SECTION 100 TITLE, SCOPE AND GENERAL CONDITIONS

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110.00 TITLE

These regulations shall be known as the City of Brighton Standards and Specifications for the Design and Construction of Public Improvements 2015 Edition and may be cited as such and will be referred to herein as the STANDARDS AND SPECIFICATIONS.

111.00 Purpose

The purpose of these STANDARDS AND SPECIFICATIONS is to provide acceptable standards of design, construction, quality of materials, use, location, and maintenance of all public improvements and common facilities including, but not limited to, sanitary sewer systems, water supply systems, storm drainage systems, streets, open space, public landscaping, parking lots and appurtenances thereto.

120.00 SCOPE

The provisions of these STANDARDS AND SPECIFICATIONS shall apply to the construction, enlargement, alteration, moving, removal, conversion, demolition, repair, and excavation of any public improvements or common facilities specifically regulated herein except where an approved P.U.D. plan specifically states otherwise. The provisions of these STANDARDS AND SPECIFICATIONS apply to City contracts, Developer contracts, and private contracts.

Alterations, additions, or repairs to existing improvements shall comply with all requirements of these STANDARDS AND SPECIFICATIONS unless specifically exempted in writing by the Director(s).

121.00 Alternate Materials and Methods of Construction

The provisions of these STANDARDS AND SPECIFICATIONS are not intended to prevent the use of any material or method of construction not specifically prescribed by these procedures, provided any alternate has been approved and its use authorized by the Director(s).

The City shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding the alternate. The details of any action granting approval of an alternate shall be recorded and entered in the files of the City.

122.00 Exemption from These Standards and Specifications

Whenever there are practical difficulties involved in carrying out the provisions of these procedures, for example in existing City subdivisions, or a request for a change in the provisions, the City may grant exemptions for individual cases provided the City shall first find that a special individual reason makes these procedures impractical, that the request is in the best interest of the City, that the exemption is in conformity with the intent and purpose of these procedures, and providing that such exemption does not lessen any design requirement or any degree of integrity or safety. The details of any action granting exemptions shall be recorded though an Exemption Application and stored in the files of the City. The Director(s) shall make the interpretation and the interpretation shall be binding and controlling in its application.

123.00 Quality Control and/or Quality Assurance Testing

Whenever there is insufficient evidence of compliance with any of the provisions of these STANDARDS AND SPECIFICATIONS, or evidence that any material or construction does not conform to the requirements herein, the Director(s) shall require that the Contractor have tests performed, which will be used as proof of compliance. Test methods will be as specified by these STANDARDS AND SPECIFICATIONS or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the Director(s) will determine test procedures. All tests will be made by an approved agency and all costs shall be the responsibility of the contractor. Reports of such tests shall be submitted and retained by the City.

The person responsible for the Quality Control Testing and/or Quality Assurance Testing shall be registered as a professional engineer in the State of Colorado and practicing in this field.

Technicians shall be:

A. Certified as Level II or higher NICET in the specific area where they perform tests, i.e. soils, concrete, etc.

   1. Technicians taking concrete samples and conducting field tests must have a valid ACI Field certification or equivalent.
   2. Technicians conducting tests of Portland Cement Concrete for compressive strength shall possess a valid ACI Laboratory Grade I certification or equivalent.
   3. Technicians conducting tests or Portland Cement Concrete for flexural strength and determining mixture design characteristics shall possess a valid ACI Laboratory Grade II certifications or equivalent.

B. Technicians performing Quality Control and Quality Assurance sampling, splitting or testing on Hot Mix Asphalt Pavement materials in the field and laboratory must possess one or more of the following qualifications:

   1. Technicians sampling hot mix asphalt materials or conducting nuclear asphalt density tests must possess a valid LabCat Level A certification or equivalent.
   2. Technicians conducting tests of Asphalt Content, Bulk Specificity Gravity, Maximum Specific Gravity or Aggregate Gradation for hot mix asphalt must possess a valid LabCat Level B certification or equivalent.
   3. Technicians determining Asphalt Mixture Volumetric Properties, Hveem Stability or Resistance to Moisture Induced Damage must possess a valid LabCat Level C certification or equivalent.

Recognized equivalent certifications such as CDOT or Western Alliance for Quality Transportation Construction (WAQTC) certifications for each specified field can be submitted and will be reviewed on an individual basis.

124.00 Organization, Enforcement and Interpretation

The Director(s) is authorized and directed to enforce all provisions of these STANDARDS AND SPECIFICATIONS and for such purposes he/she will have the powers of a peace officer. The

Director(s) may appoint a civil engineer, construction inspector, or other related technical officer or inspector, or other employee to act in his/her behalf.

Whenever any work is being done contrary to the provisions of these STANDARDS AND SPECIFICATIONS, the Director(s) may order the work stopped by verbal notice by appointed representative as defined above, followed by a written notice, which will be served on any person(s) engaged in the doing or causing of such work to be done, and any such person(s) will forthwith stop such work until authorized by the Director(s) to proceed.

These STANDARDS AND SPECIFICATIONS are composed of written engineering standards, materials, specifications, and standard drawings. The Director(s) shall make the interpretation of any Section, or of any difference between Sections, when appropriate, and his/her interpretation shall be binding and controlling in its applications.

125.00 Liability

The Director(s), or authorized representatives charged with the enforcement of these STANDARDS AND SPECIFICATIONS, acting in good faith and without malice in the discharge of duties, will not thereby be rendered personally liable for any damage that may accrue to persons or property as a result of any act or by reason of any act or omission in the discharge of his duties.

126.00 Violations

It shall be unlawful for any person, firm, or corporation to construct, enlarge, alter, repair, move, improve, remove, excavate, convert, demolish, or operate any public improvements or common facilities or permit the same to be done in violation of these STANDARDS AND SPECIFICATIONS.

127.00 No Waiver of Legal Rights

The City will not be precluded or stopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or that the work or materials do not conform in fact to these STANDARDS AND SPECIFICATIONS.

128.00 Contractor's License

Any person performing work that requires a permit as detailed in Section 150.00 of these STANDARDS AND SPECIFICATIONS shall obtain a Contractor's License as set forth in the City of Brighton’s Municipal Code Chapter 15, as amended from time to time.

