a manner that is acceptable to the DOU director. Development projects incorporating any treatment control measures, structural hydromodification control measures, low impact development measures or full capture trash controls are required to execute a maintenance agreement for their project. The maintenance agreement shall be recorded with the deed for the property and follow property ownership. Stormwater quality maintenance agreements shall be accepted by DOU prior to approval of Plans.

All projects are subject to the requirements of the State Water Resources Control Board under the authority of the Clean Water Act and the framework for regulating storm water discharges under the National Pollutant Discharge Elimination System (NPDES), refer to <http://www.waterboards.ca.gov/>. In general, projects must comply with the State General Permit requirements specified in Section 8 below.

7.1 Stormwater Quality Post Construction Requirements

Tables 3-2 and 3-3 of the SQDM indicate the types of projects and associated thresholds, which are subject to permanent post construction stormwater quality measures.

In general, permanent post construction stormwater quality measures as specified in chapter 5 of the SQDM are required for:

- Single family residential projects 20 acres or more,
- Commercial/industrial projects adding and/or replacing 1 acre or more of impervious area,
- Standalone parking lot paving and/or replacing an impervious area greater than 5,000 square feet

Stormwater quality design calculations, demonstrating the project meets the design and sizing requirements of the SQDM for all selected post construction control methods, shall be submitted to the

DOU for review and approval. These calculations shall be approved by the DOU prior to plan approval.

Any plan sheets used for the construction of stormwater quality facilities shall have the following note placed on them: "City requires Engineer inspection and certification upon completion of the Stormwater Facility to ensure the facility is built per plans. Certification letter shall be mailed to City of Sacramento Department of Utilities, Environmental and Regulatory Compliance (1395 35th Ave, Sacramento, CA 95822) for City records."

All permanent post construction stormwater quality measures shall be privately owned and maintained and require a maintenance agreement as specified in Section 7.1 above.

7.2 Low Impact Development (LID) Design

Projects adding and/or replacing an acre or more of impervious area or standalone parking lots paving and/or replacing 5000 square feet or larger are required to implement LID features, such as:

- Compost-Amended Soil,
- Bioretention planters,
- Disconnected roof drains,
- Porous Pavement/Pervious surfaces,
- Interceptor trees,
- Capture and Re-use Features,
- Green Roofs,

etc. into their design, see chapter 5 of the SQDM for more information. LID measures help reduce the need to convey water and treat it in large and often more costly facilities located at the downstream end of drainage sheds. By reducing the total runoff volume, LID measures can help alleviate potential downstream habitat degradation and erosion problems.

A LID worksheet, in Appendix D of the SQDM, has been created to demonstrate project compliance with the City's low impact development requirements. The worksheet allows an applicant to input the various LID elements selected for the project, and determine if LID features will be sufficient to address water quality mitigation, or if the project is required to provide additional water quality mitigation not addressed by the LID features.

Unrelated to SQDM requirements, projects not utilizing a Dynamic Model for their Drainage Study may partially or fully mitigate their drainage impacts by implementing Low Impact Development (LID) features, provided these features conform to the DOU's requirements. To satisfy onsite detention design criteria, the latest edition of Sacramento Area Hydrology Model (SAHM) shall be used to illustrate mitigation of post project flows. Refer to <http://www.beriverfriendly.net/newdevelopment/sacramentoareahydrologymodel/> to download SAHM. The setup of SAHM when used for this purpose shall be in accordance with the CSS Model User Guide.

All LID measures shall be privately owned and maintained and require a maintenance agreement as

specified in Section 7.1 above.

7.3 Hydromodification Management Plan Requirements

Hydromodification Management Plan (HMP) requirements address changes to runoff characteristics from urbanization and other sources that would otherwise result in the artificially altered rate of erosion or sedimentation within downstream channels. To determine the applicability of the hydromodification management requirements for a project, a list of exemptions have been provided in Chapter 5 of the SQDM. If a project is required to implement hydromodification control measures, the latest edition of Sacramento Area Hydrology Model (SAHM) shall be used to illustrate mitigation of post project flows. SAHM can be downloaded at:

<http://www.beriverfriendly.net/newdevelopment/sacramentoareahydrologymodel/>

All HMP measures shall be privately owned and maintained and require a maintenance agreement as specified in Section 7.1 above.

7.4 Trash Control Measures

On April 7, 2015, the State Water Board adopted an amendment to the State's Water Quality Control Plan, that added trash provisions (the "Trash Amendment"). The City's storm drain system is subject to the requirements set forth in this amendment. Projects that include: high density residential, commercial, industrial and mixed use, will be required to comply with the Trash Amendment's requirements by implementing certified full capture systems and/or trash multi-benefit treatment systems. These measures shall be reviewed and approved with each project's building permit. Any proposed full capture system or multi-benefit treatment systems shall be included on the list certified by the State Water Resources Control Board (State Water Board) Executive Director, which can be viewed online, along with other Trash Amendment information at:

https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html

All trash control measures shall be privately owned and maintained and require a maintenance agreement as specified in Section 7 above.

8. State General Permit Requirements

Projects that do not drain to the CSS, disturbing one or more acres of soil (or that are part of a larger common development that in total disturbs one or more acres of soil) must obtain a Construction Activities Storm Water General Permit from the State Water Resources Control Board. For more information visit:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Owners of these projects must file a Notice of Intent (NOI) package and develop a Stormwater Pollution Prevention Plan (SWPPP) prior to beginning any soil disturbing activities. SWPPP's must be prepared by a certified Qualified SWPPP Developer (QSD). The State will issue a Waste Discharge Identification (WDID) number which must be displayed on the cover sheet of any plans prior to their approval.

Industrial development projects within the City of Sacramento must determine if they are required to comply with the "NPDES General Permit for Stormwater Discharges Associated with Industrial Activity". Project applicants shall submit the determination letter/correspondence to the DOU prior to the issuance of a building permit. The submittal must include the applicable Standard Industrial Classification (SIC) code(s), which describe the business activities that will be occurring at the facility.

9. Grading, Erosion and Sediment Control

All projects within City limits must comply with the City's Grading, Erosion and Sediment Control Ordinance (City Code Section 15.88), the City's Stormwater Management and Discharge Control Ordinance (City Code Section 13.16), and the City's "*Administrative and Technical Procedures Manual for Grading and Erosion and Sediment Control*" (Grading Manual), which can be downloaded at <http://www.cityofsacramento.org/-/media/Corporate/Files/DOU/Specs-Drawings/Sediment-control-manual.pdf?la=en>

In general, a grading permit is required for any of the following activities:

- Grading 50 cubic yards or more of material,
- Creating depth of cuts and fills of two vertical feet or more,
- Modifying any drainage pathway that may affect its carrying capacities or contribute to increased erosion.

See City Code Section 15.88.070 for more detailed requirements.

Any grading that requires a permit must be approved through a set of grading plans as required in chapter 2 Section 2 of the Grading Manual and as described in Sections 2 & 3 of this manual. These plans shall be submitted, reviewed and approved either through the Public Works' Offsite Improvement Plan process, or the Community Development Department's (CDD) onsite building permit process.

All projects disturbing greater than 1,000 square feet of surface area are required to have erosion and sediment control plan as described in chapter 2 Section 3 of the Grading Manual. All other projects are simply required to have the City's standard erosion and sediment control notes placed on the plans, see **Figure 9**.

