

# Section 1600

## Local Entity Criteria

---

### 1601 CITY OF HENDERSON

#### Section 201

The City of Henderson shall require **Standard Form 1** be included with every submittal to the City.

The City of Henderson shall require the latest copy of all grading plans and any necessary improvement drawings to evaluate the control of drainage for the project are included with every submittal to the City.

The City of Henderson shall require an exhibit showing which lots are being protected by any proposed facilities. The City will not issue any building permits for any lots impacted by this exhibit prior to the associated facilities being completed.

#### Section 203.3

Parcel Map Drainage Study requirements:

- a) Parcel Maps dividing land into parcels greater than 2 acres shall complete a Conceptual Study for the purpose of defining off-site flow impacts and to determine if any drainage easements are required.
- b) Parcel Maps dividing any land into parcels less than or equal to 2 acres shall complete a Technical Drainage Study as defined in Section 204.

#### Section 303.1.3, Paragraph 1

The City of Henderson will allow nuisance water to travel a maximum length of 1,000 feet or across the front of 20 lots before it is required to be conveyed within a storm drainage system.

#### Section 303.10

The City of Henderson requires a minimum 20-foot wide easement for all publicly maintained facilities per the current City of Henderson Development Code.

The City of Henderson will require a surface overflow path with the capacity for the major storm in addition to any proposed underground facility. The overflow path will not be required to meet the same criteria as if it were the primary flow

path; however, the adjacent structures need to be elevated above the calculated water surface elevation for the major storm without freeboard.

**Section 303.4, Paragraph 3, Number 2**

... The City of Henderson will require all new development to construct any facilities required to protect their site and mitigate any increase in runoff.

**Section 303.6.1**

The City of Henderson requires a finished floor elevation certificate be submitted to Public Works for approval prior to receiving any shear and ties inspections for any structure. A copy of the form is shown in **Figure 1601**.

For lots located in a FEMA designated flood zone, a FEMA elevation certificate is also required prior to receiving any shear and ties inspections.

The City of Henderson requires that a Letter of Map Revision (LOMR) be submitted to FEMA prior to approval of the elevation certificate for lots located within the 100-year floodplain.

**Section 304.4**

The City of Henderson will only allow bubbler laterals to convey storm water under streets as an interim solution to outlet the downstream end of a storm drain, which will be extended in the future. A minimum 6-inch temporary drain line will be required to drain the bubbler. No permanent bubblers will be allowed.

**Section 303.4**

B) Residential Streets: The City of Henderson requires that the depth of flow from a major storm in any street with residential lots fronting be contained within the street right-of-way.

**Section 304.4, Paragraph 6, Letter D, Number 1**

The City of Henderson requires that the finished floor elevation be set at a vertical distance above the adjacent curb of at least 18-inches. This shall be measured at the center of the structure.

**Section 304.4, Paragraph 6, Letter D, Number 2**

The City of Henderson requires that the finished floor elevation is set at a vertical distance above the adjacent curb of at least 18-inches or twice the depth of flow, which ever is higher. This shall be measured at the center of the structure.

**Section 304.4, Paragraph 6, Letter E**

The City of Henderson requires that the finished floor elevation be set at a vertical distance above the adjacent curb of at least 18-inches. This shall be measured at the center of the structure.

**Section 705.7.1.13**

For minor drainage channels the City of Henderson will accept one of the following as an alternate to the standard concrete section:

- a) A 4-inch thick, 3,000 psi concrete with 3.0 pounds of 2-inch 100 percent virgin homopolymer polypropylene fibrillated fibers per cubic yard added at the batch.
- b) A 2-inch AC Pavement section consistent with Standard Drawing No. 209 of the Uniform Standard Drawings for Public Works Construction Off-Site Improvements, Clark County Area, Nevada.

**Section 803.1.2**

The City of Henderson will accept only reinforced concrete pipe/box for a publicly maintained storm drain.