130.00 SCOPE OF WORK

131.00 Work Conditions

The Contractor of record on the construction permit will be the responsible party for all activities on and related to the site.

131.01 Working Hours

All work to be completed on a permitted construction project shall be performed during regular working hours as defined in Section 171.00 of these STANDARDS AND SPECIFICATIONS as adopted by Municipal Code. The Contractor will not permit overtime work outside of regular working hours or the performance of work on Saturday, Sunday, or any legal holiday without receiving written consent from the Director(s). All expenses incurred by the City shall be reimbursed at a rate to be determined by the Director of the Finance Department.

131.02 Emergency Work

When, in the opinion of the City, the Contractor of record on the construction permit has not taken sufficient precautions to ensure the safety of the public or the protection of the work to be performed, or of adjacent structures or property that may be injured by processes of construction on account of such neglect, and an emergency may arise and immediate action is considered necessary in order to protect public, private, or personal interests, the City, WITH OR WITHOUT NOTICE to the Contractor or the Developer of record, may provide suitable protection by causing such work to be done and material to be furnished and placed as the City may consider necessary and adequate. The cost and expense of such work and material so furnished will be borne by the Contractor or Developer of record and will be paid on presentation of the related itemized costs.

The performance of such emergency work under the direction of the City will in no way relieve the Contractor of responsibility for damages which may occur during or after such precaution has been taken.

In an emergency threatening loss of life or extensive damage to the work or to adjoining property, and where the Developer or Contractor of record is unable to obtain special instructions or authorization from the City after diligent attempts to obtain such special instruction or authorization in sufficient time to take the necessary action, the Developer or Contractor of record is hereby permitted to act at his own discretion to prevent such threatening loss or damage.

131.03 Final Cleanup

Upon completion of the work, the Contractor of record shall remove from the project area all surplus and discarded materials, rubbish, and temporary structures, and leave the project area in a neat and presentable condition. The Contractor of record shall restore all work that has been damaged by his/her operations to general conformity with the specifications for the item or items involved.

The Contractor shall inspect the interior of all manholes, valve boxes, and catch basins within the construction limits for construction materials, dirt, stones, or other debris deposited therein by the activities of the Contractor.

132.00 Control of Work

132.01 Authority of Director(s)

The Director(s) will have the authority to stop work whenever such stoppage may be deemed necessary. The Director(s) will resolve all questions that arise as to the quality and acceptability of materials furnished, work performed, interpretation of the plans and specifications, and acceptable fulfillment of the requirements of these STANDARDS AND SPECIFICATIONS.

The Director(s) may, when deemed necessary, define the schedule and/or priority of the work to be completed on the project. The Contractor of record shall comply with this schedule. The Director(s) must authorize any revision to the schedule in writing.

The Director(s) shall resolve all questions that may arise relative to the performance of the work with respect to these STANDARDS AND SPECIFICATIONS.

132.02 Authority and Duties of Inspector

Inspectors are authorized to inspect all work completed and all material furnished. Inspections may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. The inspector is not authorized to revoke, alter, or waive any requirements of these STANDARDS AND SPECIFICATIONS. The Inspector is authorized to call the attention of the Contractor of record to any failure of work or materials required to conform to these STANDARDS AND SPECIFICATIONS. Inspectors are authorized to serve a "Field Order" when inspection of the project reveals violation(s) of these STANDARDS AND SPECIFICATIONS. The inspector will have the authority to reject materials until the Director(s) can resolve any questions at issue.

The inspector will not, in any case, act as foreman or perform other duties for the Contractor of record, and will not interfere with the management of the work done by the Contractor. Any "advice" that the inspector may give the Contractor will not be construed as binding upon the Director(s) or the City in any way, and shall not release the Contractor from fulfilling all of the terms of these STANDARDS AND SPECIFICATIONS.

The presence or absence of the Inspector will not relieve, in any degree, the responsibility or the obligation of the Contractor.

The Director(s) and inspector will, at all times, have reasonable and safe access to the work whenever it is in preparation or progress and the Contractor of record will provide proper facilities for such access and inspection.

132.03 Contractor's Responsibility for Work

In case of suspension of work for any cause, the Contractor of record, before leaving the job site, shall take such precautions as may be necessary to prevent damage to the project, provide for normal drainage, and erect any necessary barricades, signs, or other facilities at his/her expense, as directed by the Director(s) and required by these STANDARDS AND SPECIFICATIONS.

132.04 Removal of Unauthorized and Unacceptable Work

Work that does not conform to the plans and specifications, which results in an inferior or unsatisfactory product, will be considered unacceptable work.

Unacceptable work, whether the result of poor workmanship, poor design, use of defective materials, damage through carelessness or any other cause, found to exist prior to the final acceptance of the work, will be immediately removed and acceptably replaced or otherwise satisfactorily corrected by and at the expense of the Developer or Contractor of record. This expense includes total and complete restoration of any disturbed surface to original or better than the original condition that existed before the repairs or replacement, regardless of improvements on lands where the repairs or replacement are required.

133.00 Control of Materials

MATERIALS NOT IN CONFORMANCE WITH REQUIREMENTS OF THESE STANDARDS AND SPECIFICATIONS WILL BE CONSIDERED DEFECTIVE AND WILL BE REJECTED. REJECTED MATERIALS SHALL BE REMOVED FROM THE WORK SITE IN THE TIME INDICATED BY THE DIRECTOR(S).140.00

133.01 Samples and Tests

To ascertain that materials comply with contract requirements, samples will be taken and/or tests made at the source or at the job destination at the discretion of the Director(s) and as often as deemed advisable or necessary. Taking of samples and completion of tests will be in accordance with standard practices except where methods and procedures for sampling materials are otherwise set forth in these STANDARDS AND SPECIFICATIONS.

The Contractor of record shall furnish, without charge, all samples, tests, and reports required by the Director(s), and will afford such facilities as may be necessary for collecting and forwarding them. The contractor may be required to furnish, when requested by the Director(s), a written statement giving the origin, composition, and process of manufacture of a material.

133.02 Storage of Materials

Materials shall be stored so as to insure the preservation of their quality and suitability for the work. Stored materials, even though approved prior to storage, will be subject to inspection prior to their use in the work and will meet all requirements of these STANDARDS AND SPECIFICATIONS at the time they are used. Stored materials will be located so as to facilitate inspection. With the Director(s') approval, portions of the right-of-way not required for public travel may be used for storage purposes, and for the placing of the Contractor's materials and equipment, but any additional space required will be provided by the Contractor of record at his expense.

