

# City of Humboldt

## 2014 Minimum Design Standards for New Development

Development of new areas requires the approval of the City Council. It should be clear to the Developer that the City wishes to be fully informed in regard to the proposed development prior to granting approvals for the Subdivision. To this end the Developer is requested to present his proposal to the City for study and advice prior to approval in principle of the subdivision and development.

Prior to any development taking place, the Developer shall submit a preliminary proposal of development to the City. The proposal shall include pertinent information as to standards of construction, requirements for capacity of water mains, sewer mains, roadways, street patterns, utility easements and other significant aspects relating to the proposed development.

The preliminary proposal shall include plans of the proposed development at a standard engineering scale (1:1000 typical). The following shall be included in the set of plans:

1. Existing Site Plan
  - Existing Contours
  - Site Features, Facilities, & all Utilities
  - Identify any demolition. (A separate demolition plan may be required.)
  - All property lines, right of way, lots & block #'s shall be clearly identified
2. Proposed Site Plan
  - Any proposed lots, blocks, & right of way, municipal reserves, buffer strips
  - All buildings, parking areas, access locations, and road ways
  - Transportation plan indicating roadway type.
3. Utility Plan
  - Site Plan with water, sewer, and any other utilities identified
  - Elevation data for sanitary sewer including rim & invert elevations.
  - Identify all discharge or tie in locations.
4. Grading Plan / Storm Management Plan
  - Site Plan with existing and proposed contours
  - All stormwater infrastructure including pipework, structures, and any attenuating areas
  - Critical elevation information including high points, drainage paths
  - Label effective grade points
  - Identify all discharge or tie ins locations
  - Sedimentation & erosion control measures
5. Any other information that is necessary to aid the City in assessing and considering the proposed development.

At such time as the City approves the Preliminary Report along with required revisions,

amendments or deletions, the Developer may proceed with the detailed design and preparation of plans and specifications for the development.

The Developer shall submit to the City four complete sets of plans and specifications for the proposed construction. No construction shall commence or be undertaken until the plans and specifications have been approved in writing by the City.

Prior to the commencement of the construction the Developer shall provide two permanent reference points in the Development Area. The elevation of each reference point shall be established to a geodetic datum. These reference points shall be available for use for all construction activities in the Development Area. They are the responsibility of the developer to maintain, protect, or replace.

All services to be installed by the Developer shall be installed in such a manner as to least interfere with the existing services and any cost incurred by the City on account of the installation of services by the Developer shall be charged to the Developer who will pay the City promptly for such expenditures incurred.

Upon completion of the construction the Developer shall submit to the City, two sets of prints and one cad drawing of the as-built works completed. These plans shall be in a form and to the detail required by the City.

#### **CLOSING OF ROADS FOR EXISTING FACILITIES**

Where the Developer is reasonably required to close any street or a part of a street within the City that is not within the Subdivision in order to construct or install any of the Developer's Services, the Developer may close the street upon providing reasonable notice to the City as set forth in the paragraphs below provided that any closure of any street or part of a street will be for the minimum time reasonably necessary to complete the Work and any street shall be restored to its prior condition.

The Developer shall provide the City with 10 days' notice of its intention to temporarily close any street or part of a street within the City that is not within the Subdivision in order to construct or install any of the Developer's Services, and shall further take all necessary safety precautions, including obtaining City approval, and ensuring the adequate warning of the closure of the street, during the time of such temporary closure.

Notwithstanding paragraph 0 above, where the street or part of a street within the City that is proposed to be temporarily closed is any portion of a provincial highway, as defined in *The Highways and Transportation Act, 1997* or provides continuity to a provincial highway and for which there is a plan on file in the Ministry of Highways and Infrastructure, the Developer shall in addition to the notice provided for in paragraph 0 above, provide the City with 30 days' notice of its intention to close the street so that the City in turn has sufficient time to give notice pursuant to s. 15(2) of *The Cities Act* (Saskatchewan) to the minister responsible for the administration of such Act of the proposed temporary closure.

#### **ROAD CROSSINGS**

Developed roads shall be returned to their original conditions. Where it is necessary to excavate

across an existing road or lane, excavations shall be backfilled and compacted to the satisfaction of the City.

