

City of Hamilton

Public Works Standards

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PART I GENERAL PROVISIONS

10.01 PURPOSE

- .01 Establishment of Minimum Standards This Public Work Standards Manual, based upon sound, practical and well-established principals of civil engineering, is prepared for the purpose of adopting minimum standards for the design of improvements, kind and use of materials, methods of construction, and the preparation of plans for construction, repair or alteration of streets, roadways, alleys, drainage, sewer, or water facilities which lie within municipal's right-of -way or easements.

The minimum standards required herein supplement the City of Hamilton Municipal Code, particularly Title 12 “Streets, Sidewalks and Public Places”; Title 13 “Public Services”; Title 15 “Buildings & Construction”; and Title 16 “Subdivision”.

- .02 Uniformity of Engineering and Construction Practices. This Design Standards Manual is established to promote the minimum uniformity of engineering and construction practices within the community and thereby should reduce design, supply, construction and maintenance costs.
- .03 Adherence to Standards. It will be the policy of the Department of Public Works to require adherence to the Standards set forth herein; however, where unique circumstances or design considerations make it impractical to follow the Standards and where such adherence would actually create problems detrimental to the public interest, **the Department of Public Works, with consent of City Council, will consider alternate solutions and may approve departures from Standards when substantiated by engineered design analysis.**

10.02 ADOPTION OF STANDARD SPECIFICATIONS

- .01 The City of Hamilton in establishing this set of DESIGN STANDARDS by Ordinance # 826 supplements the Montana Public Works Standard Specifications, latest edition, addendums and all future revisions and updates.
- .02 The City of Hamilton DESIGN STANDARDS provides for modifications, revisions or additions to the Montana Public Works Standard Specifications. These modifications, revisions or additions shall in all cases either govern over the original standards where applicable, or shall work in conjunction with the original standards where applicable.

10.03 SUPPLEMENTAL GENERAL CONDITIONS

- .01 Public Works Standards. Copies of these Design Standards may be obtained from:

City of Hamilton
Department of Public Works
920 New York Avenue

Hamilton, MT 59840
Telephone (406) 363-6717 Fax (406) 375 - 1470

- .02 Montana Public Works Standards. Copies of the latest Montana Public Works Standard Specifications and Addendums may be obtained by writing:
- The Montana Contractor's Association, Inc.
1717 11th. Ave
P.O. Box 4519
Helena, MT 59604
Telephone (406) 442-4162 Fax (406) 449 - 3199
- .03 Topographical Hardships. In some locations, compliance with these standards may impose a hardship due to existing development or unusual topography. In these locations, the Director of Public Works, with consent of City Council, may accept alternate standards.
- .04 Scope. These standards shall apply to all improvements within the public right-of-way, to all improvements within the proposed public right-of-way of new subdivisions, for all improvements within easements intended for maintenance by the City, and for all other improvements for which the City requires approval from the Director of Public Works.
- .05 Standard Specifications. The Montana Public Works Standard Specifications and these Public Works Standards have been adopted by the City of Hamilton. These standards must be used in the design and construction of improvements intended for public use and/or maintenance in the City of Hamilton. Where improvements are not covered by these design standards nor by standard drawings, the Director of Public Works shall establish the appropriate standards with consent of City Council.
- .06 Project Plans. Plans for public improvements shall be submitted on sheets not larger than 24x36 inches. In general, a minimum horizontal scale of 1 inch equals 40 feet is preferred for plans of proposed improvements in the public right-of-way. Plans will include all existing or new utilities located within the proposed construction area.
- .07 Engineer Certification of Plans and Test Results. Design plans and final as-built plans for improvements in the public right of way shall bear the stamp and signature of an engineer licensed to practice in the State of Montana. The designer shall submit calculations or other appropriate materials supporting the design of utilities, pavement, and storm drainage. The designer shall submit calculations for structures and other designs when requested by the Director of Public Works. All test results will be reviewed and certified by a licensed engineer.
- .08 Licenses. Construction in the public right of way must be by a contractor licensed in the State of Montana and furthermore, any construction within the city limits by a contractor requires a City Business License. Contractor shall also maintain a bond on file with the City for any work done for the City or within City right-of-way.

- .09 Permits. Any construction within the public right-of-way, and all water and sewer service line installations or repairs, requires a Public Works Permit available from the Department of Public Works. Applications for Public Works Permits must be completed; fees paid, and approved at least 24 hours prior to beginning construction activities.
- .10 Traffic Control and Work Zone Plan. A Traffic Control and Work Zone Plan are required for all construction activities affecting the public right-of-way. Traffic Control and Work Zones Plans, when required, shall be submitted for review and approval with the Public Works Permit. Montana Department of Transportation requires an Encroachment Permit and Traffic Control Plan for any work within or adjacent to MDT rights-of-way that may impact traffic. All excavation work affecting public right-of-way and its traffic will have safety features such as barricades, orange cones, road closed signs, detour signs, and/or flaggers as needed. All utility trenches or excavations shall have barricades around them to keep the public away from the excavation.
- .11 Pollution Controls and Trackout.
- Air: A Dust Control Plan is required for all construction sites to control dust and dirt to avoid the introduction of particulate matter into the air using water and other methods. The plan is required for any utility, street, demolition, or construction within the city limits.
- Water: No runoff containing sediment shall be permitted to flow off any construction site. Sediment shall not discharge into storm drainage systems, waterways, or wetlands. Plans and specifications will include type and location of temporary erosion and sediment control barriers that the contractor will provide and maintain. All drains will be protected by sufficient diameter erosion control wattles or other devices. The control barriers shall not be removed until paving and stable landscaping and vegetative cover has been completed.
- Tracking of Public Streets: All construction and/or building site approaches onto public streets may be required by the City to have a vehicle tire cleaning area consisting of 1 ¼ ” mechanically crushed rock wide enough to clean tires or an approved equal. All vehicles entering and exiting the site shall do so on the tracking control approach. All public streets shall be kept free of mud, dirt, and rock from the construction or building sites. Contractor shall be responsible for cleaning streets daily with sweepers, water trucks, or other approved methods.
- .12 Fencing. Portable fencing shall be required around building sites during demolition of existing facilities and construction of commercial facilities or residential units greater than 2,000 square feet to protect the general public.
- .13 Demolition: Materials from demolition must be removed from the site within three weeks of demolition starting. Extensions can be granted by the Public Works Director with proper justification.

- .14 Meeting Regional Needs. All public improvements shall be designed as a logical part of the development of the surrounding area. Storm sewers and sanitary sewers shall be sized to accommodate the entire drainage basin served by the utility. Water mains shall be designed to provide distribution and looping to adjoining systems. Collector streets will be developed to the extra width in accordance with the Standard Drawings Section 20.04.005. Utilities and street improvements will be extended to the boundaries of the development for future extensions to adjoining areas. The Director of Public Works may require over-sizing of utility lines to accommodate future growth of the City.

Where existing City utility lines do not adjoin the proposed development; the developer will be required to extend the lines to the development as necessary. Where the existing roadway improvements do not extend to the proposed developments; the developer may be required to improve the roadway to the development. These extensions will be no cost to the City except as detailed below.