Projects with an erosion and sediment control plan are required to call out the type and location of their selected Best Management Practices (BMPs); see chapter 4 of the Grading Manual for information about the various types of BMPs and their use. The typical BMPs specifically called out on the plans for use during construction are a stabilized construction entrance, inlet sediment control (gravel bags and filter bags), site border protection with fiber rolls and concrete washout areas. See Section 16-3 of the City Standard Specifications in addition to City Standard Drawings Q-10 through Q-90 for more information.

10. Flood Related Requirements

Projects in a Special Flood Hazard Area are required to determine if the proposed work is a “Substantial Improvement” (SI). A SI is any reconstruction, rehabilitation, addition, or other improvement of a structure, where the cost of improvement equals or exceeds 50 percent of the market value of the structure (not including land). This term also includes structures that have incurred “Substantial Damage”.

Projects proposing new construction or SI in FEMA designated flood zones: A, AE, AH, AO, as well as the Magpie Creek Flood Zone (as defined by the DOU) must provide an elevation certificate demonstrating the finished floor is a minimum of one foot above the base flood elevation and must also execute a hold harmless agreement with the City.

Per the City General Plan and City Code Section 17.200.340 F Zone, setbacks for development projects less than five acres in size, are a minimum of 20-feet of landside levee toe or floodwall toe and increases to 50-feet for projects five acres or larger. No primary or accessory structures may encroach into this setback zone.

The Central Valley Flood Protection Board (CVFPB) requires an encroachment permit for any work (i.e., trees, structures, fences, etc.) within 15-feet of a levee toe or floodwall. A CVFPB permit is also required for improvements within 30 feet of the top of bank of a regulated stream or designated CVFPB floodway.

Contact Information for CVFPB: (916) 574-0609, or by e-mail at cvfpbquestions@water.ca.gov

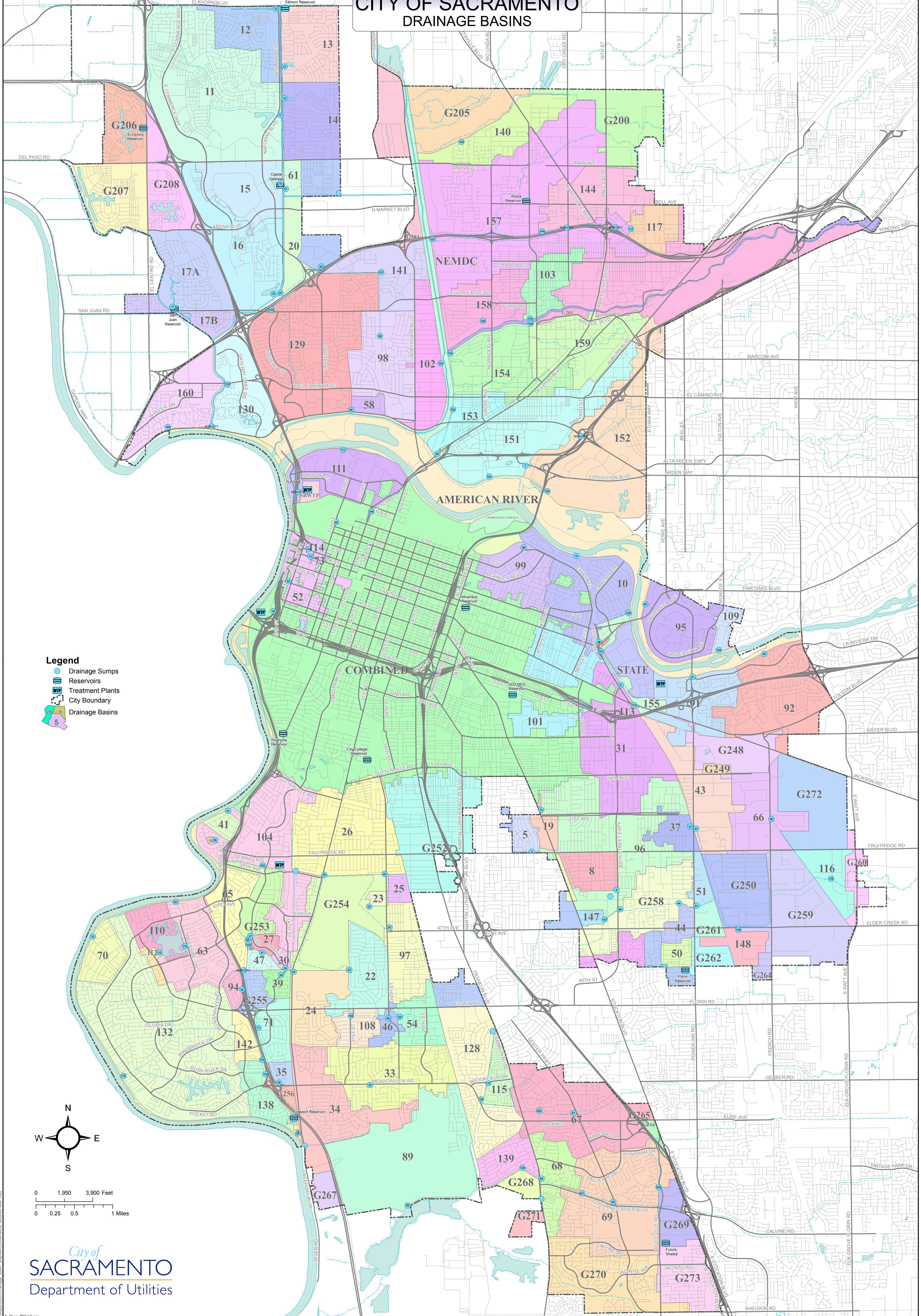
More information on CVFPB encroachment permits:

<http://cvfpb.ca.gov/permitting/encroachment-permit-information-and-application-forms/>

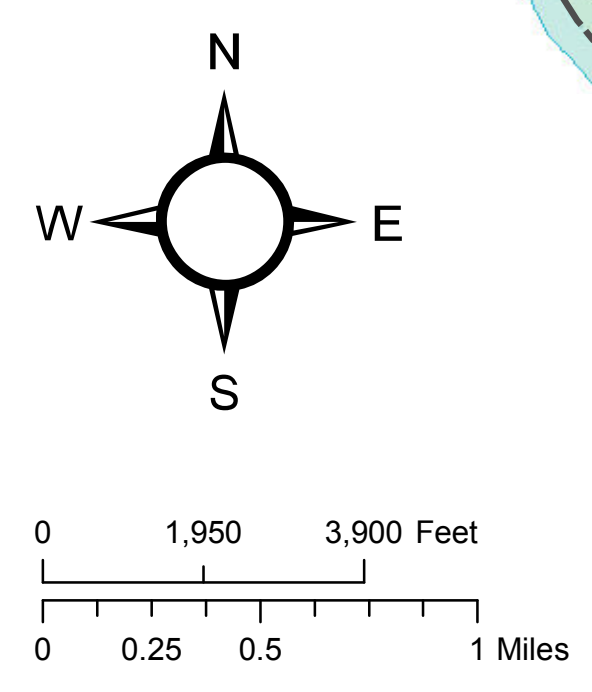
State Law SB 5 and City Code Section 17.810 requires that the City make specific findings prior to approving development agreements, tentative maps, discretionary entitlements for new buildings, discretionary entitlements that increase the occupancy of a building and secondary dwelling units; within a 200-year floodplain. The purpose is to ensure that development will have protection from a 200-year flood event or will achieve that protection by 2025.