## **STANDARDS**

Outlined herein are the standards intended to be the minimum standards for construction a new development. It shall be the developer's responsibility to ensure all works are constructed in accordance with City of Humboldt's standards and conform to best engineering and construction practices.

## **ROADS**

### **GENERAL**

All lanes shall be graveled and all streets paved. Concrete curbs and gutters, (and sidewalks) shall be constructed according to approved plans.

### **GEOMETRIC DESIGN STANDARDS**

- (A) Curb to curb width of all streets shall be determined by the City at the time application is approved.

Width of collector and arterial streets shall be as designated by the City.

- (B) GRADES

- Minimum gutter grades around curves shall be 0.50%.
- Minimum gutter grades straight sections shall be 0.30%.
- All roads shall be crowned on a slope of 3%.
- Surface drainage will be carried across streets at intersection in concrete swales.

- (C) STREETS

All streets shall be constructed as follows:

**SUB-GRADE:** remove organic or otherwise unacceptable sub-grade material replace with acceptable material compacted in 150 mm lifts to a minimum of 98% of the Standard Proctor Density. Top 150 mm of Sub-grade compacted to a minimum of 100% of Standard Proctor Density and graded to within 20 mm of final cross section and grade.

#### **BASE:**

- 1) Sub-Base: If needed; as directed by the Director of Planning and Engineering. Typically, 200mm of a good quality, well-graded pit-run gravel or sub-base material with a minimum CBR of 35 compacted to a minimum of 100% of the Standard Proctor.
- 2) Local Streets: 240 mm of crushed gravel base course with a minimum CBR of 65 compacted to a minimum of 100% Standard Proctor Density.
- 3) Collector and Arterial Streets: 200mm of a good quality, well-graded pit-run gravel or sub-base material with a minimum CBR of 35 compacted to a minimum of 100% of

the Standard Proctor. In addition to the sub-base, 240 mm of crushed gravel base course with a minimum CBR of 65 compacted to a minimum of 100% Standard Proctor Density.

#### **ASPHALT SURFACING:**

- 1) Local Streets: 60 mm of hot mix asphalt surface course with fog coat on the surface
- 2) Collector and Arterial Streets:
  - 75 mm of hot mix asphalt surface course with fog coat on the surface
  - Prime approved base surface with approved priming materials, prior to placing hot asphalt.
  - All hot mixed asphalt shall comply with the City of Humboldt, Hot Mix Asphalt Surface Course.
  - Aggregate to be type 71 gradation.
  - Asphalt binder to be 150-200A penetration.
  - Air voids in compacted mix to be 2 percent to 4 percent.
  - Density of finished pavement to be minimum 98 percent of Marshall Density.

#### **(D) LANES**

All lanes shall be constructed as follows:

- 150 mm compacted sub-grade
- 100 mm of crushed gravel base course with a minimum CBR of 65 compacted to a minimum of 100% Standard Proctor Density.
- Prime coat (if pavement is required).
- 50mm hot mix asphalt surface c/w fog coat. (if pavement is required)

#### **CONSTRUCTION ROADS**

Roads provided to new development areas that do not have sub-grade preparation and base gravel placed and approved by the Director of Planning and Engineering shall be considered a Construction Road. Construction roads shall have sufficient gravel to provide access to construction trades at all times. This road shall be posted by the Developer that it is a "Construction Zone - authorized personnel only, no public access" at all entrance points. The sign shall measure no less than 9 square feet and shall include the name and phone number of the land developer responsible for the construction of the road. Should the road become impassable as deemed by the Director of Planning and Engineering or Works and Utilities Manager, the road will be closed until once again deemed passable.

Construction zones will not be permitted to be opened without access to operational fire hydrants. No conditional development or conditional building permits will be issued for an area which there is no approved access via construction road. The water will not be turned on for any circumstance until the road bed is approved by the Director of Planning and Engineering and no person shall occupy the dwellings until the water is turned on.