- .15 Recovering Costs. When the improvements serve adjoining properties (e.g. extensions of existing utilities or improvements along the boundary of the development) a portion of the cost can be recovered from owners of the adjoining property by one of the following methods.
- A. A private agreement between the various property owners;
 - B. A Sewer/Water Extension Agreement, requiring owners of adjoining property to pay an equitable share of the costs in the future at the time they connect to the improvements (require City Council approval for formation of a reimbursement), as negotiated by the Director of Public Works.
 - C. A Special Improvement District (SID), which authorizes the City to make the improvements and to distribute the costs to the benefitted property (requires City Council approval). The SID must be established in accordance with Title 7, Chapter 12, M.C.A.
- .16 City Participation in Cost. If the Director of Public Works determines that proposed public improvements should be over-sized for the purpose of meeting regional requirements and are not required for the proposed Project; the City may elect to require and cover the cost of the following items:
- A. Water lines, valves and associated materials in excess of 8" in diameter;
 - B. Sanitary sewers in excess of 8" in diameter;
 - C. Storm sewers in excess of 12" in diameter;
 - D. Street widths in excess of 38' (back of curb to back of curb);
 - E. Collector street pavement structural sections in excess of minimums shown in Standard Drawings.

The City's share of the cost of over-sizing will be based on the extra material costs caused by over-sizing. The City's share of materials cost will be determined by the Director of Public Works on recent bids received by the City, price quotations from reputable suppliers, and similar impartial information. Any agreement by the City to share the costs of over-sizing is subject to the availability of City funds, must be in writing, and must have the prior approval

by resolution of the City Council. Any work completed prior to City Council approval of an agreement will not be eligible for City payment of over-sizing.

- .17 Deferred Construction. When projects are located remote to existing roadway improvements, portions of street work may be deferred to a later date to allow more orderly construction of a complete project. The developer will be required to provide security for the estimated cost of deferred work in an amount and form approved by the City Council.
- .18 Special Improvement Districts. The Director of Public Works may determine that required improvements for a development will be better installed as part of a regional or neighborhood improvement and that improvement may be funded by a future Special Improvement District (SID). The Director may accept from the property owner a Consent to Agree to the Formation of Special Improvement District, in lieu of construction of that improvement prior to approval of the development. This form can be obtained from the Public Works Office.
- .19 As Built Drawing. A developer shall provide to the City on AutoCAD, version 2010 or later, a CD Rom and a .pdf file on CD with all of the projects "As Built Documents" as well as 3 printed copies. All documentation shall be given to the City 30 days before acceptance is expected. As built drawings and all test documentation and certifications shall have an Engineer's certification. Developer will also provide survey control and control point files.
- .20 Final Plat Maps. A developer shall provide the City on AutoCAD, version 2010 or later, and .pdf file on a CD Rom with Subdivision final plat maps and drawings as well as one printed copy. All documents shall be given to the City 30 days before acceptance of final construction within the subdivision. Additional printed final plat maps may be required as specified in the Subdivision Regulation.
- .21 Warranty. Developer will provide a warranty for **one year** on all labor, materials and workmanship, from the date of acceptance of the improvement by the City. For excavation areas within the City right-of-way, the Contractor is responsible for maintaining and repairing any and all defects or failures, including settling and pavement failures, for a period of **one year**. If the contractor fails to make such repairs, the City will have the repairs performed and charge the Contractor the cost of repairs.

PART II DESIGN CRITERIA**20.01 WATER SUPPLY IMPROVEMENTS**

- .01 Design Domestic Flows. Water mains shall be designed in accordance with "Circular DEQ-1, Standard for Water Works" published by the State of Montana Department of Environmental Quality. Water mains shall be sized to provide a domestic peak day flow of 967 gallons per day per EDU, with a typical single family residence being 1 EDU. Design flows are based on the most recent Water Facilities Master Plan. The number of dwelling units used for design shall be consistent with existing development and the zoning of undeveloped land. Alternate design bases may be used if justified by the designer.

In non-residential areas, water lines shall be sized to serve developments which can be reasonably expected in the areas based on zoning and topography using the most recent factors and tables in the Water Facilities Master Plan.

- .02 Design Fire Flows. For design purposes, minimum fire flows shall be 1250 gpm in low and medium density residential areas, 2500 gpm in commercial and high density residential areas, and 3500 gpm in industrial areas for a fire event of 2 hour duration. The design shall provide for the system to provide the minimum fire flow at each fire hydrant, assuming one hydrant flowing at any given time and a minimum pressure of 20 psi.

Where special conditions exist, greater or lesser design fire flows may be approved by the Fire Chief for new and existing buildings.

- .03 Design Pressure. Water systems shall be designed to provide a minimum pressure of 40 psi and a maximum of 90 psi, with no fire flow. With fire flow, a minimum pressure of 20 psi in all areas. Pumping stations and pressure reducing valves may be required to meet these requirements. Pipes shall be specified to withstand the maximum test pressures but in no case shall pipes be classed less than 150 psi. The designer should contact the Director of Public Works for information on the pressure zones and water supply available for the area.

- .04 Valves. Water valves on mains shall be resilient wedge gate valves which meet the latest American Water Works Association standards. Generally, valves will be located so that a water line can be shut off without eliminating service to more than 20 homes or eliminating service to more than one fire hydrant.

- .05 Minimum diameter. Water mains for public maintenance shall have a minimum diameter of 8 inches.

- .06 Water lines near sewer lines. Water lines shall be a minimum of 10 feet from any sewer line or manhole in parallel configuration and a minimum of 18 inches vertical separation will be required for any lines crossing sewer lines, including service lines. Water mains shall be 10 feet from any storm drain sump to prevent freezing.

- .07 Line Valves in distribution line. A minimum of three valves shall be installed at a "cross" intersection. A minimum of two valves shall be installed at a "Tee" intersection. The valve configuration shall be approved by the Director of Public Works.
- .08 Hydrant Spacing. Fire hydrant spacing shall not exceed 500 feet measured along the curb line in areas zoned for residential and shall not exceed 450 feet in other areas. The Fire Chief may require additional hydrants in accordance with Uniform Fire Code. All hydrants will have secondary valves, located at least six feet from the hydrant barrel. Hydrants shall be readily accessible from a paved street or parking area and be installed with a Mueller Hydrant Defender and stainless steel barrel lock keyed for the City of Hamilton (or approved equal).
- .09 Blow-off Valves. A blow-off valve or a fire hydrant must be located within 20 feet of the end of any dead-end water main including temporary dead-end mains in phased developments. Blow-off valves and their location shall be as approved by the Director of Public Works.
- .10 Air Relief Valves. An air relief valve will be required at the high point of each water main. Pipe grade design shall minimize the use of air relief valves wherever possible.
- .11 Extensions. The property Owner is responsible for extension of the water main across the full frontage of his/her property to provide for orderly development of the City.
- .12 Easements. Where water mains and/or fire hydrants are constructed outside of existing public right-of-way, easements will be required. The easements for maintenance of lines must have a minimum width of 20 feet, 10 feet either side of the main. Easements must be dedicated to the City prior to final project acceptance. Private utilities such as electric, gas, telephone, and cable TV shall not place their utility lines in water or sewer main trenches but must be placed at least 5 feet away to allow access to the mains.
- .13 Minimum Cover/Trace Wire. Water lines shall have a minimum cover of 6 feet from finished grade. Less cover with insulation may be approved by the Public Works Director. All water mains will include #14 stranded copper trace wire brought to the surface on valve boxes. Three-inch wide detectable tape marked "WATER" shall be installed two feet below finished grade along the alignment of the new pipe and attached to all valve box risers.
- .14 Private Water Wells. Any new or improved private water well requires a permit from the City of Hamilton Public Works Office in accordance with Section 13.04.200 of the Municipal Code and will not be connected to any city water systems.
- .15 List of Standard Materials. A list of standard water supply materials acceptable to the City is given below:

- A. Gate Valve:** Mueller Resilient Wedge Gate Valve, A2360-20
East Jordan Iron Works RW Valve
- B. Butterfly Valve:** Mueller Butterfly Valve B3 211-20, min. 150 psi
- C. Tapping Valve:** Mueller Resilient Seat Tapping Valve A-360-16
Mueller Resilient Wedge Gate Valve A2360-19
- D. Tapping Saddle:** Powerseal Stainless Steel Model 3490AS or 3490 AS *mj*
Romac "S ST III" Stainless Tapping Sleeve or
Mueller stainless steel style H304
- E. Valve Boxes:** Tyler 6860 Series "DD" or SIGMA, screw type, #6 base for water
Tyler 64-A and 65-B Solid Sleeve Ductile Iron
- F. Corporation Stops:** Mueller B-25005 - 3/4", 1", 1 1/2", and 2" cc x inst.
All repair items to be Mueller.
All service fittings to be Mueller.
- G. Service Saddles:** Mueller SS Series Stainless Steel, 3/4", 1" 1/2", and 2" taps
Romac Model 306 - 2" to 12" PVC, 3/4" and 1" taps PVC
Romac Model 101S for OD steel
- H. Service Pipe:** Main to Building
PE Pipe (IPS) SDR7, 3/4", 1", 1 1/2", and 2"
- I. Curb Stop:** Mueller H-15156, 3/4" and 1" IPS Poly, inst. x inst.
Mueller B20287, 3/4", 1", 1 1/2", and 2"
All repair items to be Mueller.
All service items to be Mueller.
- J. Curb Boxes :** Mueller H-10300 Minneapolis pattern extension box or AYM 5600
Series w/ pentagon plug and nut with 1 1/4 inch upper section
- K. Joint Restraint:** Megalug with concrete thrust blocks
EBBA Series 2000 for AWWA C900 or IPS PVC Pipe or equal
EBBA Series 1100 for Ductile Iron Pipe or equal
- L. Fire Hydrant:** Mueller Super Centurion 250, 5-1/4", 3-way Aqua Grip
East Jordan Iron Works WaterMaster 5CD250N.
- M. Water Meters:** to be supplied by Department of Public Works
- N. Meter Pits:** Mueller Model Inline Thermal Coil for 3/4" and 1" pits
Mueller Model EZ-VAULT for 1-1/2" and 2" services
- O. Backflow Preventers:** All new construction for 3/4" and 1" services
Dual Check Valve: 3/4" – McDonald Model 11-3NA-44
WATTS #007 1" or 2"
3" and larger back flow prevention assemblies to be
approved by the DPW.
- Reference Manual of Cross Connection Control, 9th Edition, by the Foundation for Cross
Connection Control and Hydraulic Research, University of Southern California.*
- P. Distribution Main:** Ductile Iron, AWWA C151 or AWWA C900 PVC
Minimum Pressure Class 150
(Pipe larger than 12 inches shall meet AWWA C905 standards)

- Q. Resetters:** McDonald Meter Resetters Series 18-4, 5/8" x 3/4"
1" – McDonald Model 18-4-10-XD
Larger sizes to be approved by the DPW.
- R. Repair Clamps:** Large Sizes - Smith Blair full circle clamp coupling
Series 200 or Romac Style SS1
Mueller Style 221 pipe repair clamp, 3/4" to 2"
- S. Couplings:** Large Sizes - Romac Style 501 or Smith-Blair Omni
coupling system Series 441 or Hymax coupling
Smith-Blair compression couplings, 3/4" to 2"

Any non-standard materials to be approved by Director of Public Works.

- .16 Service lines: Services will be stubbed to property lines for access by the property owner without further opening of the Street. Locations will be approved by DPW. All service lines must have a #14 stranded copper trace wire installed with the service line and brought to the surface at the curb valve riser box. Water service lines shall have a minimum of 10 feet horizontal separation in parallel or 18 inches vertical separation when crossing from sewer service lines. Structures containing two or more residences under separate ownership, such as condominiums or town house, shall have separate water and sewer service lines, meters, and valves, for each residence.
- Abandoned service lines will be disconnected and capped (abandoned) at the corporation valve at the main.
- .17 Tapping city water. The City of Hamilton Public Works Department water technicians shall tap all water mains. Preparations for exposing and preparing the water main for tapping and scheduling for the City to make the tap are the responsibility of the owner or contractor. The water department can be contacted at 406-363-6717 for scheduling and a minimum of 72 hour notice is required. Materials for tapping and stubbing out the 2 inch and smaller service lines shall be provided by the City with costs included with the Public Works Permit. Materials include tapping saddle with incorporation valve, curb stop valve with riser, and meter pit with meter.
- .18 Meters. Water meters shall remain the property of the City. The City Public Works Department shall maintain meters installed in meter pits located within city right-of-way. Meters in pits located within private property and those located within or under the residence or commercial building shall be installed or removed by a licensed plumber but maintenance or testing will be performed by the water department. Replacement meters shall be provided by the City. If the meter was damaged by lack of protection from frost or damage from activities of the owner, the cost of the meter will be reimbursed to the City. Additional information on meters can be found in Hamilton Municipal Code Section 13.04.160.