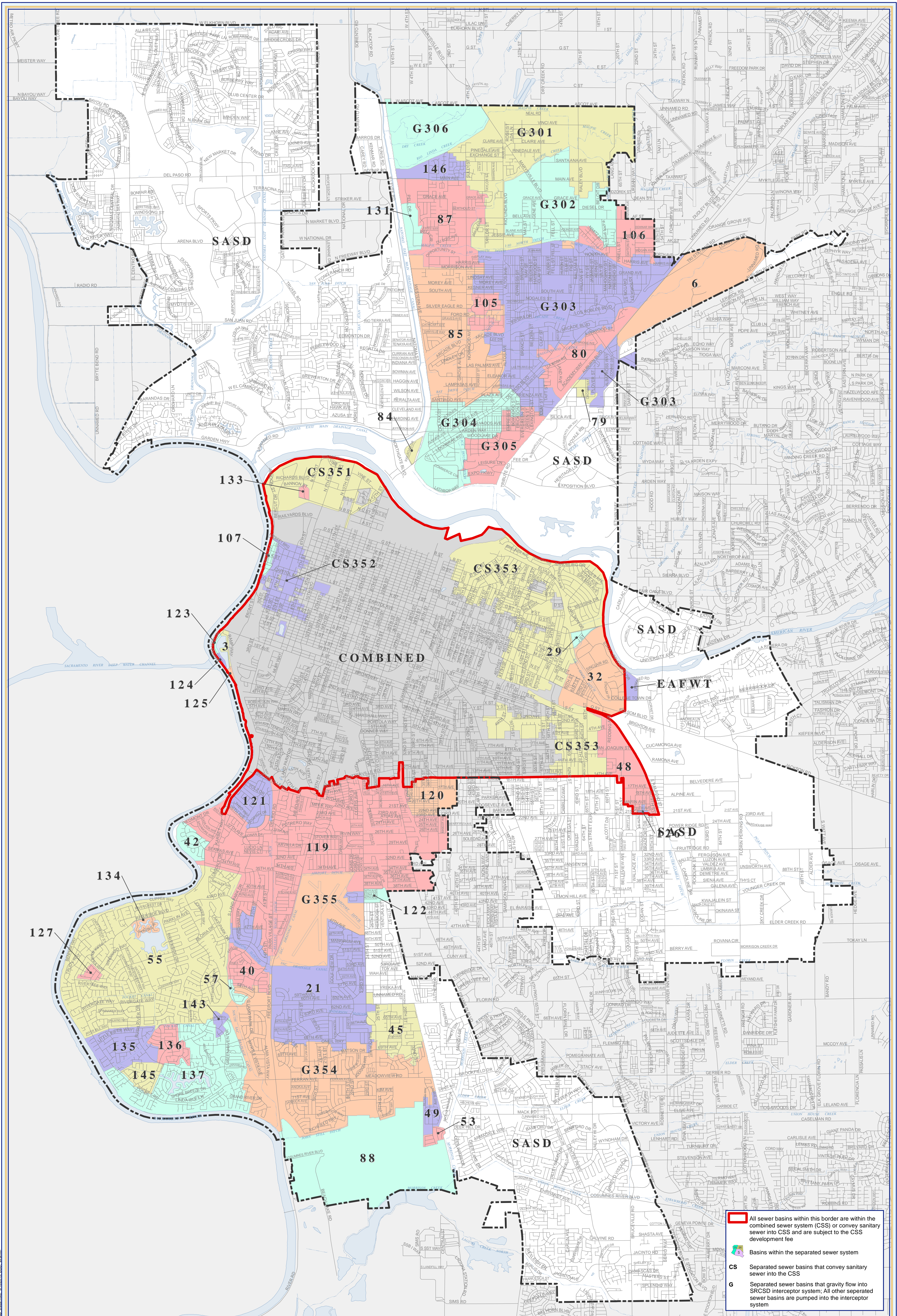
APPENDIX

CITY OF SACRAMENTO DRAINAGE BASINS



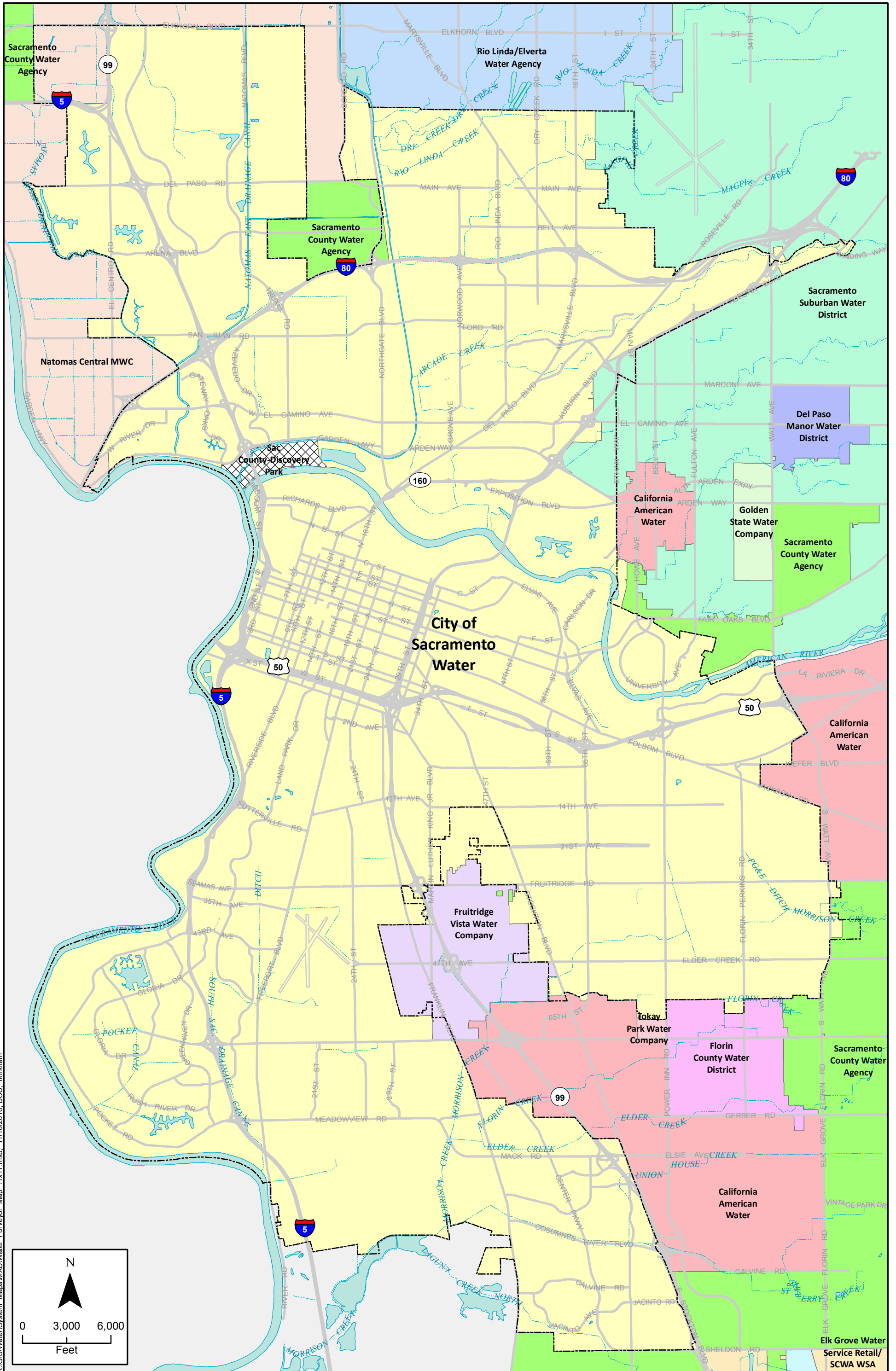
- Legend**
- Drainage Sumps
 - Reservoirs
 - Treatment Plants
 - City Boundary
 - Drainage Basins