133.03 Defective Materials

GENERAL REQUIREMENTS

141.00 Protection of Public and Utility Interests

141.01 Public Convenience and Safety

Fire hydrants will be visible and accessible to the Fire District from the street at all times. No obstructions will be placed within five (5) feet of a fire hydrant.

Unless otherwise specified, the Contractor will give notice in writing to the proper authorities in charge of streets, gas and water pipes, electric service, cable television and other conduits, railroads, poles, manholes, valve boxes, catch basins, and all other property that may be affected by the Contractor's operations, at least seventy-two (72) hours before breaking ground. The Contractor will not hinder or interfere with any person in the protection of such property, or with the operation of utilities at any time. The Contractor of record is responsible to obtain all necessary information in regard to existing utilities, protect such utilities from injury, and avoid unnecessary exposure so as not to cause injury to the public.

If a temporary utility outage is required to perform the work, the Contractor of record shall be responsible to coordinate with the City of Brighton for determination of minimum notification time requirements and maximum time allowed for the outage. Once determined, the Contractor of record shall notify the affected utility customers.

The Contractor of record shall obtain all necessary information related to the planned installation of new utilities and cables, conduits and transformers, make proper provision and give proper notification so that new utilities and electrical equipment can be installed at the proper time without delay to the Developer or Contractor or unnecessary inconvenience to the owner. The location of new underground utilities and electrical equipment shall not be covered with pavement prior to the installation of such facilities.

When the scope of work involves excavation adjacent to any building or wall, the Contractor of record will give property owners due and sufficient notice thereof, in writing with a copy to the City.

141.02 Protection and Restoration of Property and Survey Monuments

The Developer and Contractor of record shall use every reasonable precaution to prevent the damage or destruction of public or private property. This shall include, but shall not be limited to poles, trees, shrubbery, crops, fences, and survey monuments adjacent to or interfering with the work, and all overhead structures such as wires or cables within or outside of the right-of-way.

The Contractor of record shall protect and support all water, gas, sanitary sewer, storm sewer, or electrical pipes or conduits, and all railway tracks, buildings, walls, fences, or other properties that are liable to be damaged during the execution of work. All reasonable and proper precautions shall be taken to protect persons, animals, and vehicles from injury. When necessary, the Contractor of record shall erect and maintain a fence or railing around any excavation and shall place a sufficient number of amber lights about the work and keep them burning from twilight until sunrise. When deemed necessary or required by the Director(s), one or more watchmen shall be provided by the Contractor of record to facilitate additional security to the construction site.

The Contractor of record shall not prevent the flow of water in the gutters of the street and will use proper means to permit the flow of surface water along the gutters while work is progressing.

The Contractor of record must protect and carefully preserve all land boundary and City survey control monuments. Any monument that may be disturbed shall be referenced and replaced by a Professional Land Surveyor registered in the State of Colorado. All monuments disturbed or removed by the Contractor, through negligence or carelessness on his part or on the part of his employees or subcontractors, shall be replaced at the Contractor's expense. Replacement of any monument shall be completed in accordance with the requirements set forth in Section 141.04 of these STANDARDS AND SPECIFICATIONS.

No person shall remove or disturb any grade or line stakes or marks set by the Director(s) for all construction.

Developer and Contractor of record shall be responsible for the damage or destruction of property resulting from neglect, misconduct, or omission in the manner or method of execution or non-execution of the work, or caused by defective work, or the use of unsatisfactory materials. The property shall be restored to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or replacing it as may be directed, or shall otherwise make good such damage or destruction in an acceptable manner. Developer and the Contractor or record will be responsible for the repair of underground pipes, wires, or conduits damaged during site construction including any damage caused by subcontractors, whether said subcontractor doing work on the permitted site is listed on the permit or not.

Developer and Contractor of record shall be liable for all damage caused by storms and fire, and will not, under any circumstances, start fires without first securing the necessary permits and approval of the authority having jurisdiction, even though they may be ordered or required to do such burning. While burning brush, stumps, or other burnable rubbish, care must be taken not to damage any standing trees, shrubs, or other property.

141.03 Surveys

Surveys will conform to Colorado Bylaws and Rules of Procedures and Rules of Professional Conduct of the State Board of Registration for Professional Engineers and Professional Surveyors “Revised”.

141.04 Survey Monuments

Permanent survey monuments (including the replacement of monuments), range points, and lot pins shall be set in accordance with the requirements of the *Colorado Revised Statutes, Title 38, Articles 51 and 53*, and as required by the Bylaws and Rules of Procedure of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors.

141.05 Protection of Streams, Lakes and Reservoirs

The Developer and Contractor of record will take all necessary precautions to prevent pollution of streams, lakes, and reservoirs with fuels, oils, bitumen's, calcium chloride, or other harmful materials. They will conduct and schedule their operations so as to avoid or minimize siltation of streams, lakes, and reservoirs. *See Section 150.00 PERMITS AND INSPECTIONS*.

141.06 Dust proofing

The Contractor of record will take all necessary steps to control dust arising from operations connected with the permitted construction work. When ordered by the Director(s) the Contractor will dust proof the construction area by sprinkling with water or as otherwise directed by the Director(s).

141.07 Traffic Control, Barricades, and Warning Signs

All construction and/or maintenance work being completed within the Public Right-of-Way must have a Traffic Control Plan (TCP) approved by the Director(s). The TCP is a plan for guiding and handling traffic safely through the construction work zone. The TCP must provide safe methods for movement of pedestrians and motorists that travel through the work zone and a safe area for all workers engaged in the construction activity. The TCP shall show the location, spacing, and scheduling of the usage of advance warning signs, barricades, pavement markings, and other control devices. All control devices must be installed and maintained in accordance with the *Manual on Uniform Traffic Control Devices* (MUTCD) and the *Colorado Department Of Transportation Work Zone Safety Handbook*, latest editions.

Requirements contained in these manuals will be strictly enforced during the progress of the work.