20.02 SANITARY SEWER IMPROVEMENTS

- .01 Design Capacity. Sanitary sewers shall be sized to carry the design volumes when flowing full. In residential areas, the design volume shall be based on 100 gals. per capita daily, 2.5 persons per dwelling unit, and a number of dwelling units consistent with existing uses and the proposed development and zoning. In other areas, the design volumes shall be calculated based on the development which can be reasonably expected in the area according to the City of Hamilton 2006 Wastewater Facilities Plan. Sanitary sewer shall be designed in accordance with "Circular DEQ 2 Standard for Water Works" published by the State of Montana Department of Environmental Quality.
- .02 Extensions. The property Owner is responsible for extension of the sewer main across the full frontage of his/her property to provide for orderly development of the City.
- .03 Easements. Where sewers run outside an existing public right of way, easements will be required for public maintenance. Such easements shall be a minimum of 20 feet in width, 10 feet either side of the main. Easements must be dedicated to the City prior to final project acceptance. A standard form Public Utility Easement must be used and can be obtained at the Public Works Building.
- .04 Minimum Cover. Sewers shall have a minimum cover of 4 feet without appropriate measures taken to prevent freezing. Sewer service lines shall have #14 stranded copper tracer wire brought to the surface at the cleanout. Services shall have a cleanout outside the building with additional cleanouts installed if the service line is longer than 100 feet or if there are more than 135 degrees of turns from the building to the main. Each turn will be restricted to a 45-degree elbow or sweep.
- .05 Septic effluent. Septic effluent will not be allowed.
- .06 Grease Interceptors. As required by Section 13.12.320 of the Municipal Code shall be constructed per Standard Drawing No. HC-20.02.002. As required by paragraph C of the referenced section, grease interceptors in commercial facilities in B, B1, B2, or CM zoned areas will include a filter and alarm. The filter will be a Polylok PL 625 Effluent Filter or approved equal. Filters and alarms in facilities outside the commercially zoned areas will be at the discretion of the Public Works Director.
- .07 Oil and Sand Separators. As required by Section 13.12.320 of the Municipal Code shall be constructed per Standard Drawing No. HC-20.02.003.
- .08 Lift Stations.
- A. All new sewage pumping stations shall be above ground, self priming, suction lift type or below ground equipped with submersible pumps and the pumps shall be **equal to** that manufactured by the Gorman Rupp Company, and/or approved by the Director of Public Works.
 - B. All sewage pumping stations shall be equipped with a submersible transducer control system as approved by the Director of Public Works.

- C. All new sewage lift stations shall be equipped with a backup, redundant level control system.
 - D. All new pumping Stations shall be powered by 460 volt, three phase power unless another source is approved by the Director of Public Works.
 - E. All new pumping stations will include emergency power generator with automatic transfer switch, standard muffler, block heater, and liquid-cooled diesel powered engine.
 - F. All new pumping stations shall be equipped with an alarm system detecting unauthorized entry, power interruption, high water, and high pump temperature conditions.
 - G. All new pumping stations shall be equipped with an electro-magnetic flow meter with 4-20ma output signal, flow totalizer, and chart recorder and/or electronic recorder.
 - H. All new pumping stations shall be equipped with SCADA telemetry system fully compatible with the City's system and as approved by the Director of Public Works.
 - I. Wetwells will be waterproofed using waterproofing criteria for concrete outlined in Addendum A and tested for permeability using the vacuum test as outlined in Addendum B in this standard. Xypex or equal shall be used for waterproofing.
 - J. Wet well joints shall have Conseal 102 gasket seal (or approved equal) and Conwrap 213 (12 inch wide) (or approved equal) external joint wrap on all joints and inlets will include A-Lok flexible gaskets cast into the wet well wall.
 - K. Spare pump and motor with cable and spare parts for critical components will be provided.
- .09 Manholes. The maximum spacing will be 400 feet between manholes per DEQ Circular 2 for 15 inch mains or less, 500 feet for all others. Dog house manholes will not be allowed. Service line taps into manholes will not be allowed.
- .10 Service lines: Services will be stubbed to property lines for access by the property owner without further opening of the Street. Locations will be approved by DPW. Sewer service lines shall be a minimum of 10 feet horizontal separation and 18 inches vertical separation from water service lines.
- Abandoned service lines will be disconnected and capped or plugged at the main such that the cap or plug will show when videoing the main and "looking up" the service line.
- .11 List of Standard Materials: A list of standard sewer system materials acceptable to the City is given below:
- A. Collection Main: 8" minimum
8" to 21", SDR35 PVC, ASTM D-3034, or HDPE
Force main-PVC Class 200 SDR 21, ASTM 224, or HDPE
 - B. Manholes: Precast concrete meeting ASTM C478 including mandatory rejection requirements.
 - C. Rings and Lids: Inland Foundry Model 777, solid cover with Hamilton City logo (EJ3777C)
 - D: Service Saddles: DFW/HPI flexible saddle
 - E: Service Pipe: Main to Building - 4" minimum for residential, 6" commercial
Schedule 40 PVC, ASTM D 1785
 - F. Service Tee: SDR35 tees

Any non-standard materials to be approved by Director of Public Works.

- .12 Testing. All new sewer mains and those services within the public right-of-way shall be pressure tested with air per MPWSS Section 02730 (3.4.E). All manholes shall be vacuum tested per ASTM C1244-93. Mandrel and lamp test are also required.

- .13 TV Inspection. All new sewer mains will be cleaned and videotaped by the installer. Video inspection will be done with water in the line to visually indicate sags and bellies. There will be a footage counter and services will be noted. There will be a written inspection report indicating services, defects and other items of note.

- .14 Ditch Cards. All new sewer connections to the sewer main will have a ditch card created and filed with the Department of Public Works. Ditch Card form and example are shown in Appendix B and are available from the Public Works office.

- .15 Sewer lines near water lines. Sewer lines shall be a minimum of 10 feet from any water line in parallel configuration and a minimum of 18 inches vertical separation will be required for any lines crossing water lines, including service lines.

20.03 DRAINAGE IMPROVEMENTS.

- .01 GENERAL. All developments being constructed within the City of Hamilton shall be protected from drainage problems by the use of proven engineering techniques as set forth and described hereinafter. Problems resulting from natural waters such as creeks, springs, and groundwater, from storm water runoff, from winter icing accumulations, from spring breakup waters, and from existing irrigation ditches, will be considered in determining the necessary drainage improvements that will be required for any specific project.
- .02 TYPES OF REQUIRED IMPROVEMENTS. The following improvements, if based on or designed in accordance with proven engineering techniques, are viable alternatives which may be used in solving drainage problems: Placement of proper drainage easements or reserves, construction of subsurface storm drains, open channels, placement of culverts, construction of temporary storage areas, construction of sub-drains, constructions of dry wells, construction of chamber systems, construction of metering basins, placement of staggered culverts, and other methods or combinations of the above if the situation warrants such use. Sumps and catch basins require Storm Sentinel Drain Protection, Part # 1343 (round) or 1344 (rectangle), with sediment and oil filtration (or approved equal).
- .03 BASIS FOR REQUIRED IMPROVEMENTS. The need for drainage improvements may be based on one or more of the following items: topographic maps, field inspections, historical information, soil tests, existing storm drainage improvement studies, and any future drainage related studies, reports, or ordinances as may be adopted for use by the City.
- .04 DESIGN OF IMPROVEMENTS: GENERAL.
- A. Design Size. Storm drain inlets, pipes and drainage structures shall be sized to carry storm drainage runoff based on engineering calculation for the following minimum storm recurrence frequency and require an Engineer's certificate: For drainage areas less than 50 acres, a ten-year storm frequency- 6 hour duration; for drainage areas greater than 50 acres but less than 100 acres, a 20-year storm- 6 hour duration; for drainage areas greater than 100 acres, a 50-year Storm- 6 hour duration; for improvements to drainage channels in the floodway, a 100-year storm- 6 hour and 24 hour duration which ever produces the greater flow. Precipitation frequencies can be found in NOAA Atlas 2 from the Western Regional Climate Center. The rational formula may be used in calculating storm runoff utilizing rainfall intensity.
- B. Discharge Design. Plans for storm drainage shall indicate where the storm water will be discharged, if the proposed development will increase the rate or energy of runoff, and it must be shown that the pipes and channels downstream from the discharge point can carry the proposed runoff without damage to the adjoining properties. Provisions should be made for detainage and /or retainage of storm water on site, with no net increase in discharge after development.
- C. Design Parameters. Catch basins connected to standard sumps or storm sewer will be used to control sediment. A minimum 6 inch Schedule 40 PVC pipe at 1% minimum slope will be used to connect from catch basin to sump. The pipe will be placed so that no more than 4-6 inches sticks out into the catch basin so a vac truck can vacuum out the sediment. See Detail HC 20.03.001 for more details.