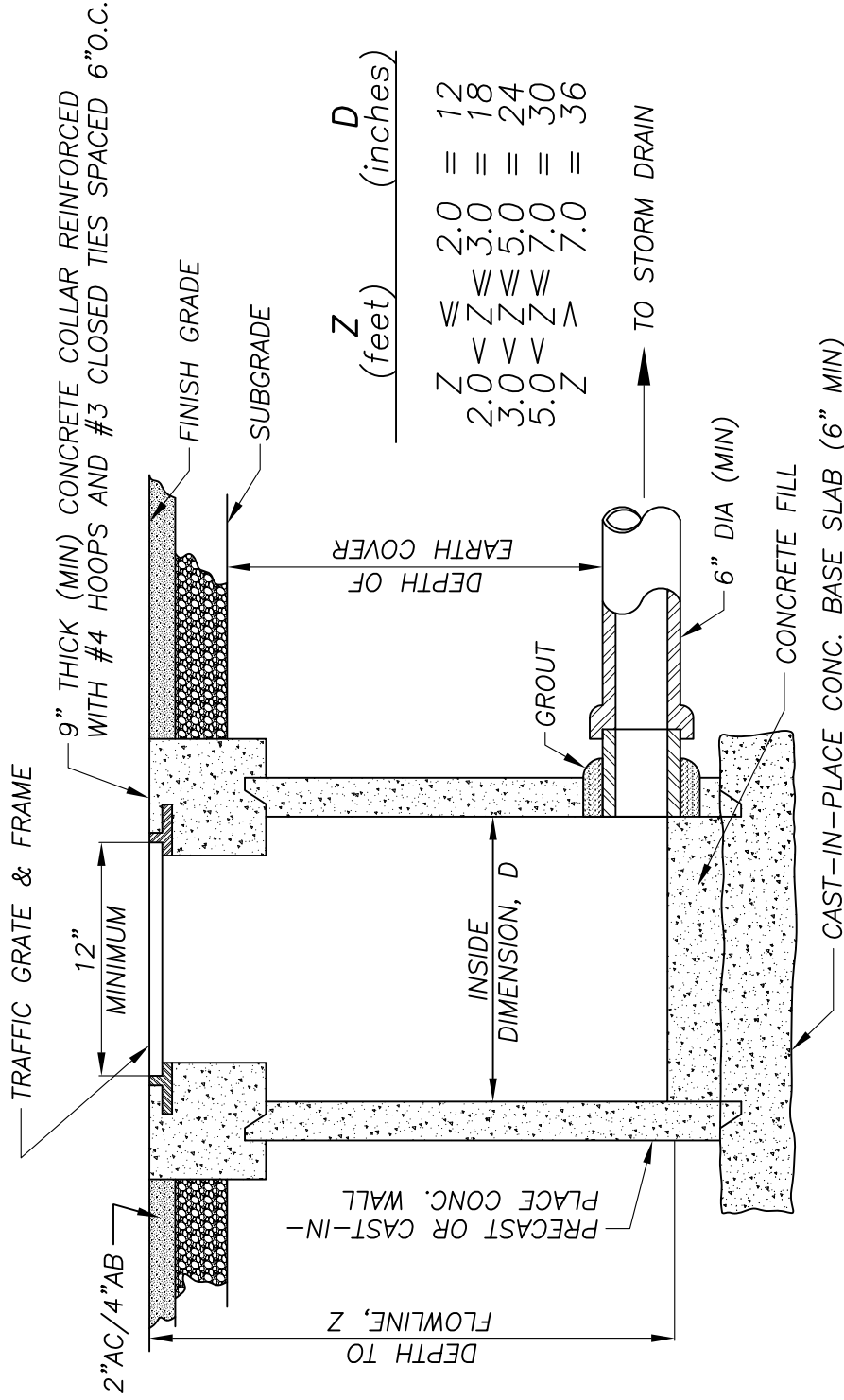


- All sewer basins within this border are within the combined sewer system (CSS) or convey sanitary sewer into CSS and are subject to the CSS development fee
- Basins within the separated sewer system
- CS** Separated sewer basins that convey sanitary sewer into the CSS
- G** Separated sewer basins that gravity flow into SRCSID interceptor system; All other separated sewer basins are pumped into the interceptor system

WATER PURVEYOR MAP



R:\GIS\Water\System Maps\MXD\Water Purveyor Map 11x17.mxd - 11/10/2016 - DOU - rkritham

