

WATER DESIGN CRITERIA

The following requirements pertain to the design and preparation of plans for construction of the various components for water line installation.

General

1. All design shall conform to the City of Hesperia Standard drawings or latest revision thereof.
2. Plan views of water line construction should include all other utilities and structures within the right-of-way.
3. PROFILE: Water lines that are 8" or smaller require a plan view only when submitted with a final street design. All water lines that are larger than 8" require plan and profile views.
4. The road improvement plans shall be approved by the City of Hesperia Engineering Department and submitted with the water improvement plan.

Water Mains

1. All 12" and above water mains shall be fitted with butterfly valves.
2. Water distribution mains shall be Ductile Iron Pipe (Pressure Class 250 or 350) or PVC C900 Class 200 with mid-block valves placed at fire hydrant locations (placed on high side of hydrant tee) approximately every 660 feet. Transmission mains shall have mid-block valves at intervals of 660 feet.
3. A minimum cover of 48" over top of pipe will be required for 8", 42" minimum cover for 12" and larger pipe.
4. Existing water main to remain in service until all service changeover are made.
5. Tie-ins to existing water main shall be per details (see enclosed detail sheet).
6. Water main shall be a minimum of 5 feet from face of curb.
7. Locating wire to be taped to top of pipe (see general note #7).

Water Services

1. All existing water services are to be changed over from main to angle meter stop as per City of Hesperia Standard Drawing W-7.
2. New services, i.e. as in tract development shall be installed 2 feet minimum and 5 feet maximum from property line. When possible, adjacent services are to be from the same property line.

Fire Hydrants

1. Fire hydrants shall be placed at 600 foot intervals for single family residential homes and 300 foot intervals for tracted areas per City of Hesperia Standards. Hydrants are to be located at property line whenever possible per City of Hesperia Standard Drawing W-3.
2. Fire hydrants to be placed 1 foot behind back of curb (if existing), or 2 feet from right-of-way line at a perpendicular property line; and at all intersections, 2 feet from curb radius. Placement to be minimum of 5 feet from existing power poles or other utility pedestals, vaults, etc...
3. In tract development hydrant laterals shall be ductile iron or C900 with restraint joints.

Blow-Offs

Blow-offs to placed at low points in water main at property line whenever possible.

Air-Vacs

Air-vacs/air release to be placed at all high points in water main at property line wherever possible.

Valves and Fittings

Fittings are to be flanged, M.J., push-on or any combination thereof per AWWA C110. Short body fittings (AWWA C153) are allowed for M.J. and/or push-on only per City of Hesperia Standards and Material List.

Crosses and Tees

Crosses and tees on main line at street intersections shall have full complement of valves.

Thrust Blocks

Thrust blocks shall be installed per Standard of City of Hesperia Standards Drawing W-4. Thrust block sizing should also take into account local field conditions for that specific fitting.

SEWER DESIGN CRITERIA

The following requirements pertain to the design and preparation of plans for construction of the various components to the sewer system.

General

All sewers, sewerage lift stations, treatment facilities and appurtenances to be owned, maintained and/or operated by the City of Hesperia shall be designed according to the criteria set forth in this section. The same criteria shall hold for systems served but not owned, maintained and/or operated by the City of Hesperia insofar as said criteria may affect the efficiency of the City of Hesperia's system. All additions to the City of Hesperia's system shall be plan-checked and inspected by the City of Hesperia Engineering Department.

Design Competence

All City of Hesperia facilities shall be designed by professional engineers according to accepted practice in the sewerage field.

Sewerage Lift Stations and Inverted Siphons

Every effort should be made, within economic reason, to avoid sewerage lift stations, inverted siphons and exposed piping. Their use will be allowed only upon approval by the City of Hesperia.

Legal Access

Each lot to be served by sewer shall abut a public street or recorded easement containing a sewer, or be provided with permanent legal access to such a sewer. The location of the street, easement, or legal access shall permit gravity flow from the lot to the sewer main. Deviations from any of the criteria adopted herein may be permitted upon prior written approval by the City of Hesperia.

Sewers and Appurtenances

Flows

The flows used for the design capacity for sewers and sewerage lift stations shall be the "computed peak flow" which shall be determined on the basis of projected land use and average, daily flow per capita for this City of Hesperia area shall be as follows:

- Gallons per Capita Day 90.0
- Average persons per EDU 2.7
- Average GPD per EDU 245.0

The following peaking factors shall be used for this City of Hesperia area:

AVERAGE FLOW	PEAK FACTOR
0.01.....	4.0
0.05.....	3.4
0.10.....	3.2
0.20.....	3.0
0.30.....	2.8
0.50.....	2.7
0.80.....	2.6
1.00.....	2.5
1.50.....	2.4
2.50.....	2.3
4.00.....	2.2
6.00.....	2.1
10.0.....	2.0
15.0.....	1.9
30.0.....	1.8

Design flows from commercial, industrial, hotels, motels, campgrounds, etc. shall be determined in consultation with the City of Hesperia.

Formula

Capacity of all sewers shall be determined by the use of the “Manning” formula:

$$Q = A \frac{1.486 r^{2/3} s^{1/2}}{n}$$

Q= flow capacity – cfs n= coefficient of roughness r= hydraulic radius

S= slope A= cross sectional area

Roughness Coefficient

The roughness coefficient used in design shall be n = .013 for all sewers. If any manufacture claims that the “n” factor of his pipe should be less, he must submit documented evidence of substantiate his claims. The reliability of such evidence shall be determined by the City of Hesperia.