**Section 804.1**

The City of Henderson will accept computer software in lieu of **Standard Form 6** for the hydraulic analysis of the proposed storm drain system; if and only if, the software calculates the losses per chapter 804.2. The engineer shall provide an output table, which includes all of the parameters included on **Standard Form 6**.

**Section 905**

The minimum street slope shall conform to the current City of Henderson Development Code.

**Section 1002.1.3**

Culvert crossings as part of an improved channel system or a future proposed channel system-conveying 500 cfs or greater shall be sized using the bridge criteria per Section 1005.

Where vertical constraints **DO NOT** exist, the minimum box culvert shall have a rise greater than or equal to 6-feet.

**1602 CITY OF LAS VEGAS**

**Section 201, Paragraph 4**

The City of Las Vegas requires only one copy of the drainage study and two copies of the Grading Plan.

**Section 204, Technical Drainage Study**

A grading plan is required with the Technical Drainage Study.

**Section 204.2, Drainage Plan**

A reference point on the drainage map must be shown for street capacity and drainage easement locations.

**Section 207, Paragraph 3**

Mitigation of nuisance water, both during construction and for the fully developed condition must be addressed in the drainage study.

**Section 300, Drainage Policy**

Concrete valley gutters are required in parking lots with slopes < 1 percent. Slopes through cul-de-sacs must be at a 1 percent minimum where flow is drained through the cul-de-sac.

**Section 303.10, Paragraph 2**

Ten-foot wide public drainage easements to be privately maintained are allowed for flow < 20 cfs. The depth of flow entering the easement must be checked by using the submerged weir calculation.

**Section 304.4.D.1**

The limits of the flood zones and the Base Flood Elevations (BFE) must be shown on all Grading Plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.

**Section 304.4.E.1**

Minimum finished floor elevation is 6 inches above highest adjacent top of curb.

Finished floor elevation calculations must include allowances for super elevations on curves and velocity head (head loss) for tee intersections.

Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q-100 weir or submerged weir elevation, whichever is greater.

Lots with “B and C Type Drainage” (drainage into the back yard) shall be required to install an underground nuisance drainage system or a 2-foot valley gutter through the lot. A 16-inch x 24-inch block wall opening between lots at the property boundaries with No. 4 - rebar 6 inches on center is required for both options. Improvements shall include a “private” drainage easement to be shown on the grading plan and granted by the final map, parcel map or separate document.

Block wall openings must be sized using a 50 percent clogging factor (i.e., assuming the lower half of the opening is clogged). The minimum block wall opening allowed is 16-inch x 48-inch for flows up to 10 cfs. For flows greater than 10 cfs a wrought iron fence is required at one end of the easement. Concrete bollards are required at the opposite end. However, a 10 foot gate is also acceptable in lieu of the bollards. A 2-foot minimum scour pad must be provided at the opening entrance and exit. A 3-foot cutoff wall must be provided at the entrance to prevent erosion.

Finished floor elevations for each lot must be shown on the grading plan with top-of-curb elevations at the upstream end of the lot.

**Section 706.1.3**

Minimum freeboard of 1.5 feet from adjacent finished floor elevations of buildings/homes.

**Section 706.2.4**

Minimum freeboard of 1.5 feet from adjacent finished floor elevations of buildings/homes.

**Section 803.5**

Bubblers are required across 80 foot and 100 foot wide streets in-lieu of valley gutters. When flows exceed 10 cfs, bubbles larger than 18 inches will be required up to a maximum of 36 inches in diameter. Inlets sized to match the pipe size must be provided. Bubblers are considered interim solutions and are intended to have connected to neighborhood or regional storm drain facilities. Bubblers must be drained with 6-inch drains except when lengths become excessive.

**Section 805, Paragraph 3**

Hydraulic calculations must provide for a 50 percent clogging factor in the capacity calculations for all drop inlets.