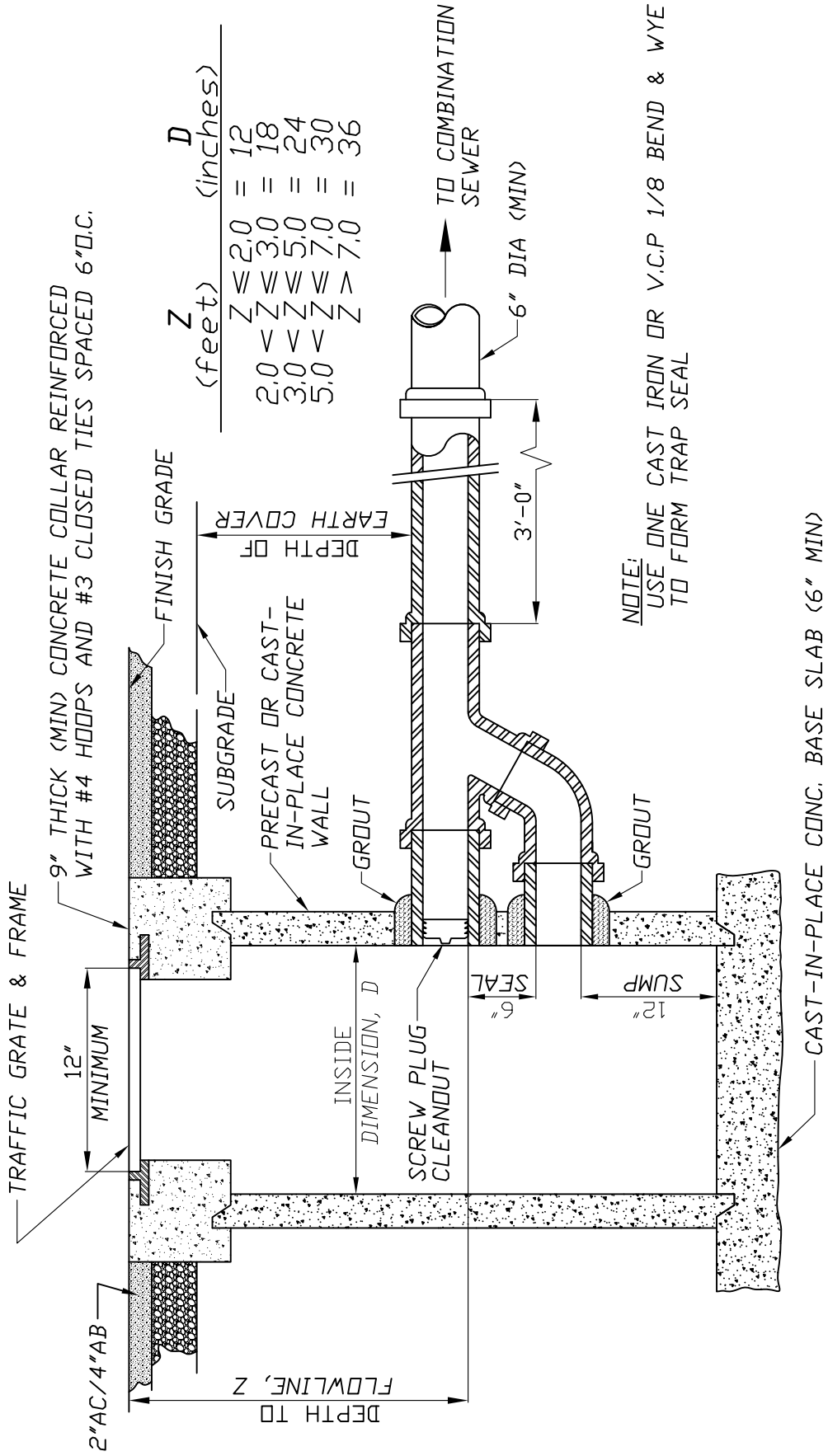


DRAINAGE INLET (TYPE I)

FOR COLLECTION AND DISCHARGE INTO SEPARATE STORM DRAIN

NOTE:

1. MINIMUM WALL THICKNESS IS 6 INCHES FOR CAST-IN-PLACE CONCRETE.
2. REINFORCE CAST-IN-PLACE CONCRETE WALLS WITH #4 BARS AT 12"O.C. EACH WAY WITH 2" MIN. COVER FROM INSIDE FACE



DRAINAGE INLET WITH TRAP AND SUMP (TYPE II)

FOR COLLECTION AND DISCHARGE INTO COMBINATION SEWER

SCALE: 3/4"=1'-0"

NOTE:

1. MINIMUM WALL THICKNESS IS 6 INCHES FOR CAST-IN-PLACE CONCRETE.
2. REINFORCE CAST-IN-PLACE CONCRETE WALLS WITH #4 BARS AT 12"O.C. EACH WAY WITH 2" MIN. COVER FROM INSIDE FACE

Water Tap Notes (projects without offsite plans):

Residential (Single Family Home) new water tap:

City crews will install a 1” domestic service connection and meter box fee of \$_____. Contractor shall provide all excavation, backfill, and surface restoration. After onsite plumbing has passed inspection call (916) 825-9815 to coordinate meter installation. An encroachment permit issued by the Development Engineering Section of Public Works is required for any work to expose the City water main.

Residential (Single Family Home) with existing killed/non-billed water service:

Contractor shall install meter box, yoke and fittings on existing water line at the point of service per City standard drawing W-401 and W-402. City crews will install a 1” water meter after onsite plumbing has passed inspection. Call (916) 825-9815 to coordinate meter installation. An encroachment permit issued by the Development Engineering Section of Public Works is required for any work within the public Right-of-Way (park strip or alley).

2” and Smaller (*Replace W-505 with W-406 for 1” services*)

City crews will install a ___” domestic service connection and meter for a fee of \$_____. Contractor shall provide all excavation, backfill, and surface restoration. Contractor shall furnish, install and test a ___” approved RP assembly per City Standard Drawing W-505.

4” and up

City crews will install a ___” domestic tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration and install a ___” domestic service connection. Contractor shall furnish, install and test a ___” approved RP assembly per City Standard Drawing W-608. City will provide a ___” meter (for contractor installation) for a fee of \$_____. Contact Meter Shop Supervisor at (916) 808-4891 to arrange for meter pick-up.

Fire Service

City crews will install a ___” Fire tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration and install a ___” fire service connection. Contractor shall furnish, install and test a ___” approved double check valve per City Standard Drawing W-510.

Public Fire Hydrant

City crews will install a ___” Fire hydrant tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration, fire hydrant service connection and install a standard fire hydrant per City Standard Drawing W-201.

Private Fire Hydrant

City crews will install a ___” Private Fire hydrant tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration, fire hydrant service connection and install a private fire hydrant per City Standard Drawing W-201.

If offsite plans are required use the following tap notes on the offsite plans:

2” and Smaller

City crews will install a ___” domestic service connection and meter box for a fee of \$_____. Contractor shall provide all excavation, backfill, and surface restoration.

4” and up

City crews will install a ___” domestic tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration and install a ___” domestic service connection to the point of service.

Fire Service

City crews will install a ___” Fire tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration and install a ___” fire service connection to the point of service.

Public Fire Hydrant

City crews will install a ___” Fire hydrant tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration, fire hydrant service connection and install a standard fire hydrant per City Standard Drawing W-201.

Private Fire Hydrant

City crews will install a ___” Private Fire hydrant tap and Gate Valve for a fee of \$_____. Contractor shall provide all excavation, backfill, surface restoration, fire hydrant service connection and install a private fire hydrant per City Standard Drawing W-201.

If the private hydrant is located out of the public right-of-way and on private property the highlighted portion of this note will be removed and used on the onsite plans.

If offsite plans are required use the following meter and backflow preventer notes on the onsite plans:

2” and Smaller (*Replace W-505 with W-406 for 1” services*)

City crews will install a ___” meter for a fee of \$_____. Contractor shall furnish, install and test a ___” approved RP assembly per City Standard Drawing W-505.

3” and up

Contractor shall furnish, install and test a ___” approved RP assembly per City Standard Drawing W-608. City will provide a ___” meter (for contractor installation) for a fee of \$_____. Contact Meter Shop Supervisor at (916) 808-4891 to arrange for meter pick-up.

Fire Service

Contractor shall furnish, install and test a ___” approved double check valve per City Standard Drawing W-510.

Private Fire Hydrant (located out of the public right-of-way and on private property)

Contractor shall install a private fire hydrant per City Standard Drawing W-201.

Abandonment/Kill Tap Note:

City crews will abandon the existing ___” water service for a fee of \$_____.

City crews will kill the existing ___” water service for a fee of \$_____.

GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE CITY OF SACRAMENTO STANDARD SPECIFICATIONS, DATED JUNE 2007. THE CONTRACTOR SHALL OBTAIN AND USE ALL APPLICABLE ADDENDUMS.
2. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES AND FOR THE PROTECTION OF AND REPAIR OF DAMAGE TO THEM. CONTACT UNDERGROUND SERVICE ALERT 1-800-642-2444, 48 HOURS BEFORE WORK IS TO BEGIN.
3. FOR ALL TRENCH EXCAVATIONS 5 FEET OR MORE IN DEPTH, THE CONTRACTOR SHALL OBTAIN A PERMIT FROM THE DIVISION OF INDUSTRIAL SAFETY (2422 ARDEN WAY, SUITE 165, SACRAMENTO, PHONE 263-2800) PRIOR TO BEGINNING ANY EXCAVATION. A COPY OF THIS PERMIT SHALL BE AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND FURNISH, INSTALL, AND MAINTAIN TEMPORARY SIGNS, BRIDGES, BARRICADES, FLAGMEN, AND OTHER FACILITIES TO ADEQUATELY SAFEGUARD THE GENERAL PUBLIC AND WORK, AND TO PROVIDE FOR THE PROPER ROUTING OF VEHICULAR AND PEDESTRIAN TRAFFIC. CONSTRUCTION OPERATIONS SHALL COMPLY WITH THE WORK AREA TRAFFIC CONTROL HANDBOOK (WATCH).
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS OR MARKERS DURING CONSTRUCTION.
6. THE CONTRACTOR SHALL MAINTAIN ALL EXISTING DRAINAGE AND SEWER FACILITIES WITHIN THE CONSTRUCTION AREA UNTIL NEW DRAINAGE AND SEWER IMPROVEMENTS ARE IN PLACE AND FUNCTIONING.
7. IF UNUSUAL AMOUNTS OF BONE, STONE OR ARTIFACTS ARE UNCOVERED, WORK WITHIN 50 METERS OF THE AREA SHALL CEASE IMMEDIATELY AND A QUALIFIED ARCHEOLOGIST AND A REPRESENTATIVE OF THE NATIVE AMERICAN HERITAGE COMMISSION SHALL BE CONSULTED TO DEVELOP, IF NECESSARY, MITIGATION MEASURES TO REDUCE ANY ARCHAEOLOGICAL IMPACT TO A LESS THAN SIGNIFICANT EFFECT BEFORE CONSTRUCTION RESUMES IN THE AREA.
8. COST TO REMOVE AND REPLACE EXISTING PAVEMENT OVER THE WATER, STORM AND SANITARY LINE TRENCHES SHALL BE INCLUDED IN THE PRICE BID FOR PIPE IN PLACE. REPLACEMENT SHALL BE 4" AC AND 12" AB, MINIMUM, OR INDICATED ON THE PLANS.
9. PIPE AND MANHOLE DIMENSIONS ARE TO THE CENTERLINE, UNLESS OTHERWISE NOTED.

10. ALL TAPS 24 INCHES AND SMALLER INTO SEWER & DRAIN MANHOLES SHALL BE CORE BORED WITH KOR-N-SEAL TAPS OR APPROVED EQUAL.
11. ANY WATER ENTERING THE SANITARY SEWER SYSTEM TO BE CONSTRUCTED UNDER THESE PLANS SHALL NOT BE DISCHARGED TO THE EXISTING SYSTEM. PLUGS MUST BE INSTALLED IN EXISTING MANHOLES AS NECESSARY TO PERMIT PUMPING THE NEW SYSTEM CLEAR OF WATER AND DEBRIS PRIOR TO ACCEPTANCE. CARE SHALL BE EXERCISED IN LOCATING PLUGS TO AVOID INTERRUPTING SERVICES TO EXISTING CONNECTIONS. MORTAR OR BRICK PLUGS MUST BE USED, INFLATABLE DEVICES ARE NOT SATISFACTORY.
12. DRAIN PIPE MATERIAL SHALL BE REINFORCED CONCRETE PIPE C-76 CL III, NON-REINFORCED CONCRETE PIPE C-14 CL III, PVC SDR 35, OR AS SPECIFIED ON PLANS. IN ALL CASES, JOINTS FOR CONCRETE PIPE SHALL BE RUBBER GASKETED JOINTS.
13. DRAIN INLET LEADS SHALL BE PVC C-900 CL 150, RCP C-76 CL III, OR NON-REINFORCED CONCRETE C-14 CL III.
14. SANITARY SEWER PIPE MAINS SHALL BE CONSTRUCTED OF V.C.P., A.B.S. OR P.V.C. UNLESS OTHERWISE SPECIFIED ON THE PLANS.
15. AGGREGATE SUBBASE SHALL CONFORM TO CALTRANS SPECIFICATIONS DATED: JULY, 1992 A.S.B., SECTION 25.
16. A STORMWATER PERMIT MUST BE OBTAINED WHEN CONSTRUCTION ACTIVITY RESULTS IN SOIL DISTURBANCE OF ONE (1) OR MORE ACRES. THE STATE WATER RESOURCES CONTROL BOARD, DIVISION OF WATER QUALITY, STORMWATER PERMIT, P.O. BOX 1977, SACRAMENTO, CA 95812-1977, SHALL BE CONTACTED TO OBTAIN THE PERMIT PRIOR TO BEGINNING CONSTRUCTION.
17. IF WORK SHOWN ON THESE PLANS HAS NOT COMMENCED WITHIN TWO YEARS FROM THE DATE OF THE CITY'S ACCEPTANCE OF THE PLANS, A SUBSEQUENT PLAN REVIEW AT THE CITY'S DISCRETION AND THE DEVELOPER'S EXPENSE MAY BE NECESSARY.
18. THE CONTRACTOR SHALL COMPLY WITH THE CITY OF SACRAMENTO ADMINISTRATIVE AND TECHNICAL MANUAL FOR GRADING/EROSION AND SEDIMENT CONTROL. CONTRACTOR SHALL HAVE ALL APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES IN PLACE FOR THE WINTER MONTHS PRIOR TO OCTOBER 1 AND MUST ENSURE THAT THE CONSTRUCTION SITE IS PREPARED PRIOR TO THE ONSET OF ANY STORM.

GENERAL WATER NOTES

1. ALL CONSTRUCTION AND MATERIAL ASSOCIATED WITH THIS PLAN SHALL BE IN ACCORDANCE WITH THE CITY OF SACRAMENTO STANDARD SPECIFICATIONS, DATED JUNE 2007 AND ALL APPLICABLE ADDENDA AND STANDARD DRAWINGS.
2. CONTRACTOR SHALL CALL 808-6810 FOR A PUBLIC WORKS CONSTRUCTION INSPECTOR A MINIMUM OF 48 HRS PRIOR TO BEGINNING OF WORK WITHIN THE RIGHT-OF-WAY.
3. THE CITY OF SACRAMENTO STANDARD DRAWINGS HAVE BEEN MODIFIED. THE CONTRACTOR SHALL BE IN POSSESSION OF CURRENT STANDARD WATER DRAWINGS (W). COPIES OF THESE DRAWINGS CAN BE DOWNLOADED FROM <http://www.cityofsacramento.org/Utilities/Resources>.
4. THE CONTRACTOR SHALL PAY ALL FEES FOR TAPS, TIE-IN CONNECTIONS, AND METER INSTALLATION IN ADVANCE AT THE COMMUNITY DEVELOPMENT DEPARTMENT OFFICE AT 300 RICHARDS BLVD., THIRD FLOOR PUBLIC COUNTER. FEES ARE SUBJECT TO CHANGE EVERY JULY 1ST OR AT ANY TIME. FOR CURRENT FEES VISIT <https://www.cityofsacramento.org/Online-Services/FeeChargeSearch>
5. AT THE TIME OF FEE PAYMENT THE CONTRACTOR SHALL PROVIDE A COPY OF ALL APPROVED PLAN SHEETS SHOWING DEPARTMENT OF UTILITIES APPROVAL STAMPS.
6. THE DEPARTMENT OF UTILITIES WILL NOT INSTALL TAPS OR METERS UNLESS (a) ALL FEES HAVE BEEN PAID AND (b) PRIVATE ON-SITE PIPING HAS SUCCESSFULLY PASSED THE PLUMBING INSPECTIONS.
7. METERS WILL BE INSTALLED BY THE CITY AFTER PAYMENT OF FEES. CALL 808-4891 FOR METER ARRANGEMENT.
8. CONTRACTOR SHALL FURNISH, INSTALL AND TEST APPROVED R.P ASSEMBLIES, AND DOUBLE CHECK VALVES PER APPLICABLE W DRAWINGS
9. THE CONTRACTOR SHALL SCHEDULE ALL WATER TAPS, METER INSTALLATIONS AND SHUT DOWNS WITH THE PUBLIC WORKS INSPECTOR. CALL 808-6810 AT LEAST 14 DAYS ADVANCE FOR SCHEDULING A TAP OR METER INSTALLATION.
10. WITHOUT EXCEPTION, CONTRACTOR SHALL NOT OPEN/CLOSE ANY VALVES ON EXISTING CITY WATER MAINS.
11. ALL WATER SERVICE CONNECTIONS HAVE BEEN SET UP AS:
 - FULL SERVICE TAP- CITY WILL EXCAVATE TRENCH, INSTALL TAP, GATE VALVE AND SERVICE CONNECTION FROM MAIN LINE TO THE POINT OF SERVICE. THE CITY WILL ALSO BACKFILL THE TRENCH AND RESTORE THE SURFACE/PAVEMENT. IF THE FULL