- .05 Easements. Where storm drains run outside an existing public right of way; easements will be required for public maintenance. Such easements shall be a minimum of 20 feet in width. Easements must be dedicated to the City prior to final project acceptance. A standard form Public Utility Easement must be used and an example is available at the Public Works Department office.

20.04 STREET and ALLEY IMPROVEMENTS.

- .01 Purpose. The purpose of the design requirements in this section is to provide minimum standards for road and street design and Construction that will insure adequate facilities for the benefit and safety of the general public.

- .02 Cross sections. The developer must submit cross sections with the plans, and with the “as built” drawings.

.03 Street Definitions:

- A. Business Collector Street: Streets which are designed to provide the main ingress and egress to adjoining or neighboring businesses. Access to businesses should require a center turn lane. Defined by traffic flows of 400 vehicles per day to 4500 vehicles per day.
- B. Residential Collector Street: Streets which are designed to provide the main ingress and egress to a subdivision or neighborhood. Access to adjoining lots should be controlled to limit potential conflicts. Defined by traffic flows of 400 vehicles per day to 4500 vehicles per day.
- C. Local Residential Street: Streets which provide access to individual lots or areas. Cul d’ sacs are within this category. Defined by traffic flows of 400 vehicles per day or less.
- D. Roadway: Existing street initially located in the county but later annexed into the city which provides access to individual lots or areas and due to construction is limited in right-of-way width to less than 60 feet.
- E. Alley: Secondary city street, which serves primarily as a service access to individual lots.
- F. Bicycle Paths and/or Walkways: Access-ways for people to use with non-motorized vehicles, primarily for recreational use.

.04 DESIGN REQUIREMENTS – STREETS AND ROADWAYS.

General. Designs shall be done in order to provide safe streets that require only normal maintenance to keep them in good condition, free from potholes and other driving nuisances.

- A. Vertical Design should seek to attain the following objectives:

- 1. Draining of adjacent property.
- 2. Matching existing driveways where possible.
- 3. Minimizing storm drainage cost.
- 4. Minimizing retaining wall cost
- 5. Minimizing slope easement requirements.
- 6. Providing drainage of the roadway.

- B. Horizontal Design. The construction centerline normally will coincide with the right-of-way centerline. Intersection monuments will be required for new streets and within new subdivisions per Administrative Rules for Montana, Uniform Standards for Survey Monumentation, ARM 24.183.1101. The monument shall be capped with a brass or aluminum cap stamped with the name and license number of the responsible land surveyor. Monument boxes with lids similar to water valve lids may be used.
- C. Where ROW width is sufficient, and to maintain safety; the construction centerline may be shifted to attain the following objectives:
1. Reduction of retaining wall requirements.
 2. Reduction of slope easement requirements.
 3. Facilitation of intersection alignment.
 4. Reduction of utility relocations.

Design Parameters. The following table gives the basic design parameters to use in the vertical and horizontal design of streets. Roadway design (D) will be handled on a case-by-case basis.

Parameters	Street Type (20.04.05 and 20.04.06)				
	A	B	C	E	F
Horizontal Design					
1. ROW width	80 ft.	80 ft.	60 ft.	20 ft.	20 ft.
2. Development width	51 ft.	51ft.	25 - 39 ft.	15 ft.	10 ft.
3. Minimum Radius / curvature	300 ft.	300 ft.	N/A	N/A	N/A
4. Super-elevation	AASHTO	AASHTO	N/A	N/A	N/A
5. Curb type	Catch	Catch	Catch	N/A	N/A
6. Curb radius (min.)	25 ft.	15 ft.	15 ft.	N/A	N/A
7. Cul d' sac length (max.)	N/A	N/A	600 ft.	N/A	N/A
8. Cul d' sac radius (min.)	N/A	N/A	50 ft.	N/A	N/A
Vertical Design					
1. Minimum Grade	0.40%	0.40%	0.40%	0.40%	0.40%
2. Maximum Grade	8%	6%	10%	10%	5%
3. Pavement cross slope	2%	2%	2%	N/A	N/A
4. Maximum Grade at Intersections	3%	3%	3%	3%	5%
5. PPC Gutter grade (min.)	0.40%	0.40%	0.40%	0.40%	0.40%
6. AC Gutter grade (min.)	1.00%	1.00%	1.00%	1.00%	1.00%

Design Requirements

1. Valley gutters shall be allowed to cross only local residential street intersections. Mid-block gutters are prohibited.
2. Cut and fill slopes.
 - (a) Finish cut slopes shall be approved by Director of Public Works.
 - (b) The minimum fill slope shall be 3 feet horizontal to 1 foot vertical with approval by the Director of Public Works.
 - (c) Slopes shall not exceed the angle of repose for the sloped material.

- (d) All graded areas where people walk shall not have a slope greater than 4:1.
3. The stopping sight distance shall be considered for horizontal curves. Superelevation of horizontal curves shall be considered where practical and shall not exceed 0.06 feet per foot. Transition to the superelevated section shall be obtained through the runoff length with $\frac{2}{3}$ of the runoff on the tangent and $\frac{1}{3}$ on the curve. Superelevation runoff length shall be determined by the degree of curve, design speed, and superelevation rate.
 4. Cul d' sac turnarounds will be required at the ends of temporary dead-end streets.
 5. Angle parking is not permitted in city right-of-way unless the developer can demonstrate that vehicles backing from the angle stalls will not interfere with traffic in the nearest driving lane.
 6. If water lines, sanitary sewer lines, or other utilities are required to provide service within the paving project or to neighboring properties, coordination with the utility of concern will be required to insure construction of the line prior to paving (One-Call).
 7. Where water and sanitary lines are located within the paved right-of-way; service connections are required for all un-serviced lots. It will be the City's policy not to allow cutting of the pavement for a period of two years after installation of water and sewer lines.
 8. Snow removal and storage are required in the street design and will be evaluated on a case by case basis.
 9. Where soils investigations show that organic or other unsuitable material is present within the proposed roadway prism; the plans shall call for its removal.
- D. Signing. Proper traffic control signs shall be required as follows, per Manual on Uniform Traffic Control Devices (M.U.T.C.D.), latest edition.
1. Guard rails and guideposts shall be provided where conditions of poor visibility or other hazards would result in danger to vehicles accidentally leaving the roadway. Generally, such points are fills along steep grades or sharp curves on non-level terrain.
 2. All streets within an improvement shall be named and names shall be approved by the City. No duplication of street names will be allowed. Signs shall be placed at all intersections. All signs shall be of a breakaway type.
 3. Stop signs, yield signs, speed limit signs, etc. shall be required on and along all streets as appropriate and determined by the Public Works Director. All signs shall be of the breakaway type.
 4. A traffic control plan shall be submitted at least 48 hours in advance of construction to the Public Works Department and will show the appropriate signing and detour routes for lane closures or road closures. If roads are to be closed, the contractor will notify the Public Works Department so local news media can be notified and a road closure notice can be posted on the City website.
- E. Street Lighting. The City will require lighting along streets.
- F. Pavement Design. The design of the pavement shall be in accordance with the City's standard specifications and drawings, and in accordance with design procedures as outlined in the "Soils Manual for Design of Asphalt Pavement Structures" and "The Asphalt Handbook" by the Asphalt Institute.