The TCP must be job specific. In order for a TCP to be approved by the Director(s), it must contain, as a minimum, a drawing showing the project area and the street(s) that may be affected by the project. The drawing shall include the following information:

A. Location and spacing of properly planned traffic control devices;
B. The length of time that the construction will be in progress;
C. The name and phone number(s) for twenty-four (24) hour contact of the Contractor's designated traffic control supervisor; and,
D. Any special notes or information on how the traffic control operation is to be handled.

The responsibilities of the Contractor of record shall include the following:

A. Obtain any required permits from the One Stop Customer Service Center.
B. Provide timely notification to, and coordination with, all affected agencies including, but not limited to the following:
    1. Brighton Fire Rescue District;
    2. Brighton Police Department;
    3. Brighton Streets and Fleet Department;

4. Utility Companies;
5. RTD,;
6. Schools; and,
7. Post Office.

C. Inform occupants of abutting properties about access limitations made necessary by the work;

D. Schedule and expedite the work to cause the least inconvenience to the public. Construction or repair work will not be permitted at or in the vicinity of signalized intersections or on major streets and State Highways without advance approval of the Director(s) and CDOT as applicable;

E. Furnish, install, and maintain required traffic control devices and facilities, as required, throughout the life of the contract (including periods of suspension);

F. Provide flagmen when required;

G. Assure that survey crews and other employees working in or adjacent to a traveled roadway wear flagging garments as required for flagmen;

H. Provide adequate safeguards for workers and the general public;

I. Patrol the construction site as required insuring that all devices are in place and operating at all times; and,

J. Remove traffic control devices when they are no longer needed.

Intersections and driveways will be closed for a minimum amount of time. The Contractor shall coordinate driveway closures with property owners with final approval by the Director(s).

Unless otherwise specified, construction operations are limited to one-half of the roadway at any time. Maintenance activities in arterial streets shall be planned and scheduled to minimize interference with traffic. Except for emergency situations, no maintenance work shall encroach into a moving lane of traffic between the hours of 7:00 a.m. to 9:00 a.m. or from 4:00 p.m. to 6:00 p.m. unless otherwise authorized.

All temporary traffic lanes shall be a minimum of ten (10) feet in width unless otherwise authorized. In addition, lane clearance shall be a minimum of five (5) feet from an open excavation and two (2) feet from a curb or other vertical obstruction.

Suitable surfacing must be provided for the temporary traffic lanes in work areas. When traffic is diverted from the existing pavement, temporary surfacing shall be provided as required by the Director(s).

Construction equipment not actively engaged in the work, employee vehicles, and official vehicles of the agency shall not be parked in the vicinity of the work in such a manner as to further restrict traffic flow.

Vehicles and equipment in continuous or frequent use may be operated or parked in the same traffic lane as the work obstruction. Construction spoil or materials may be similarly stored in this area or on the nearby parkway or sidewalk area, provided four (4) feet of sidewalk is kept clear for pedestrian use. To prevent the soil bank from occupying too great a space at its base, toe boards may

be used to keep it two (2) feet from the edge of the excavation on one side and two (2) feet from the edge of the traffic lane on the other.

Whenever necessary, trenches and excavation shall be bridged to permit an unobstructed flow of traffic.

A. Bridging must be secured against displacement by using adjustable cleats, angles, bolts, or other devices.
B. Bridging shall be installed to operate with minimum noise.
C. The trench must be adequately shored to support the bridging and traffic.
D. Temporary paving materials (premix) shall be used to feather the edges of the plates to minimize wheel impact.
E. Bridges shall be designed by a Professional Engineer.

When the work area encroaches upon a sidewalk, walkway, or crosswalk area, special consideration must be given to pedestrian safety. Since pedestrians move at a relatively slow rate, a minimum of advance warning is required; however, effort must be made to separate pedestrians from the work area.

All work shall be barricaded at all times between the hours of sunset and sunrise and shall be properly lighted so as to warn all persons. The Contractor of record will be responsible for all damages to the construction work due to failure of barricades, signs, lights, and flagmen and watchmen to protect it, and whenever evidence of such damage is found prior to acceptance, the Director(s) may order the damaged portion immediately removed and replaced by the Contractor.

142.00 Use of City Water

If the Contractor requires City water for use as construction water on any part of the project, a Hydrant Meter permit must be requested from the Brighton One-Stop Customer Service Center. Any theft of water, including but not limited to meter jumpers, hose connections in meter pits, drawing water from fire hydrants without a City of Brighton hydrant meter permit, or any other unauthorized use of City water, will be considered a violation of both this manual and the current adopted *City of Brighton Municipal Code, Chapter 13, Article 4, Section 200*. Uncontrolled usage by contractors and subcontractors will be reported to the Contractor of record. Violations will be enforced in conjunction with *City of Brighton Municipal Code, Capter 13, Article 4, Section 200,* and/or building permits and inspections may be withheld until such time as violations are corrected and the City is satisfied that proper control channels are established. (Refer to *City of Brighton Municipal Code, Section 100.24 Organization, Enforcement, and Interpretation* for details on fines and enforcement).

143.00 Pavement Cuts

Boring, except for emergency repairs, shall be done for all underground utility installations crossing arterials An exception may also be granted when a plan is submitted to overlay the entire street (block to block), or the Director(s) approves such other plan. All street cuts, when approved, must be saw cut prior to street patching and an approved hot/cold mix asphalt patch shall be placed the same day the cuts are employed. Street cuts, when completed, shall have permanent patching within

five working days, unless otherwise directed. The Contractor of record on the ROW permit shall be responsible for maintenance of the permanent patch for a period of one year.

If a pavement cut is required, the Contractor of record will make every effort to install a permanent, hot mix asphalt patch within twenty-four (24) hours. The Contractor will place a temporary, all-weather surface patch in all street cuts immediately after completing backfill and compaction if a permanent patch cannot be installed within twenty-four (24) hours. The Contractor will submit a schedule for the hot mix patch installation to the Director(s) for approval in the latter case. Refer to Standard Drawings for details.

When street cuts are required, the following conditions will be met so as to avoid interference with traffic:

A. Street service cuts will be open only between 9:00 a.m. and 4:00 p.m.; and
B. Two-way traffic will be maintained at all times around the construction area. A Traffic Control Plan (TCP) must be prepared in accordance with *Brighton STANDARDS AND SPECIFICATIONS, Section 141.08, Traffic Control, Barricades and Warning Signs*, and submitted to the Director(s) for approval prior to the commencement of construction.