SERVICE IS FOR THE INSTALLATION OF A PUBLIC FIRE HYDRANT, THE FIRE HYDRANT ASSEMBLY IS INCLUDED.

- EASEMENT TAP (4" AND LARGER SERVICE) - THE CONTRACTOR SHALL PROVIDE EXCAVATION AND EXPOSE THE MAIN LINE FOR THE CITY CREW TO INSTALL A TAP AND A GATE VALVE ONLY. CONTRACTOR IS REQUIRED TO INSTALL SERVICE CONNECTION FROM THE GATE VALVE TO THE POINT OF SERVICE AND ALL NECESSARY APPURTENANCES. THE CONTRACTOR ALSO IS REQUIRED TO BACKFILL THE TRENCH AND RESTORE THE SURFACE /PAVEMENT.
- EASEMENT TAP (2" AND SMALLER SERVICE) - THE CONTRACTOR SHALL PROVIDE EXCAVATION AND EXPOSE THE MAIN LINE FOR THE CITY CREW TO INSTALL A TAP, A CORPORATION STOP AND A SERVICE CONNECTION. CONTRACTOR SHALL BACKFILL THE TRENCH AND RESTORE THE SURFACE/PAVEMENT.

12. IF CONSTRUCTION WATER IS NEEDED, THE CONTRACTOR MAY REQUEST FOR A TEMPORARY PUBLIC FIRE HYDRANT USE PERMIT. CALL 808-5454.

CITY OF SACRAMENTO STANDARD EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL FOLLOW THE GUIDELINES FOR THE CITY OF SACRAMENTO'S "ADMINISTRATIVE AND TECHNICAL PROCEDURES MANUAL FOR GRADING AND EROSION AND SEDIMENT CONTROL" FOR THE MEASURES SHOWN OR STATED ON THESE PLANS.
2. CONTRACTOR MUST ENSURE THAT THE CONSTRUCTION SITE IS PREPARED PRIOR TO THE ONSET OF ANY STORM. CONTRACTOR SHALL HAVE ALL EROSION AND SEDIMENT CONTROL MEASURES IN PLACE FOR THE WINTER MONTHS PRIOR TO OCTOBER 1.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED. CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF A REPRESENTATIVE OF THE DEPARTMENT OF UTILITIES.
4. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DIRECTION OF A REPRESENTATIVE OF THE DEPARTMENT OF UTILITIES.
5. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CHECKED BEFORE AND AFTER ALL STORMS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY.
6. CONTRACTOR SHALL MAINTAIN A LOG AT THE SITE OF ALL INSPECTIONS OR MAINTENANCE OF BMPS, AS WELL AS, ANY CORRECTIVE CHANGES TO THE BMPS OR EROSION AND SEDIMENT CONTROL PLAN.
7. IN AREAS WHERE SOIL IS EXPOSED, PROMPT REPLANTING WITH NATIVE COMPATIBLE, DROUGHT-RESISTANT VEGETATION SHALL BE PERFORMED. NO AREAS WILL BE LEFT EXPOSED OVER THE WINTER SEASON.
8. THE CONTRACTOR SHALL INSTALL THE STABILIZED CONSTRUCTION ENTRANCE PRIOR TO COMMENCEMENT OF GRADING. LOCATION OF THE ENTRANCE MAY BE ADJUSTED BY THE CONTRACTOR TO FACILITATE GRADING OPERATIONS. ALL CONSTRUCTION TRAFFIC ENTERING THE PAVED ROAD MUST CROSS THE STABILIZED CONSTRUCTION ENTRANCE. THE STABILIZED CONSTRUCTION ENTRANCE SHALL REMAIN IN PLACE UNTIL THE ROAD BASE ROCK COURSE IS COMPLETED.
9. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE SWEEPED AT THE END OF EACH WORKING DAY OR AS NECESSARY.
10. CONTRACTOR SHALL PLACE _____ AROUND ALL NEW DRAINAGE STRUCTURE OPENINGS IMMEDIATELY AFTER THE STRUCTURE OPENING IS CONSTRUCTED. THESE

_____ SHALL BE MAINTAINED AND REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETED.

11. CONTRACTOR SHALL IMPLEMENT HOUSEKEEPING PRACTICES AS FOLLOWS:

A. **SOLID WASTE MANAGEMENT:**

PROVIDE DESIGNATED WASTE COLLECTION AREAS AND CONTAINERS. ARRANGE FOR REGULAR REMOVAL AND DISPOSAL. CLEAR SITE OF TRASH INCLUDING ORGANIC DEBRIS, PACKAGING MATERIALS, SCRAP OR SURPLUS BUILDING MATERIALS AND DOMESTIC WASTE DAILY.

B. **MATERIAL DELIVERY AND STORAGE:**

PROVIDE A DESIGNATED MATERIAL STORAGE AREA WITH SECONDARY CONTAINMENT SUCH AS BERMING. STORE MATERIAL ON PALLETS AND PROVIDE COVERING FOR SOLUBLE MATERIALS. RELOCATE STORAGE AREA INTO BUILDING SHELL WHEN POSSIBLE. INSPECT AREA WEEKLY.

C. **CONCRETE WASTE:**

PROVIDE A DESIGNATED AREA FOR A TEMPORARY PIT TO BE USED FOR CONCRETE TRUCK WASH-OUT. DISPOSE OF HARDENED CONCRETE OFFSITE. AT NO TIME SHALL A CONCRETE TRUCK DUMP ITS WASTE AND CLEAN ITS TRUCK INTO THE CITY STORM DRAINS VIA CURB AND GUTTER. INSPECT DAILY TO CONTROL RUNOFF, AND WEEKLY FOR REMOVAL OF HARDENED CONCRETE.