- G. Repairing Utility Cuts. The design of all excavations, including ground and surface water control, when necessary should be made available for review by the public works agency. (MPWSS Drawing No.02221-1)
1. When requested, the construction equipment and procedures to be used shall be described in the permit application.
 2. Pipe installation shall be done according to the requirements of the appropriate agency specifications in use. The required granular material should meet the material requirements for Select Granular Fill in the current Montana Public Works Standard Specifications.
 3. Pavement shall be cut at termination points of pavement replacement.
 4. Pavement and shoulder removal shall be done in a manner that provides for proper restoration of the replacement section.
 5. Straight vertical cuts of the pavement are required. Pavement surfaces that become undermined shall be cut back, removed, and replaced.
 6. For crosscuts in paved areas, one sack control density fill (cdf) will be used to fill the entire trench as backfill material. It will fill to the bottom edge of pavement and allowed to harden appropriately prior to paving. Follow MDOT standards for mix design and placement of cdf materials.
 7. Generally cuts shall be filled at the end of each work day. With prior approval, steel cover plates may be used. Recessing of these steel cover plates may be required.
 8. For backfills not requiring control density fill, the backfill material shall be placed and compacted according to established standards for backfilling structures, culverts, pipes conduits, and direct burial cable. The proper backfill material shall be replaced in layers not to exceed 6 inches and thoroughly compacted with proper moisture, before placement of an additional layer of backfill. If mechanical compaction is not used, the contractor, i.e.; holder of the permit, will be liable for repairs for a period of two years from the date of completion. If mechanical compaction is used, the period is reduced to one year.
 9. The permit requires construction which adversely affects the subsurface drainage of the pavement structure shall be corrected by the addition of surface or subsurface drain.
 10. The replacement pavement shall be similar to the existing pavement in composition and texture. The selection of the material type, composition, and placement methods should be approved by the Director of Public Works. All joints must be tacked.
 11. The limit of pavement replacement shall be such that the replacement pavement is supported by thoroughly compacted sub-base material and the pavement is restored to the proper grade, cross-slope, and smoothness. In addition, the replacement section shall be at a minimum, 12 in. greater in all directions than the disturbed soils. All joints must be tacked.
- H. Traffic Volumes. Traffic volumes will be calculated based on the Institute of Transportation Engineer's (ITE), *Trip Generation Manual*. Parking requirements related to commercial and industrial development will be based on the ITE *Parking Generation Manual* and the Urban Land Institute (ULI) *Shared Parking Guideline*.

- I. Sidewalks and Curbs. Public sidewalks will be required on both sides of new streets and in new pedestrian easements. Sidewalks along business collector streets shall be at least 7 feet in width. Sidewalks on all other streets shall be a minimum of 5 feet wide. Concrete will be M-4000 concrete with a maximum of 25% slag content. See drawing 20.04.002 for additional construction details.

All sidewalks and access at intersections and cross walks shall be Handicap accessible in accordance with ADA requirements. Detectable warnings shall be provided at perpendicular curb ramps, landings, and blended transitions and shall consist of truncated domes aligned in a square or radial grid pattern that complies with published ADA standards. Corner ramps and transitions shall be fan-type where applicable and all ramps or transitions shall meet slope requirements as published in MDT standards and Montana Public Works Standard Specifications.

Detectable warnings shall be composite plastic or black asphalt dipped cast iron and shall be colored to contrast visually with surrounding street or sidewalk materials. Either cast-in-place or surface applied panels are acceptable and will be installed per manufacturer's instructions.

- J. Driveways. Driveways located within the City's right-of-way must be asphalt and a Street Excavation Permit is required. Where driveways cross sidewalks that are in place, the sidewalk must be cut and redone with proper compaction, base and 6" of concrete with proper grade and slope. For driveways serving four or more dwelling units, the driveways will include standard curb, gutter and sidewalk similar to a Class C residential street. Where a private driveway serving four or more dwelling units connects to a public street, the opening to the public street will be a standard street opening per Section 20.04.011. Driveway openings on collector streets will be 80 feet from the edge of pavement of an intersection and 35 feet from edge of pavement of an intersection along residential streets. There will be a minimum of 40 feet spacing between driveways.

20.05 UTILITIES

- .01 Permits: Installation of any public or private utility in public rights-of-way of the City of Hamilton shall require a Utility Permit available from the Department of Public Works.

20.06 SITE DEVELOPMENT

- A. Private development shall have vehicular access to the street in accordance with the Standard Drawings, off street parking in accordance with Hamilton Municipal Code 12.04.240, and adequate access and egress for fire vehicles.
- B. The developer must provide evidence that parking areas would provide the minimum number of parking stalls required by std. dwg. 20.06.002 in accordance with the minimum standards for parking lots.
- C. Parking areas of four (4) or fewer parking spaces shall be gravel or paved. Parking areas of more than 4 spaces shall be paved. Driveways serving the parking areas shall be gravel or

paved. Driveways serving loading areas and fire access lanes shall have a minimum width of 23 feet. At least 20 feet of this driveway width shall be paved with the remainder to be gravel surfaced. Gravel surfaced means a thickness of not less than 4 inches compacted gravel over the entire area. Paved means three (3) inches of asphalt pavement, as a minimum with a four (4) inch gravel base. See std. dwg. 20.04.005 and 20.04.006 for asphalt and gravel base requirements. The Director of Public Works may require curbs along driveways in parking areas to control storm water or to control vehicular access.

- D. The Director of Public Works may require the developer to improve the public streets used for access to the site to control dust and erosion and to provide for traffic safety and/or the potential increase in vehicular traffic. Improvements may include paving, curb and gutter, sidewalks, storm drainage, turn lanes, signing, marking or striping by paint or hot tape, street lighting, signals, and similar improvements. The improvements required shall be limited to those necessitated by the new traffic movements from the private development. DPW may require a traffic study to aid in determining any necessary improvements.
- E. Roof drains, subsurface drains, and surface drains shall be shown on the site plan. When the development will increase “the rate or energy of storm runoff and/or change the location of the storm runoff discharge”; provisions must be made so there is no additional increase in the natural runoff.
- F. A grading plan must be submitted if any of the following items apply. Also a grading permit must be obtained if the Site Plan review process is not applicable.
 - 1. If any fill will exceed ten (10) feet in height; or,
 - 2. If any excavation will exceed ten (10) feet in depth; or,
 - 3. If the total volume of cut and fill will exceed 2,500 cubic yards.