Type of Pipe

The approved pipe for use in this City of Hesperia shall be PVC solid-wall SDR-35 as specified in the City of Hesperia “Material” section. VCP pipe shall be used only in industrial/commercial applications and/or deeper excavations, and only with prior written approval from the City of Hesperia.

Pipe Size

All gravity sewer pipe up to and including 8 inch in diameter shall be sized to carry the peak flow when fifty (50%) full. This requirement shall apply regardless of the cross-section shape of the sewer. All larger sewer pipe, except those designed as laterals, shall be sized to carry the peak flow when seventy-five (75%) full. This requirement shall apply regardless of the cross-section shape of the sewer. No sewer main with an internal diameter less than 8 inches shall be installed within the City of Hesperia owned sewer collection system.

Sewer Slopes and Velocities

The minimum allowable slope is that which will give a velocity of not less than two feet per second (fps) when the sewer is flowing fifty (50%) full. The purpose of this requirement is to prevent sewerage sedimentation and subsequent generation of corrosive gases. The velocity shall be determined by means of the "Manning" formula:

$$V = \frac{1.486 r^{2/3} s^{1/2}}{n}$$

V = velocity n = coefficient of roughness r = hydraulic radius s = slope

In sewers of uniform size passing through manholes without a major change in direction or slope, there shall be no arbitrary drop between inlet and outlet. In sewers which change slope but do not change direction or size, the slopes of the incoming sewers shall be carried through to the outlet of the manhole. Where diameters change, and in junctions involving major direction or slope changes, the various elevations shall be chosen to match water surfaces under average flow conditions at ultimate development of the tributary area (not under maximum flow conditions).

Minimum Slopes

Minimum slopes to be used with various pipe sizes are listed below:

DIAMETER	SLOPE	FT/FT
6.....	0.0060	(.60%)
8.....	0.0040	(.40%)
10.....	0.0029	(.29%)
12.....	0.0022	(.22%)
15.....	0.0016	(.16%)
18.....	0.0012	(.12%)
21.....	0.0010	(.10%)
24.....	0.0008	(.08%)

Exceptions to Minimum Slopes

Where topography limits or prevents the use of minimum slopes as described herein, the City of Hesperia may require an engineer's report. This report shall describe the alternatives and their economies. The report shall also include an evaluation of prospective maintenance and sewer gas problems. Greater minimum slopes than these specified herein may be required where the presence of hydrogen sulfide may be detrimental to and affect the life of the sewer pipe being used.

Slopes in Force Mains

In force mains, a continuous uphill slope shall be provided from the sources to the outlet, to include check-valves as required. The intention is to avoid formation of air pockets, and to keep the system “primed”.

Curved Sewers

Curvilinear sewers will not be allowed in the City of Hesperia. Any special occurrences that may dictate the use of curved sewers shall be approved by the City of Hesperia prior to design.

Depth of Sewers

Permission from the City of Hesperia must be obtained if the following minimum depths cannot be met. In general, the load on the pipe must be considered and adequate precautions taken to protect it either by means of encasement, supports, or added strength.

- Minimum cover in public streets or easements..... 8 feet
- Minimum cover for sewer laterals at right-of-way.....6 feet

Sewer Lateral Size

All commercial sewer laterals shall be 6 inches and installed per the City of Hesperia Standard Drawing S-9, S-10 and S-15. Residential lateral may be 4 inches.

Clearance from other Utilities

Special care shall be exercised in locating sewer lines near other utilities, especially water lines. Sewer line clearances shall be as per the City of Hesperia Standard Drawing S-1.

MANHOLES AND CLEAN-OUTS

Shallow Manholes

Shallow manholes will not be allowed in this City of Hesperia. Any special occurrences that may dictate the use of shallow manholes shall be approved by the City of Hesperia prior to design.

Manhole Location and Spacing

Manholes shall be located at all junctions, all changes in directions and all changes in pipe size. Where the distance between manholes required for the foregoing reasons exceeds three hundred (300) feet, good judgment should be used in placing intermediate manholes at points of probable sewer intersections, at beginning or end of curves, or lacking other reasons, at approximately equal intervals. In general, the maximum of three hundred and fifty (350) feet should be observed. Good judgment should be used in the location of manholes along water courses. Manholes shall conform to the City of Hesperia Standard Drawing S-4, S-5, S-6, and S-7.

Drop Manhole

Whenever possible, sewers shall be brought into manholes without a drop. Where the invert of an incoming sewer is above the top of an outlet sewer, a drop manhole will be required and shall conform to the City of Hesperia Standard Drawing S-8.

Frame and Cover

All manholes shall have cast-iron frames and covers and shall conform to the City of Hesperia Standard Drawing S-8.

Clean-Outs

Dead-end sewers not over one hundred and seventy-five (175) feet in length shall terminate in standard manholes or clean-outs. Dead-end sewers over one hundred and seventh-five (175) feet shall terminate in standard manholes unless future extension of said dead-end sewer will include a manhole within three hundred and fifty (350) feet, in which case a temporary clean-out is permitted. Clean-outs shall conform to the City of Hesperia Standard Drawing S-13 and S-14.