143.01 Pavement Replacement Construction Requirements

Pavement replacement for street cuts will be constructed according to the Standard Details.

144.00 Public Utility Easements

Easements must be dedicated for public utility mains and fire hydrants that extend onto or are looped through private property. Utility services that extend onto private property and service a single property are private and will be maintained by the property owner.

150.00 PERMITS AND INSPECTIONS

All permits are handled through the One Stop Customer Service desk.

160.00 PLANS AND SPECIFICATIONS

Refer to the most recent land use application to determine the amount, size, type of plans that will be needed for each type of submittal. The City will require that plans, computations and specifications be prepared and designed by a Registered Professional Engineer, licensed to practice in the State of Colorado.

EXCEPTION: THE DIRECTOR(S) MAY WAIVE THE SUBMISSION OF PLANS, CALCULATIONS, ETC., IF HE/SHE FINDS THAT THE NATURE OF THE WORK

APPLIED FOR IS SUCH THAT REVIEWING OF PLANS IS NOT NECESSARY TO OBTAIN COMPLIANCE WITH THESE STANDARDS AND SPECIFICATIONS.

161.00 Construction Plan Requirements

All construction plans will be checked for conformance to the STANDARDS AND SPECIFICATIONS prior to acceptance by the City. This acceptance shall be for conformance to City design standards and other requirements; engineering design or needs will remain the responsibility of the professional design engineer. Either written comments or one (1) marked up plan set will be returned if changes are required or recommended. The written comments and/or the marked up plan set shall be returned to the City with the revised plan set. Upon final acceptance of the construction plans by the Director(s), a minimum of five (5) sets of plans and a CD containing the full set in PDF and DWG format will be submitted. The sets of plans shall be signed and sealed by the registered professional engineer, licensed in the State of Colorado (in accordance with The 1973 Colorado Revised Statues, Title 12, Article 25, Paragraph 117) responsible for the design, and shall be signed by the Director(s). One (1) of the signed plans shall be returned to the contractor, one (1) of the signed plans shall be returned to the developer/owner and the City shall keep two (2) sets. The Contractor shall keep the set returned to the contractor on the job for the duration of the project. All construction drawings and prints shall be drawn in 22" x 34" format. Should circumstances warrant changes to the accepted plans or specifications, written approval must be obtained from the Director(s). Copies will be given to the Developer or Contractor and the Design Engineer. It will be the duty of the Design Engineer and the Contractor to record any and all changes on "as-built" drawings at the completion of the project in compliance with Section 222.00, Acceptance Procedures, of these STANDARDS AND SPECIFICATIONS.

161.01 General Requirements

Plans and specifications shall be drawn to scale and shall have sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that they conform to the provisions of these STANDARDS AND SPECIFICATIONS and all relevant laws, Municipal Codes, rules and regulations.

Each set of construction drawings shall include an overall utility drawing(s). The overall utility drawing(s) shall be a plan drawing at a reasonable scale (preferably 1" = 50') and shall show all of the water, sanitary sewer, storm drainage and street construction to be completed under the project.

The City of Brighton utilizes the State Coordinate system. More information is available through the GIS Division.

An AutoCAD file of the Final Plat shall be furnished upon Final Plat approval.

The following items will be shown on all plan sheets:

A. Title Block (lower right-hand corner preferred)
B. Scale (both horizontal and vertical for plans and profiles)
C. Both original date and revision date
D. Name of professional engineer or firm
E. Professional engineer's seal

F. Drawing number(s)

161.02 Plan Details

A. North arrow pointing to the top of the sheet or to the right except in special cases.
B. Property lines; indicate lots to be served by solid lines; other property lines faded
C. Ownership or subdivision information
D. Street names, existing or proposed right of way, and easements with width dimensions
E. Existing utility line (buried) locations and depth, water, gas, telephone, storm drain, irrigation ditches, and sanitary sewers.
F. Other pertinent details, i.e. houses, curbs, water courses, etc.

161.03 Profile Details

A. Vertical and horizontal grids with scales
B. Ground surface existing (dotted) and proposed (solid)
C. Existing utility lines where crossed, include invert elevations
D. Bench marks
E. Existing manhole inverts and rim elevations

161.04 Water Supply Construction Details

In addition to the above general plan and profile details, all water supply construction plans will include the following items:

A. Proposed water mains;
    1. Size
    2. Length
    3. Materials and types of joints
    4. Location dimensions
B. Fittings;
    1. Tees
    2. Crosses
    3. Reducers
    4. Bends
    5. Plugs
    6. Blow-offs

C. Valves – Including hydrant and blow-off valves
D. Fire Hydrants
E. Plan, profile and complete details for off-site transmission mains, pump stations, special valves, and vaults, tanks, etc.
F. Standard bedding detail (cross-section)

161.05 Sanitary Sewer Construction Details

In addition to the general plan and profile details, all sanitary sewer construction plans will include the following:

A. Proposed sanitary sewer mains;
   1. Diameters
   2. Materials
   3. Gradients
   4. Length between manholes
B. Proposed manholes and cleanouts;
   1. Stationing and other number designation
   2. Elevation of inverts in and out of manhole
   3. Elevation of manhole rim
C. Location control dimensions
D. Proposed future extensions
E. Proposed service connections or stub-ins
F. Proposed private under-drain
G. Standard bedding cross-section
H. Proposed concrete encasement
I. Proposed cut-off walls

161.06 Storm Drainage Construction Details

In addition to the above general plan and profile details, all storm drainage construction plans will include the following:

A. Drainage area plan; an overall plan of the area under study showing:

   1. Contours – existing and proposed finished (maximum two foot intervals)
   2. Location and elevation of benchmarks
   3. Property lines
   4. Boundary lines (counties, districts, tributary area, etc.)
   5. Streets and street names and approximate grades
   6. Subdivision (name and location by section)
   7. Existing irrigation ditches
   8. Existing drainage ways including gutter flow directions
   9. Drainage sub-area boundaries
   10. Easements required
   11. Proposed curbs and gutters and gutter flow directions
   12. Proposed cross pans and flow directions
   13. Proposed piping and open drainage ways
   14. Flow calculations for 2, 5, and 100-year storm runoff
   15. Path of 100-year storm runoff flows
   16. Critical minimum finished floor elevations for protection from 100-year runoff
   17. Proposed inlet locations and inlet sizes