A grading plan must be adequate to show all new cuts, fills, and changes in drainage. Grading (cut and fill) should be kept to a minimum. Grading should be designed to minimize the visual impacts from the surrounding properties. Cut slopes and fill slopes steeper than 1-1/2:1 will require a retaining wall or other protection to insure slope stability. A slope steeper than 2:1 and more than ten (10) feet in height will be required to have a pedestrian railing or other protection at the top of the slope. Where cuts or fills greater than twenty (20) feet in height are proposed, a report must be submitted, signed by a registered engineer showing the methods that will be used to ensure stability of the slopes. Grading plans shall include provisions for drainage and erosion control during construction.

- G. Proposed connections to the public water and sewer mains must be shown on the site plan. If existing public water and sewer mains are not adequate to accommodate the increased demand created by the proposed development, the City may require the developer to improve or replace the existing public water or sewer main at no cost to the City.

- H. Additional fire hydrants may be required along the adjoining street or within the development when determined necessary by the Fire Chief in accordance with the utility codes. All fire hydrants and all water mains serving the fire hydrants shall be dedicated for City use and maintenance.
- I. Each building must have pedestrian access separate from vehicular driveways and at least one pedestrian access route shall be usable by the handicapped. EXCEPTIONS: Apartment buildings of four or fewer apartments; warehouses and other structures where the need for pedestrian access is negligible.
- J. The Director of Public Works may require the construction of a public walkway along the adjoining street if none exists. The Director may require replacement of an existing sidewalk along a public right of way if the existing walkway does not meet current City standards.
- K. The City will assign a street address(es) for each development and will designate the various units of the development by numbers, letters or otherwise. If the development consists of more than six (6) units; the owner will submit a reproducible copy of the system of unit numbers, etc., and the system will be used for postal addresses, building permits, etc. The City will not assign individual street addresses to the various units of a single structure development having more than two units. Multi-unit, centralized postal boxes cannot be located within public right of way.
- L. Any development in the Flood plain must meet the requirements of Hamilton Municipal Code Title 18.

20.08 PLAT MAPS

- A. Final Subdivision, Amended Subdivision Plats, and Certificates of Survey's creating new or revised Lots or parcels shall contain all certifications and approvals and shall be approved and signed by the City before the map is recorded with the Office of Ravalli County Clerk & Recorder.
- B. Durable black ink shall be used in plat maps, including signatures, to assure clear reproduction on standard printing equipment. All plats shall be drawn on sheets no larger than 24 x 36 inches. If the plat is more than one sheet, each sheet shall be labeled "sheet #__ of # __". A standard sheet size of 24 x 36 inches is preferred for all plats and short plats. A 22 X 34 inch sheet may be used to accommodate accurate 11 X 17 inch half size to scale.
- C. Residential subdivision plats should include utility easements five (5) feet wide along each front lot line.
- D. If grading is to occur outside the limits of roadway improvements, a grading permit may be required prior to final plat approval. See requirements under "Site Plans".

AFTER RECORDING return to:
Hamilton City Clerk
223 South 2nd Street
Hamilton, MT 59840

GRANT OF EXCLUSIVE PUBLIC UTILITY EASEMENT

FOR VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, the undersigned,

[NAME] (“Grantor”)

does hereby grant, dedicate, and convey to the CITY OF HAMILTON, a municipal corporation of the State of Montana, its successors and assigns, an exclusive perpetual easement and right-of-way, and the right to use, for public utility purposes, including a City sewer main and those appurtenances and uses commonly associated therewith, through, in, on, over, above, under and across that certain portion of Grantor’s real property situated in the City of Hamilton, County of Ravalli, State of Montana, legally described on “Exhibit A,” the easement itself being further described and/or illustrated on “Exhibit B”.

SEE LEGAL DESCRIPTION MARKED “EXHIBIT A” AND DESCRIPTION AND SKETCH MARKED “EXHIBIT B” ATTACHED HERETO AND MADE A PART HEREOF BY REFERENCE.

The easement granted herein includes the following:

1. the right to construct, reconstruct, inspect, repair, replace, operate, maintain and remove the existing sewer main or other utility services, including surface and buried uses, along and across the easement;
2. the right to enter upon, pass and re-pass over, along, and beside said easement and right-of-way, including with the City's sewer truck for periodic cleaning of the sewer manhole located at the northwest corner of the subject property;
3. the right to deposit tools, implements and material thereon by the City, its officers, agents, employees, successors or assigns, or by any contractor, its agents or employees, engaged by the City whenever and wherever necessary for the purposes set forth above; and
4. the right of ingress and egress across the lands of Grantor for all purposes useful or convenient in connection with or incidental to the exercise of the rights herein granted at locations which shall not interfere with Grantor’s reasonable use of its remainder property.

Grantor shall not plant any tree or erect any fence, wall or any other type of structure over, across, or upon said easement and right-of-way without first obtaining written permission from the City.

If trenching and excavating become necessary, the affected area will be backfilled, compacted, and restored to the applicable Public Works Standards and Specifications.

Grantor does hereby covenant with the City that they are lawfully seized and possessed of the real estate above-described, that they have a good and lawful right to convey it, or any part thereof.

Grantor recognizes that the easement may afford inadequate clearance and lateral support for future entry, inspection, maintenance and repair work by the City and waives any claims or causes against the City which may result. Grantor, its heirs, agents or assigns, shall indemnify and defend the City and hold the City harmless from all losses, damages, claims, causes or actions, at law or in equity, including by third parties, which arise out of or relate to the City's use of this easement, save and except for the City's own negligent, reckless, or intentional acts.

The conveyance of this easement and right-of-way is made for the benefit of all parties who have or may acquire any right, title, or interest in any part of the above described real property. This conveyance is binding on the Grantor and shall run with the land and be binding upon Grantor's heirs, assigns, and successors in interest.

Dated this ____ day of _____, 2014.

GRANTOR:

[NAME]

STATE OF MONTANA)
 :SS
COUNTY OF RAVALLI)

This instrument was acknowledged before me on this ____ day of _____, 2014 by [NAME].

(Notary Seal)

NOTARY PUBLIC FOR THE STATE OF MT
Residing at: _____
My commission expires: _____

ACCEPTED BY CITY OF HAMILTON:

By: _____
Jerry E. Steele, Mayor

ATTEST:

By: _____
Rose M. Allen, City Clerk

**“EXHIBIT A”
LEGAL DESCRIPTION OF REAL PROPERTY**

[LEGAL DESCRIPTION OF GRANTOR'S PROPERTY OVER WHICH EASEMENT IS GRANTED]

**“EXHIBIT B”
DESCRIPTION [AND SKETCH] OF EASEMENT**

A ___ foot wide by ___ foot long strip of land extending along the entire length of the _____ boundary of the subject property [as shown in the highlighted area of sketch attached hereto].