## **CURBS AND GUTTERS AND SIDEWALKS**

- Curbs, gutters, and sidewalks shall be constructed on both sides of streets. All curbs, gutters, and sidewalks shall be constructed of poured-in-place concrete in accordance with the City of Humboldt Standards.
- Curb returns at street intersections shall have a minimum radius of 8.000 meters (measured along back of curb) or as required by the City.
- The minimum curb radius in crescents and cul-de-sacs shall be 12.000 meters.

### **CONCRETE**

Concrete for all sidewalk, curb and gutter construction shall have an air content of at least 5% and no more than 8% and shall have a minimum 28 day compressive strength of 32.0 MPa.

### **LOT DRAINAGE**

The Developer shall submit to the City an overall plan of the area to be developed on which shall be indicated the individual lots with the proposed grading of the lots. Rear lot grades shall be 100mm above design lane grade. Also indicated on this plan shall be the design sidewalk or top of curb elevations and the invert to elevation of the sanitary sewer connection at the property line. Front finished grade elevations are to be set at 450 mm above the design sidewalk or top of curb elevations.

### **EARTHWORK**

Detailed Earthwork Construction details are listed in section 2000 of the Construction Specifications. The developer shall match existing grades at the edge of their property.

### **TOPSOIL REMOVAL**

The topsoil shall be stripped from all road right-of-ways and lanes prior to construction of any utilities.

### **BACKFILL**

All utility trench backfill shall be compacted to a minimum of ninety-six (96%) percent of the Standard Proctor Density. The top 1 meter below subgrade must be compacted to a minimum of ninety-eight (98%) percent of the Standard Proctor Density when backfilling within the road right-of-way.

### **WATER DISTRIBUTION SYSTEM**

The water distribution system shall be adequate to supply the peak hourly demands or the peak day demands plus fire flows, whichever is greater. Fire flow requirements shall be as recommended by the Insurers Advisory Organization.

### **WATER MAINS**

- Minimum size of pipe shall be 150 mm inside diameter.

- Main sizes may be increased or decreased by the City at their discretion.
- Mains shall be located either within the roadway or boulevard and at least 2.0 meters horizontally from any proposed sidewalk, curb or other service structure.
- Mains shall be installed to provide a minimum depth of cover of 3.0 meters below final finished grade.
- Sand bedding 100 mm below the pipe and at half way up the pipe for the full trench width shall be provided on all mains.
- Pipe for water mains shall be AWWA-C900-81 PVC pipe complete with factory installed elastomeric gaskets, or as otherwise approved.
- Water mains shall be augured or tunneled under existing or future walks, curbs or swales.
- The ends of stub pipes shall be marked with a 38mm x 89mm wooden marker extending from the top of the stub pipe to a minimum 600mm above finished grade.

### **HYDRANTS**

- Maximum spacing of hydrants shall be such that the curb in front of any dwelling is no more than 120.0 meters from any hydrant, as measured along the traveled road surface.
- Hydrants shall be compression type of the same style and make as presently exists in the City (A442 Mueller WCUS Fire Hydrant with SS Bolting & Tyton Boot) and shall include:
  - Two (2) - 64mm hose nozzles and one (1) 114mm pumper nozzle.
  - Operating nuts and threads shall match existing hydrants in the City.
  - Hydrant leads shall be augured or tunneled under existing or future walks.
  - A 10.88kg (24 lb.) zinc anode shall be attached to hydrants.

### **VALVES**

- Valves shall be provided on the mains so that no more than three (3) valves are closed to isolate any one section of water main. Valving shall be provided such that only one hydrant is isolated at any one time.
- Valves shall be located at the extension of the street property lines at street intersections or as otherwise approved by the City.
- Valves on hydrant leads may be located in the roadway.
- Valves shall be iron body, be resilient seated gate valves conforming to AWWA C509-87, counter clockwise opening, with ends to suit the pipe.
- Valve boxes shall be complete with 25mm square solid steel operating extension stems, stone disc and operating nut with shirt.
- The top operating nut shall be within 300 mm of design grade.
- A 5.44kg zinc (12 lb.) anode shall be attached to valves.

### **WATER SERVICE CONNECTIONS**

- All pipes shall be installed in an augured excavation beneath all future sidewalks and curbs.