B. Proposed pipes;
   1. Plan showing stationing
   2. Profile
   3. Size, lengths between manholes and type of pipe
   4. Grades
   5. HGL for design storm
   6. Inlet and outlet details
   7. Manhole details (station number, invert elevations, and lid details)
   8. Typical bedding detail

C. Proposed open channels;
   1. Plan showing stationing
   2. Profile
   3. Grades
   4. Typical cross section
   5. Lining details

D. Proposed special structures (manholes, headwalls, inlets, trash gates, etc.)
   1. Plan
   2. Elevation
   3. Details of design and appurtenances

161.07 Street Construction Details

In addition to the above general plan and profile details, all street construction plans will include the following:

A. Existing irrigation ditches to be removed or piped
B. Proposed curb, gutter and sidewalk
C. Proposed cross-pans including spot elevation and flow direction
D. Storm drainage facilities
E. Slope of curb return
F. Location and elevation of bench marks
G. Horizontal curve data, with radii, tangents, points of curvature, (P.C.), intersection (P.I.), tangency (P.T.), length of curve, and delta angle.
H. Typical section of street construction showing structure and dimensions
I. Stations and elevations of radius points flow line of curve.
J. Proposed profile of centerlines and flow lines of curb with horizontal stationing
K. Stations, lengths, and elevations of vertical curve P.C., P.I. and P.T.
L. Percent slope of tangent lines
M. Limits of construction
N. Show sufficient existing or future construction to assure continuity of construction
O. Stations and elevations of drainage facilities and other structures
P. Street light and underground service cable locations
Q. Identify street classification, such as local, collector arterial, etc.
R. Signing and striping plan
S. Traffic control plan – as needed

161.08 Area Grading Plan Details

All subdivisions shall include an Area Grading Plan that shall include all pertinent information necessary to construct a dwelling on each lot. At a minimum, the following shall be included:

A. Grading and drainage patterns of existing lots adjacent to subdivision
B. Lot corner elevations
C. Building finished floor or top of foundation elevations
D. Elevations of ground outside of building to ensure proper drainage away from the foundation
E. Elevations and grades of all drainage swales and side lot lines
F. Elevations of all high points
G. One foot contours for lots over .25 acres.

The Area Grading Plan must follow the approved Drainage Plan.

161.09 Erosion Control Plan Details

All subdivisions shall include an erosion control plan. Erosion control plan drawings will use the same base map as that for the Drainage Plan and shall include, at a minimum, the following information:

A. A general location map with sufficient detail to identify drainage flow entering and leaving the development and general drainage patterns.
B. Major construction (i.e., development, irrigation ditches, existing detention facilities, culverts, storm sewers) along the path of drainage.
C. Basins and divides identified with topographic contours.
D. Specifications and details for erosion control measures.
E. A transition grading/drainage plan for construction activities that are phased or sequenced. All residential developments shall require a transition-grading plan.

161.10 Easement Widths

Water, sanitary sewer, and storm sewer easements shall be a minimum of thirty feet (30') in width. Utility locations within easements shall be a minimum of ten feet (10') from the edge of the easement to the center of pipe and 10 feet from center of pipe to center of pipe for more than one utility. For buried utility lines greater than ten feet (10'), the Engineer shall submit proposed easement width for approval by the Director(s).

161.11 Specifications and Support Documentation

The following items shall also be included with submitted construction plans:

A. City of Brighton General Notes
B. Reference on plans to other agency standards and specifications that are required or proposed

C. Where reference to other commonly available standards and specifications will not suffice, copies of specifications are to be provided.
D. Copies of written approval from other affected agencies as required.
E. Soils and other test data and design calculations for street structural sections, drainage facilities and other appurtenances as required.

162.00 Engineering Reports

All engineering reports shall include on the title page 1) the type of report (preliminary or final; Phase I, II, or III for Drainage Reports), 2) the project name, 3) the preparer's name, date, and firm, and 4) P.E. seal of preparer on the final report only.

All submitted reports should be clearly and cleanly reproduced. Photostat copies of charts, tables, nomographs, calculations, or any other reference material must be legible. Washed out or unreadable portions of the report are unacceptable and could warrant re-submittal of the report. All reports shall be typed on 8-1/2" x 11" paper and comb-bound. The drawings, figures, plates, and tables shall be bound with the report or included in a pocket attached to the report. The report shall be prepared by or supervised by a professional engineer licensed in Colorado.

City staff will make every effort to effect a complete review within the review period; however, City staff cannot guarantee the review time since the response time varies with the workload being experienced. The reports and/or construction plans cannot be accepted by default.

The applicant shall note that approval of construction plans, specifications, and associated engineering reports by the City shall only indicate that the plans, specifications, and reports are in general conformance with the City's submittal requirements, current design criteria, standard engineering principles and practices, and previously approved plans and reports. Approval shall not indicate that all assumptions, calculations, and conclusions contained within the drainage reports and/or construction plans have been thoroughly verified by City staff. **At all times, the professional engineer submitting the construction plans, specifications, and drainage reports shall be solely responsible for their accuracy and validity.**

If during the construction process or at any time within one year following the acceptance by the City of the completed improvements, any deficiencies or errors are discovered in the construction plans, specifications, drainage reports, or the actual constructed improvements, the City shall have the right to require the developer to make any and all corrections which may be deemed necessary by the City. The costs associated with any such corrections shall be the sole responsibility of the developer.