**SANITARY SEWER CONNECTION
ENGINEER'S REPORT**

COMPANY NAME _____ ENGINEER'S NAME _____

INSTALLATION DATE _____ CONTRACTOR _____

ADDITION _____ BLOCK _____ LOT(S) _____

STREET ADDRESS _____ MATERIALS _____

TYPE OF CONNECTION _____ (DS) Dry Stub (C) Connection (STS) Step CITY PERMIT NO _____

STEP SYSTEM INFORMATION		
TEST	DATE	PASSED
WATER		
AIR		
FINAL		
TANK SERIAL #		

REMARKS

DRAWING

INCLUDE THE FOLLOWING:

1. Station from manhole – show manhole – give number
2. Main location
3. Building Footprint
4. Length of service pipe
5. Horizontal angles
6. Pipe size
7. Pipe type
8. North arrow
9. Street name
10. Tie to property corner if vacant lot
11. Tie to building if connected, using at least two corners

Use back if necessary

PROFILE

INCLUDE THE FOLLOWING:

1. Depth at main
2. Depth at end
3. Vertical angles
4. Ground surface
5. Footing (if applicable)

INSPECTOR'S SIGNATURE _____ DATE _____

Additional General Requirements for City Sewer Installations

Waterproof Manholes

1. Waterproofing admixtures, be they a Xypex admixture or an approved equal must comply with the general requirements in Addendum A for integral waterproofing of cement.

Additionally when using Xypex or an approved equal the general contractor must furnish:

2. Proof of compliance with the Xypex (or approved equal) certification and training program to install the Xypex (or approved equal) Admix Waterproof System under IMX Technologies (or approved equal) Warranty Program by the PreCast supplier.
3. Certification by the PreCast Supplier that a minimum of 3% Xypex admixture (or approved equal) was included in the manhole concrete which may be accomplished by furnishing the batch ticket or equivalent.
4. A Xypex Corporation / IMX Technologies (or approved equal) Waterproof Warranty must accompany each manhole which must be identified on the warranty.
5. Any lifting holes that are used in the lifting of manhole sections shall be grouted shut with an approved water-tight material, Zypex Speed Plug or equivalent.
6. Certification that the manholes were constructed according to ASTM #C 478 and comply with the Hamilton City Standard Waterproof Manhole Drawing.

Sanitary Sewer Service lines Connected to City Sanitary Sewer Mains

1. All new sanitary sewer lines must be accompanied by #14 (or larger) copper tracer wire.

Final approval and acceptance will be contingent upon providing the above named certifications as well as engineer and Hamilton Public Works delegate signed test results for the following minimum mandatory Montana Public Works Standards tests which must be completed PRIOR TO surface restoration:

1. Deflection test using a mandrel (pig).
2. Pressure test of the sanitary sewer lines.
3. Vacuum Test for Manholes as per the ASTM #C 1244-93 (see Addendum B).
4. Video inspect with a copy of CD and a hardcopy.
5. Provide 4 hard copies of "As-Built" drawings to the City of Hamilton and MDEQ approval letter or stamp with them.
6. Final approval and acceptance will be contingent upon providing the above named certifications.

Grease / Oil / Sand Interceptor

All new commercial construction projects, commercial remodels and commercial additions located within the B, B1, B2 and CM zoning districts shall be required to install a grease / oil / sand interceptor as part of the sanitary sewer service installation or upgrade, independent to the needs of the immediate development, practical space permitting. The installation of an appropriate water-proofed* interceptor system and a public works permit, dependent upon the business type to occupy the new construction, addition or remodel, shall be required in addition to a building permit. The installation of an appropriate water-proofed* interceptor system shall also be required at any time upon sale or conveyance of the property (ie: new ownership, new occupancy type, a structural remodel, etc..) Plans and specifications for said interceptor shall be submitted for review and approval and shall include the proposed location, type of interceptor and installation method PRIOR to the issuance of the building permit. A maintenance agreement for said interceptor shall also be required PRIOR to the installation. Reference: HMC 13.12.320

*Water-proofing by Xypex admixture or an approved equal.

ADDENDUM A**INTEGRAL WATERPROOFING OF CONCRETE**

1. Admixture shall be Xypex C-500, C-1000 or C-2000, as supplied by Xypex Chemical Corporation, through IMX Technologies or approved equal. This Admixture shall be a dry powder compound consisting of Portland cement, very fine treated silica sand and various active propriety chemicals. Xypex causes a catalytic reaction that generates a non-soluble crystalline formation of dendritic fibers within the matrix of the concrete, permanently sealing the concrete from the penetration of liquids and chemicals.

Product shall meet the following criteria:

- A. Chemical Resistant for pH Levels of 3 to 11 constant contact and pH Levels of 2 to 12 periodic contact per ASTM #C267-77, ASTM #C672-76.
 - B. Potable Water Approved per National Safety Foundation (ANSI/NSF) 61.
 - C. Freeze-Thaw and De-Icing Chemical Resistance per ASTM #C672-76.
 - D. Radiation Resistance per USANI N69-1967.
 - E. Crack Sealing ability for re-sealing cracks up to .04 mm (1/64") per ASTM #C856-88.
 - F. Withstand 175 PSI water pressure penetration test per U.S. Army corps of Engineers CRD-C-48-73.
 - G. Concrete Admixture shall not decrease the compressive strength of the concrete mix design (28 day compressive strength test), ASTM #C 39/C 39M.
 - H. Crystalline Waterproofing Manufacture shall have a minimum of 10 years history manufacturing crystalline waterproofing products.
 - I. Concrete Batch Plant Operators shall be certified by Manufacturer in the mixing and use of Crystalline Waterproofing Products.
 - J. Shall provide a ten year watertight warranty per Manufacturer or Manufacturer's representative.
2. ALTERNATIVE to Xypex Admixture: contractor may submit an alternate product or method of construction to Architect/Engineer, for review and approval. Product and/or methods shall be evaluated as per the above specifications.

ADDENDUM B

ASTM # C 1244-93

Standard Public Works Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test for Permeability

1. Summary of Practice
 - 1.1 All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.
2. Significance and Use
 - 2.1 This is a routine test. The values recorded are applicable to the manhole being tested and at the time of testing.
3. Preparation of the Manhole
 - 3.1 All lift holes shall be plugged
 - 3.2 All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.
4. Procedure
 - 4.1 The test shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
 - 4.2 A vacuum of 10" of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9" of mercury.
 - 4.3 The manhole shall pass if the time for the vacuum reading to drop from 10" of mercury to 9" of mercury meets or exceeds the values indicated in TABLE 1.
 - 4.4 If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be re-tested until a satisfactory test is obtained.
 - 4.5 Use of this vacuum test is accepted as appropriate water infiltration or exfiltration testing by the City of Hamilton.
 - 4.6 All tests must be submitted to the Public work Department for review and approval prior to backfilling.