- Service pipe from the main property line shall have a minimum depth cover of 2.800 meters from finished grade.
- Service connections shall be located 3 metres from the front corner of the lot and 300mm outside the front property of the lot.
- Curb stops shall be located so that they do not conflict with driveways or sidewalks
- Water Service pipe shall be 25mm ASTM D2737 SDR 9 polyethylene tubing or otherwise as approved.
- Service boxes shall be set vertical with the tops at the sidewalk elevation. At the time of sidewalk construction, the letters “CC” shall be neatly marked into the concrete directly opposite each service box.
- Curb stop stem shall be stainless steel. Sacrificial anodes shall be installed on the curb stop box. The bottom 1.5 metres of the curb stop box wrapped with denso tape.
- The Works and Utilities Department must be contacted for assessment for any new service connection prior to installation or reuse of any existing service connection. Old connections that are not re-used will have to be cut off at the mains.

### **DUPLEX /MULTIPLE UNIT DWELLING CONNECTIONS**

The Public Works Department must be contacted regarding new service connection requirements prior to installation or reuse of any existing service connections. All semi-detached dwellings must have separate service connections to the mains for each dwelling unit. Any duplexes that may be subdivided at a future date will also require separate connections to the mains for each unit. Old connections that are not re-used will have to be cut off at the mains.

Multiple unit dwellings with individual meters for each dwelling unit must provide a separate heated meter room. A key must be provided to the City to access this room for meter reading and for the turning on and off of each individual meter as necessary. Individual meters will not be installed within dwelling units. Multiple unit dwellings with one meter for the entire building will not be billed individually.

### **CURB CONNECTION AND DRIVEWAY LOCATION**

If Driveway placement is required above the utility services, including curb stop, the contractor or homeowner must

- Contact Public Works and Utilities at least 48 hours prior to installing the driveway and have the curb stop tested.
- Any inspection chambers, cleanouts, or curb stops, must be inspected and repaired prior to installation of any driveway.
- The contractor or homeowner is responsible for any damage or repairs necessary, unless they are a warranted item from the original underground installer.
- The contractor or homeowner must install an approved curb stop protector box. These can be purchased from Public Works and Utilities.
- Driveways and Access geometry must conform to the Zoning regulations and comply with established accepted Transportation Standards (TAC).

## **TESTING**

Testing of the water distribution system shall be carried out after the service connections are installed according to AWWA Specifications. Leakage testing shall be carried out to a pressure of 1035 kPa.

Provide chlorine residual and bacterial testing results.

## **SANITARY SEWAGE COLLECTION SYSTEM**

The sanitary sewage collection system shall be of a sufficient capacity to carry peak hourly sewage flows plus infiltration.

### **SEWER MAINS**

- Minimum size shall be 200mm diameter.
- Main sizes may be increased by the City as considered necessary.
- Sewer Mains shall be PVC sewer pipe conforming to ASTM D3034, DR35 or as otherwise approved.
- Mains shall be located within the roadway or boulevard and at least 2.0 meters horizontally from any proposed sidewalk, curb or other service structure.
- Mains shall be installed to provide a minimum depth to invert of 2.8 meters from finished grade. Shallower pipes shall require the approval of the City.
- Pipes shall be bedded in sand from 100 mm below the pipe halfway up the pipe for the full trench width. Improved foundations shall be provided where soil conditions require same.
- Sewer mains shall be augured or tunneled under existing or future walks, curbs or swales.
- The ends of stub pipes shall be marked with a 38mm x 89mm wooden marker extending from the top of the stub pipe to minimum 600mm above finished grade.

### **MANHOLES**

- Manhole bodies shall be of pre-cast concrete sections with a minimum inside diameter of 1050 mm.
- Manhole steps shall be of steel safety steps galvanized after fabrication.
- Frames and covers shall be of cast iron and asphalt dipped. Norwood F-39 or as otherwise approved.
- Maximum spacing between manholes shall be 110 meters.