162.01 Preliminary Reports

The following preliminary reports must accompany all preliminary plats. The Phase I Drainage Report will be required with the Conceptual Plan submittal: (number of copies to be determined during the application process)

A. Utility Report

B. Phase II Drainage Report
C. Traffic Analysis Report
D. Geotechnical Studies
E. Additional reports as required by the City of Brighton Municipal Code

162.01.01 Preliminary Utility Report Requirements

Preliminary utility reports will include the following information and data as a minimum:

A. Sanitary Sewer
   1. Layout/Connection to City Sewer
   2. Average and Peak Flow Calculations
B. Water System
   1. Layout/Connection with City Water
   2. Potable Water Demand (peak and average)

162.01.02 Preliminary Geotechnical Report Requirements

Geotechnical and soils investigation studies are required for foundation design and pavement design. These two categories may be combined into one report when the purpose of the investigation includes both facets of design. A preliminary geotechnical report shall include the following information at a minimum:

A. General Information
   1. Past and present land uses and features
   2. Proposed use of the land when developed
   3. Surface drainage characteristics
   4. A general geologic report on the area and a discussion of the soil profiles and subsurface features
   5. Potential slope instability
   6. High groundwater elevation
B. Unusual Land Uses/Conditions
   1. Report shall identify all unusual land uses such as landfills, open dumps, wetlands, leach fields, areas of natural springs, faults, mines, etc. These shall be presented in a written and graphical format of suitable scale.

162.01.03 Preliminary Traffic Analysis Report

Required information for the preliminary traffic report shall include, but not be limited to the following.

A. Land use, site and study area boundaries.
B. Existing and proposed site uses.
C. Existing and proposed roadways and intersections.
D. Existing and proposed roadways and intersection capacities and volumes.
E. Trip generation and design hour volumes.
F. Trip distribution.

G. Trip assignments.
H. Existing and projected traffic volumes.
I. Levels of service of all affected intersections for the design hour.

162.01.04 General Drainage Reports

Drainage report calculations and supporting data required as set forth herein shall be prepared in accordance with the UDFCD (Urban Storm Drainage Criteria Manual).

Three copies of all drainage reports shall be submitted to the City for review. The City will retain two copies.

Phase I Drainage Report

The Phase I Drainage Report is the first step in the approval process. A Phase I Drainage Report must be submitted during the platting process. This report will review at a conceptual level the feasibility and design characteristics of the proposed development and drainage system.

Report Contents

The Phase I Drainage Report shall be in accordance with the following outline and contain the applicable information listed:

I. GENERAL LOCATION AND DESCRIPTION
  A. Location
    1. All streets and highways within and adjacent to the site or the area to be served by the drainage improvements
    2. Township, range, section, 1/4 section
    3. All major drainageways and storm drainage facilities within or adjacent to the site
    4. Names of surrounding developments
  B. Description of Property
    1. Area in acres
    2. Type of ground cover and vegetation
    3. Major drainageways within the property
    4. Irrigation facilities such as ditches and canals
    5. Proposed land use
    6. Identification of all wetland areas and the affected area in acres.

II. DRAINAGE BASINS

A. Major Basin Description
1. Reference to applicable major drainage way planning studies, flood hazard area delineation reports (FHAD), and flood insurance rate maps (FIRM)
2. Major drainage basin characteristics such as existing and proposed land uses within the basin
3. Discussion of existing drainage patterns
4. Identification of all irrigation facilities within 150-feet of the property boundary
5. Identification including ownership of all lakes and ponds which either influence or may be influenced by the local drainage. Identification of all dams under the State Engineer's Office jurisdiction including the dam's current rating, status, and pertinent sections and drawings of the dam breach analysis.

B. Sub-Basin Description
1. Discussion of any Master Plan improvements designated for the site.
2. Discussion of existing drainage patterns of the property
3. Discussion of the downstream drainage flow patterns and the impact of the proposed development under existing and fully developed basin conditions

III. DRAINAGE FACILITY DESIGN

A. General Concept
1. Discussion of existing drainage patterns
2. Discussion of compliance with off-site runoff considerations both upstream and downstream
3. Discussion of existing drainage problems or concerns both on-site and off-site
4. Discussion of anticipated and proposed drainage patterns and facilities
5. Discussion of wetlands issues (if any) such as mitigation or replacement
6. Discussion of the content of tables, charts, figures, plates, or drawings presented in the report
7. Discussion of assumptions, techniques, and methodologies utilized
8. Discussion of all referenced reports and studies (i.e., are they valid, complete, etc.)

B. Specific Details
1. Determine the major and minor drainage flows for the major basins
2. Discussion of potential drainage problems encountered and solutions at specific design points
3. General discussion of detention pond storage and outlet design

4. Discussion of maintenance and access aspects of the drainage facility design
5. Discussion of the drainage impacts to downstream properties

C. Adaptations from Criteria
1. Identify provisions by section number for which a adaptation is requested
2. Provide specific and detailed justification for each adaptation requested

IV. SUMMARY

A. Overall summary including conclusions and professional opinions on the existing drainage facilities and the proposed facilities

V. REFERENCES

A. Reference all criteria, storm water master plans, FHADs, FIRMs, and technical information used to support the conceptual design of the proposed drainage system

Drawing Contents

All drawings shall be a maximum 22" x 34" in size.

GENERAL LOCATION MAP

The map should be at a scale of 1-inch = 1000 feet to 1-inch = 4000 feet.

The map shall provide sufficient detail to identify drainage flows entering and leaving the proposed development. The map shall indicate the drainage flow paths from the upstream end of any off-site basin to the receiving major drainageway.

The map shall identify any major facilities (i.e., irrigation ditches, existing detention facilities, culverts, and storm sewers) along the flow path to the receiving major drainageway. All major drainageways shall be identified and shown on the report drawings.

Major basins are to be identified.
Topographic contours are to be included

FLOODPLAIN INFORMATION

A map showing the location of the subject property shall be included with the report

DRAINAGE PLAN

Map(s) of the proposed development at a scale of 1" = 20' to 1" = 100' shall be included. The plan shall show the following:

1. Physical Characteristics
   (a) Existing topography with contours shown in intervals of two feet or five feet for the entire project area
   (b) Proposed topography with contours shown in intervals of two feet or five feet for the entire project, if available
   (c) Existing off-site topography with contours shown in intervals consistent with the on-site information. Off-site topography should extend as follows:
      (1) For projects less than one acre in size, off-site topography for a distance of at least fifty feet in every direction
      (2) For projects larger than one acre in size, off-site topography for a distance of at least one hundred fifty feet in every direction or as directed by the City staff
   (d) Approved grading plans (shown in contour intervals consistent with the on-site information) for all adjacent properties which have not yet been constructed
   (e) Existing vegetation and location, type, and size of significant trees
   (f) All existing wetlands areas

2. All existing drainage facilities both on-site and off-site for a distance as determined in 1(c) above.

3. Major drainage ways and the approximate 100-year floodplain limits based on the most current available information

4. Proposed drainage facilities including location of detention ponds, storm sewers, channels, and corresponding outlet flow paths in a detail consistent with the proposed development plan

5. Major drainage basin boundaries and sub-basin boundaries

6. Any off-site feature influencing the proposed development and the proposed drainage system

7. Proposed drainage flow paths

8. Legend to define map symbols

Title block with revision dates in lower right corner

Phase II Drainage Report

The purpose of the Phase II Drainage Report is to refine the conceptual drainage system and identify in greater detail the problems, which may occur both on-site and off-site as a result of the proposed development. The Phase II Drainage Report shall be submitted with the application for the Preliminary Development Plan. The Phase II Drainage Report must be written in such a manner and contain enough detail to be self-explanatory (i.e., possession of the Phase I Drainage Report is not necessary to understand the Phase II Drainage Report).