**Section 906, Paragraph 5**

For street slopes < 0.4 percent an 18-inch storm drain must be installed. No cross gutters are permitted across streets  $\geq$  80 feet wide. A bubbler system consisting of a 36-inch pipe with inlets, inlets sized to match and a minimum 6-inch bleeder line must be provided. Where flows are less than 20 cfs, a 10 foot concrete lined drainage easement shall be allowed.

**Standard Form 2, Section 1 - General Requirement**

Grading Plan required in addition to a Drainage Plan as required in the MANUAL.

## 1603 CITY OF NORTH LAS VEGAS

### Section 204

A completed *Drainage Submittal Checklist (Standard Form 2)* must be included with the initial technical drainage study submittal.

### Section 303.6.1

The City of North Las Vegas does not permit the construction of permanent structures within a Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Area (SFHA). Under this policy, any developer/builder proposing to place structures within a SFHA must meet the following requirements prior to the issuance of various permits and certificates-of-occupancy:

- a. **Grading and off-site construction permits** may be issued by the City of North Las Vegas, Department of Public Works, once the improvement plans and drainage study have been approved and a copy of the completed Conditional Letter of Map Revision (CLOMR) application has been submitted to FEMA for processing.
- b. **Building permits** can be issued once a CLOMR has been obtained from the FEMA.
- c. **Certificates-of-Occupancy** can be issued once a Letter of Map Revision (LOMR) has been obtained from FEMA.

### Section 304.4, Paragraph 4

Where downstream storm sewer facilities are not available, the City of North Las Vegas requires bubbler laterals for the conveyance of storm water under streets with right-of-way widths greater than or equal to 80 feet. The bubbler laterals must consist of a minimum 18-inch diameter reinforced concrete pipe. To accommodate the draining of the bubbler system prior to future downstream extension of the storm sewer system, a minimum 6-inch diameter PVC pipe must be daylighted downstream.

### Section 304.4, Major Storm Street Capacity Limitations, Item A

Within the interior streets of a residential subdivision, the depth times velocity for the major storm event shall be less than or equal to 6.

### **Section 803.3**

The City of North Las Vegas requires that stormwater drop inlet signage is obtained from the City's Resources/Environmental Division to be affixed to any installed drop inlets. Quality control inspectors will verify that the signs are properly installed.

#### **General**

##### **Side Lot Drainage Easements**

Side lot drainage easements are generally discouraged unless the engineer can demonstrate design constraints that render alternative site layout and drainage facility design options as impossible or impractical.

##### **Block Wall Openings**

All block wall openings must be designed to pass the 100-year storm event flow rates using the assumption that the bottom 50 percent of the openings are obstructed. Additionally, non-damaging emergency surface flow paths must be available to convey the 100-year flows.

##### **Lot Drainage Beneath Air-Conditioning Pads**

For any ground-mounted air-conditioning pad that encroaches to within three (3) feet of a property line, the engineer must indicate on the plot plans how lot drainage will be accommodated beneath the pad. This can include, but is not limited to, the placement of a 4-inch diameter PVC pipe, with the inlet and outlet inverts of the pipe constructed to correspond with the flow line of the obstructed lot drainage swale.

---

## 1604 CLARK COUNTY PUBLIC WORKS - COUNTY POLICIES

### 1. Drainage Easements

a. Public Drainage Easements - Public drainage easements are required for situations where a publicly maintained facility must drain through a private parcel. The easements must comply with the Clark County Public Works public drainage easement policy which follows:

- Subdivisions are to be designed to minimize the need for drainage easements;
- The drainage easement must be a minimum of 15 feet wide;
- The drainage easements must be fully concrete lined, with a low flow area constructed to a minimum grade of 1 percent in 50 feet or less or 0.5 percent for lengths greater than 50 feet;
- Block walls or combination of block wall and wrought iron to meet zoning's wall height requirements. Walls are to be located outside of the drainage easement;
- At a minimum, removable locking bollards must be placed at each end of the easement. In easements 50 feet long or less, a single galvanized gate may be installed at approximately the midpoint. In easements greater than 50 feet, two galvanized gates may be installed but they must be recessed at least 10 feet or at the front yard set backs as determined by Zoning, whichever is greater, from the public rights-of-way. Gates are to be hinged to allow 180-degree movement;
- Joint or multi-use easements are not acceptable, unless the above conditions are met;
- Where existing storm drainage facilities exist, to provide an outlet, underground storm drains will be used through an underground drainage easement with overflow section. The minimum width for a public underground drainage easement is 10 feet;

b. Private drainage easements are to be used to convey flows from one private parcel through an adjacent private parcel. The private drainage easements must comply with the following criteria:

- The minimum width of a private drainage easement is 5 feet;
  - The private drainage easement must be lined with a 3-foot wide minimum concrete valley gutter;
  - Any proposed or future walls crossing the private drainage easement must have wall openings designed to pass the flow and a detail of the opening(s) must be provided on the grading plan;
2. Calculations for block wall openings must be completed with a 50 percent clogging factor applied.
  3. Calculations for storm drain inlets must be completed with a 50 percent clogging factor applied.
  4. Floodwalls:
    - a. For flow depths 1-foot or less, solid grouting is required.
    - b. For flow depths 1.5-feet or less, a County Standard Flood Wall may be used provided the criteria set forth for the flood wall is met.
    - c. For flow depths greater than 1.5-feet, a structurally designed flood wall is required.
  5. Half street valley gutters must be constructed to the future spandrel on the opposite side of the street.
  6. A completed **Standard Form 1** and the County minimum drainage criteria checklist signed and sealed by the engineer is required for each new submittal. Updates and amendments to approved drainage studies must have a completed **Standard Form 1** signed and sealed by the engineer. All submittals including addendums require a completed off-site submittal sheet.

### **Culverts and Bridges**

#### **1002.1.3 Minimum Size**

For rectangular shaped culverts, the minimum size shall be 6 feet in height and 8 feet in width.

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL



MUST BE TYPED

MUST BE TYPED

## FINISHED FLOOR ELEVATION CERTIFICATE

PERMIT # \_\_\_\_\_ DATE PERMIT ISSUED \_\_\_\_\_  
 ADDRESS \_\_\_\_\_ ASSESSORS PARCEL # \_\_\_\_\_  
 SUBDIVISION \_\_\_\_\_ LOT \_\_\_\_\_ BLOCK \_\_\_\_\_  
 OWNER OR BUILDER CONTACT \_\_\_\_\_ PHONE # \_\_\_\_\_

**This form must be completed by a Nevada-registered Land Surveyor or Civil Engineer  
 After the slab is poured and before any additional inspections.**

I hereby acknowledge that I have reviewed the approved grading plans stamped and signed by \_\_\_\_\_ and dated \_\_\_\_\_ and I certify the following:  
 (use stamp date)

According to the approved grading plans noted above, the elevation of the lowest habitable finished floor should be: \_\_\_\_\_ \* COH Bench Mark \_\_\_\_\_ Datum (29 or 88) \_\_\_\_\_

I also certify that the actual elevation of the lowest habitable finished floor (to the nearest tenth of a foot) is: \_\_\_\_\_ \* COH Bench Mark \_\_\_\_\_ Datum (29 or 88) \_\_\_\_\_

**\*Full elevation required; for example, 2045.8 not 45.8.**

(Note: The City of Henderson (COH) Bench Mark and Datum shown on the approved plans should be used for the actual elevation. If not available, explain below in comments)

Comment: \_\_\_\_\_  
 \_\_\_\_\_

Affix Seal  
 In the Space to the Right  
 Then Sign and Date

Firm Name: \_\_\_\_\_ Phone # \_\_\_\_\_ Fax # \_\_\_\_\_

Return this completed certificate to Public Works/Land Development  
 City Hall, 240 Water Street, Suite 210, Henderson, NV 89015  
 Phone: 565-2867, FAX: 565-5687

8/10/1999 REVISION

Revision	Date

**REFERENCE:**

**FIGURE 1601**