D. **PAINT AND PAINTING SUPPLIES:**

PROVIDE INSTRUCTION TO EMPLOYEES AND SUBCONTRACTORS REGARDING REDUCTION OF POLLUTANTS INCLUDING MATERIAL STORAGE, USE, AND CLEAN UP. INSPECT SITE WEEKLY FOR EVIDENCE OF IMPROPER DISPOSAL.

E. **VEHICLE FUELING, MAINTENANCE AND CLEANING:**

PROVIDE A DESIGNATED FUELING AREA WITH SECONDARY CONTAINMENT SUCH AS BERMING. DO NOT ALLOW MOBILE FUELING OF EQUIPMENT. PROVIDE EQUIPMENT WITH DRIP PANS. RESTRICT ONSITE MAINTENANCE AND CLEANING OF EQUIPMENT TO A MINIMUM. INSPECT AREA WEEKLY.

F. **HAZARDOUS WASTE MANAGEMENT:**

PREVENT THE DISCHARGE OF POLLUTANTS FROM HAZARDOUS WASTES TO THE DRAINAGE SYSTEM THROUGH PROPER MATERIAL USE, WASTE DISPOSAL AND TRAINING OF EMPLOYEES. HAZARDOUS WASTE PRODUCTS COMMONLY FOUND ON-SITE INCLUDE BUT ARE NOT LIMITED TO PAINTS & SOLVENTS, PETROLEUM PRODUCTS, FERTILIZERS, HERBICIDES & PESTICIDES, SOIL STABILIZATION PRODUCTS, ASPHALT PRODUCTS AND CONCRETE CURING PRODUCTS.

Figure 10 – Onsite Project Storage

Basin	Nominal Capacity CFS/AC	Storage per Acre of Increased Imperviousness (Cubic Feet)	
		100-Year	10-Year
5	0.2	7,000	3,600
7	UP	NA	NA
8	0.2	7,000	3,600
10	0.15	8,500	4,300
11	NN	10,600	5,500
12	NN	10,600	5,500
13	NN	10,600	5,500
14	NN	10,600	5,500
15	NN	10,600	5,500
16	NN	10,600	5,500
17	NN	10,600	5,500
18	NN	10,600	5,500
19	0.2	7,000	3,600
20	NN4	4,300	2,150
22	0.11	10,200	5,200
23	0.12	9,700	4,950
24	0.08	11,600	6,200
25	0.12	9,700	4,950
26	0.11	10,200	5,200
27	0.13	9,300	4,700
28	0.12	9,700	4,950
30	0.12	9,700	4,950
31	0.16	8,200	4,100
33	0.1	10,600	5,500
34	0.12	9,700	4,950
35	0.8	3,350	1,850
37	0.24	6,100	3,150
38	UP	NA	NA
39	0.13	9,300	4,700
41	0.07	12,000	6,600
43	0.1	10,600	5,500
44	0.23	6,300	3,250
46	0.22	6,500	3,350
47	0.17	7,900	3,950
50	0.15	8,600	4,300
51	0.15	8,600	4,300
52	0.22	6,500	3,350
54	0.14	8,900	4,450
56	0	15,000	10,500
58	0.27	5,600	2,800

Basin	Nominal Capacity CFS/AC	Storage per Acre of Increased Imperviousness (Cubic Feet)	
		100-Year	10-Year
60	UP	NA	NA
61	NN4	4,300	2,200
62	NN	10,600	5,500
63	0.07	12,000	6,600
64	NN4	4,300	2,200
65	0.07	12,000	6,600
66	0.27	5,600	2,900
67	0.12	9,700	4,950
68	0.15	8,600	4,300
69	0.11	10,200	5,200
70	0.1	10,600	5,500
71	0.12	9,700	4,950
73	UP	NA	NA
83	UP	NA	NA
89	0.1	10,600	5,500
91	0.17	7,900	3,950
94	0.13	9,300	4,700
95	0.29	5,400	2,750
96	0.2	7,000	3,600
97	0.2	7,000	3,600
98	0.19	7,300	3,700
99	0.3	5,300	2,700
101	0.19	7,300	3,700
102	0.18	7,600	3,800
103	0.15	8,600	4,300
104	0.3	5,300	2,700
108	0.09	11,000	5,800
109	0.18	7,600	3,800
110	0.07	12,000	6,600
111	0.3	5,300	2,700
112	0.3	5,300	2,700
113	UP	NA	NA
114	0.22	6,500	3,350
115	0.24	6,100	3,150
116	0.2	7,000	3,600
117	0.2	7,000	3,600
128	0.18	7,600	3,800
129	0.3	5,300	2,700
130	0.28	5,500	2,800
132	0.3	5,300	2,700

Basin	Nominal Capacity CFS/AC	Storage per Acre of Increased Imperviousness (Cubic Feet)	
		100-Year	10-Year
138	0.14	8,900	4,450
139	0.17	7,900	3,950
140	0.21	6,700	3,450
141	0.3	5,300	2,700
142	0.25	6,000	3,050
144	0.31	5,200	2,600
147	0.1	10,600	5,500
148	0.37	4,600	2,250
149	UP	NA	NA
151	0.26	5,800	2,950
152	0.23	6,300	3,250
153	0.14	8,900	4,450
154	0.13	9,300	4,700
155	0.26	5,800	2,950
157	0.2	7,000	3,600
158	0.1	10,600	5,500
159	0.05	12,800	7,500
160	0.46	3,800	1,990
161	UP	NA	NA
G200	0.2	7,000	3,600
G201	0.2	7,000	3,600
G204	0.1	10,600	5,500
G205	0.1	10,600	5,500
G206	NN	10,600	5,500
G207	NN	10,600	5,500
G208	NN	10,600	5,500
G209	0.1	10,600	5,500

Basin	Nominal Capacity CFS/AC	Storage per Acre of Increased Imperviousness (Cubic Feet)	
		100-Year	10-Year
G248	0	15,000	10,500
G249	0	15,000	10,500
G250	0.1	10,600	5,500
G251	0.2	7,000	3,600
G252	0.08	11,600	6,200
G253	0.13	9,300	4,700
G254	0.12	9,700	4,950
G255	0.2	7,000	3,600
G256	0.12	9,700	4,950
G257	0.12	9,700	4,950
G258	0.2	7,000	3,600
G259	0.2	7,000	3,600
G260	0.2	7,000	3,600
G261	0.2	7,000	3,600
G262	0.15	8,600	4,300
G263	0.2	7,000	3,600
G264	0.2	7,000	3,600
G265	0.2	7,000	3,600
G266	0.11	10,200	5,200
G267	0.1	10,600	5,500
G268	0.17	7,900	3,950
G269	0.48	3,700	1,950
G270	0.17	7,900	3,950
G271	0.2	7,000	3,600
G272	0	15,000	10,500
G273	0.5	3,700	1,900
CSS	0.18	7,600	3,800

NN = North Natomas 0.1cfs/ac - Mitigate increase in impervious area relative to approved basin wide master plan at 0.1cfs/ac

NN4 = North Natomas 0.4cfs/ac - Mitigate increase in impervious area relative to approved basin wide master plan at 0.4cfs/ac

UP = Underpass - Do not drain to these basins

Note:

100-year event volume must be contained onsite and may include parking lot storage or other surface flooding.
 10-year event volume must be completely contained in underground pipe and/or within a detention facility.