### **SEWER SERVICE CONNECTIONS**

- All pipes shall be installed in an augured excavation beneath all future sidewalk and curbs.
- Service pipe at the front property line of each lot shall have a minimum depth of 2.8 meters below final lot grade.
- Service pipe shall be of a minimum of 100 mm diameter.
- Service pipe shall be of PVC or as otherwise approved.



- Service pipe shall be connected to the sewer main with an approved saddle.
- The Works and Utilities Department must be contacted for assessment for any new service connection prior to installation or reuse of any existing service connection. Old connections that are not re-used will have to be cut off at the mains.

## **DUPLEX /MULTIPLE UNIT DWELLING CONNECTIONS**

The Public Works Department must be contacted regarding new service connection requirements prior to installation or reuse of any existing service connections. All semi-detached dwellings must have separate service connections to the mains for each dwelling unit. Any duplexes that may be subdivided at a future date will also require separate connections to the mains for each unit. Old connections that are not re-used will have to be cut off at the mains.

Multiple unit dwellings with individual meters for each dwelling unit must provide a separate heated meter room. A key must be provided to the City to access this room for meter reading and for the turning on and off of each individual meter as necessary. Individual meters will not be installed within dwelling units. Multiple unit dwellings with one meter for the entire building will not be billed individually.

## **STORMWATER MANAGEMENT SYSTEM**

### **DESIGN METHODOLOGY**

The stormwater management system shall be adequate to restrict the peak post-development stormwater runoff rates to predevelopment rates or to the capacity of the infrastructure downstream from the development; whichever is smaller.

The hydraulic sizing of drainage and conveyance structures in urban areas always requires estimation of peak flow rates. Peak flow is the maximum rate of flow passing a given point during or after a rainfall event. Historically, the Rational Method is the most widely used method of estimating the peak runoff rates for the design of urban drainage systems. Alternative modelling methods may be allowed pending approval from the City of Humboldt.

The Rational Method is based on an empirical formula relating the peak flow rate to the drainage area, the rainfall intensity and a runoff coefficient. The Rational formula is:

$$Q = 0.0028 C I A \text{ (m}^3\text{/s)}$$

#### Where

Q = peak runoff rate

C = dimensionless runoff coefficient

I = rainfall intensity for a duration that equals time of concentration (tc) of the basin (mm/hr)

See figure 1 below for more information.

A = basin area (hectares), and

tc = time of concentration for the basin for the particular event (min).

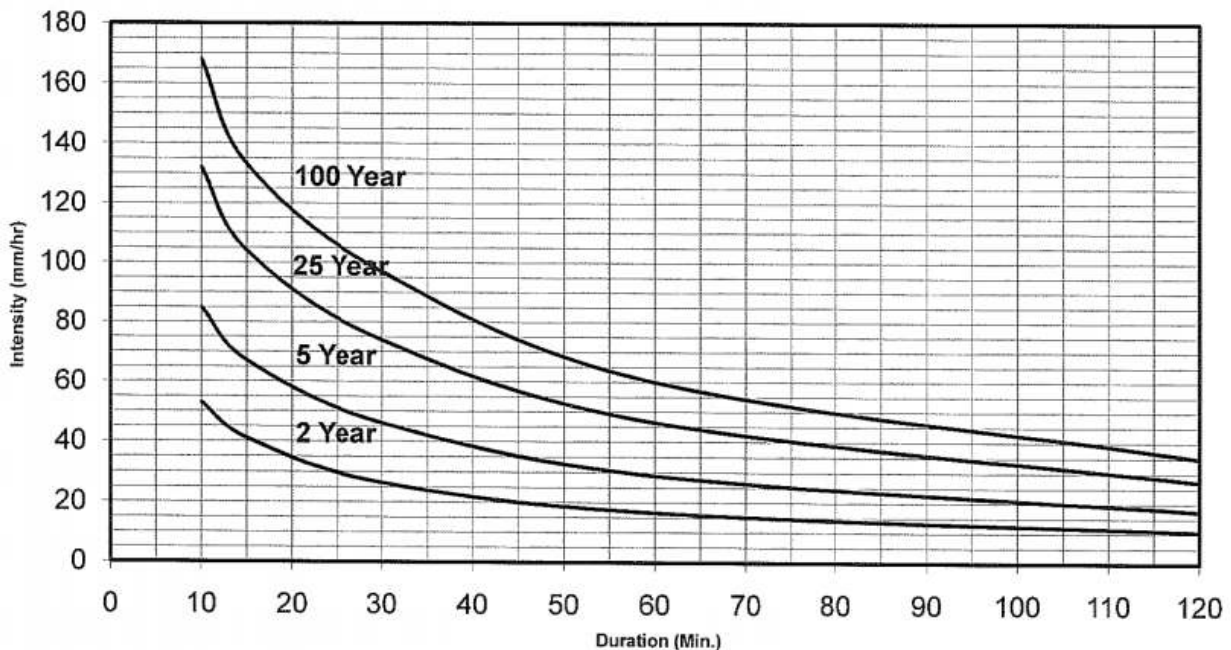
The fundamental assumptions underlying the Rational Method are:

- The rainfall intensity is constant over a period that equals the time of concentration of the basin;

- The rainfall intensity is constant throughout the basin;
- The frequency distribution of the event rainfall and the peak runoff rate are identical (this assumption is true for all event-based computations);
- The time of concentration of a basin is constant and is easily determined; and
- The runoff coefficient is invariant, regardless of season of the year or depth or intensity of rainfall.

Typically, rainfall intensities are determined from Intensity-Duration-Frequency curves (IDF curves) or Depth-Duration-Frequency curves (DDF curves). These are plots of rainfall intensity (or depth) versus duration of event rainfall. The runoff coefficient  $C$  varies with the type of development proposed for the site. As the impervious area increases, the runoff coefficient will increase.

Figure 1  
Intensity-Duration-Frequency (IDF) Curves  
University of Saskatchewan and Saskatoon Airport  
1926 to 1986 (61 years)



## STORMWATER PIPING

Minor storm networks shall be designed for 1:5 year 1 hour events, while major storm networks without stormwater detention shall be designed for 1:100 year 1 hour events. The minor systems consist of drainage works that transport flows from a catchment during minor rainstorms. The major systems consist of drainage routes that transport flow during major storm events.

## STORMWATER DETENTION SYSTEMS

Stormwater detention systems shall be designed such to minimize runoff during small rainfall events, and shall have capacity to store surcharge water due to peak runoff restrictions as stated above. Stormwater detention systems shall be designed for 1:100 year 24 hour events.

### **Wet Ponds**

Wet detention ponds are stormwater control structures designed to retain and treat the contaminated stormwater runoff. Although there are several different versions of the wet pond design, the most common design is the extended detention wet pond where adequate storage is provided above the permanent pool in order to detain storm water runoff and provide settling. Runoff from each rain event is detained and treated in the pond until it is displaced by runoff from the next storm. Sedimentation processes remove particulates, organic matter and metals, while nutrients are removed through biological uptake

#### ***Design Guidelines for Wet Ponds***

Minimum drainage area	5 hectares
Runoff detention time	< 24 hours
Side slopes above permanent pool	4:1 to 5:1.
Side slopes in permanent pool	5:1 to 7:1
Length to width ratio	4:1 to 5:1

### **Dry Ponds**

Generally, dry ponds should be implemented if wet ponds cannot be implemented due to site or planning constraints. The design guidelines for dry ponds are presented below.

#### ***Design Guidelines for Dry Ponds***

Minimum drainage area	5 hectares
Runoff detention time	up to 48 hours
Side slopes	4:1 to 5:1
Length to width ratio	3:1 to 5:1

Dry ponds may be used for Municipal Reserve at City's discretion, only if detention time is less than 24 hours.

### **Other Storage Methods**

The developer may propose alternate storage methods to the City of Humboldt. Approval of the proposed storage method will depend on if it meets standard engineering practices and is located in such a location that it is accessible for maintenance.

### **GAS, POWER, TELEPHONE SERVICES AND STREET LIGHT INSTALLATION**

Installing gas, power, street light, telephone and television cable services shall be arranged between the Developer and the respective utility/service companies. The Developer shall pay costs for these services. The City shall approve the utility design and locations.