The developer or his consultant is responsible for obtaining any and all permits, licenses, and any other documentation/correspondence that are necessary to address any additional issues such as wetlands, floodplains, irrigation facilities, groundwater dewatering, and protection of existing utilities.

Report Contents

The Phase II Drainage Report shall be in accordance with the following outline and contain the applicable information listed:

I. GENERAL LOCATION AND DESCRIPTION

A. Location
1. Township, range, section, 1/4 section
2. All streets and highways including the existing ROW widths within 150 feet of the site
3. Major drainageways and facilities within 150 feet of the site
4. Names of surrounding developments

B. Description of Property
1. Area in acres
2. Ground cover such as the type of trees, shrubs, vegetation, general soil conditions, topography, and slope
3. Major drainageways within and adjacent to the site
4. General project description
5. Irrigation facilities within and adjacent to the site
6. Proposed land use
7. Identification of all wetland areas including the affected area in acres
8. All existing easements within 150 feet of the site

II. DRAINAGE BASINS

A. Major Basin Description
1. Reference to applicable major drainageway planning studies, flood hazard area delineation reports (FHADs), and flood insurance rate maps (FIRMs)

2. Major basin drainage characteristics including existing and proposed land uses
3. Identification of all irrigation facilities within the basin
4. Identification including ownership of all lakes and ponds which either influence or may be influenced by the local drainage. Identify all dams under the State Engineer's Office jurisdiction including the dam's current rating, status, and pertinent sections and drawings of the dam breach analysis

B. Sub-basin Description
1. Discussion of historic drainage patterns of the site
2. Discussion of off-site drainage flow patterns and the impact of the proposed development under existing and fully developed basin conditions

III. DRAINAGE DESIGN CRITERIA

A. Development Criteria Reference and Constraints
1. Discussion of previous drainage studies (i.e., project master plans, Phase I Drainage Reports, etc.) for the site that influence or are influenced by the proposed drainage facilities
2. Discussion of drainage studies for adjacent properties and their effect on the proposed drainage system
3. Discussion of the drainage impact of site constraints such as streets, utilities, and existing structures
4. Discussion of wetlands issues (if any) such as mitigation or replacement.

B. Hydrological Criteria
1. Identify design rainfall for the design recurrence intervals
2. Identify runoff calculation method

C. Hydraulic Criteria
1. Determination of the capacity of the downstream drainage system and its ability to handle the drainage from the development site
2. Preliminary storm sewer system layout including inlets
3. Identify the allowed detention discharge and storage calculation method

D. Adaptations from Criteria

1. Identify provisions by section number for which a adaptation is requested
2. Provide specific and detailed justification for each adaptation requested

IV. DRAINAGE FACILITY DESIGN

A. General Concept
1. Discussion of the proposed drainage system and typical drainage patterns
2. Discussion of compliance with off-site runoff considerations
3. Discussion of the content of tables, charts, figures, plates, or drawings presented in the report
4. Discussion of the contents of referenced reports, studies, etc.

B. Specific Details
1. Discussion of drainage problems encountered and solutions at specific design points
2. Discussion of detention pond storage and outlet design
3. Discussion of maintenance and access aspects of the proposed design
4. Discussion of the necessity of easements and tracts for drainage purposes including the limitations of use
5. Discussion of the impacts on the downstream properties of flow release from the site
6. Discussion of the impact on existing floodplains of major drainageways and the requirements if altering the existing 100-year floodplain

V. SUMMARY

A. Discussion of compliance with CRITERIA, MANUAL, and major drainageway planning studies

B. Drainage Concept
1. Describe how the drainage design will control damage due to storm runoff both on-site and off-site
2. Influence of the proposed development on the Major Drainageway Planning Studies recommendations

VI. REFERENCES

A. Reference all criteria and technical information used

VII. APPENDICES

A. Hydrologic Computations
1. Land use assumptions regarding adjacent properties
2. Major and minor storm runoff peaks at specific design points
3. Historic and fully developed runoff peaks at specific design points
4. Time of concentration and runoff coefficients for each basin and sub-basin

B. Hydraulic Computations
   1. Existing and proposed culvert capacities
   2. Open channel typical sections, capacity, and depths
   3. Detention area, volume, and depth
   4. Downstream drainage system capacity to the major drainageway system

C. Approval and/or Agreement Letter(s)
   1. Approval letter(s) from other jurisdictions, canal companies, pond owners, etc., (if required)
   2. All permits, licenses, etc., for any wetland removal or mitigation as required by the USACE.

Drawing Contents

All drawings shall be a maximum 22" x 34" in size.

I. GENERAL LOCATION MAP

A. The map should be at a scale of 1-inch = 1000-feet to 1-inch = 4000-feet
B. The map shall provide sufficient detail to identify drainage flows entering and leaving the site as well as the drainage flow paths from the upstream end of any off-site basin to the major drainageway
C. The map shall identify any major facilities (i.e., irrigation ditches, existing detention facilities, culverts, and storm sewers) along the entire flow path. All major drainageways shall be identified and shown on the report drawings.
D. Major drainage basins are to be shown
E. Topographic contours are to be included

II. FLOODPLAIN INFORMATION

A. A map showing the location of the subject property shall be included with the report

III. DRAINAGE PLAN

A. Map(s) of the proposed development at a scale of 1" = 20' to 1" = 100' shall be included. The plan shall show the following:

   1. Physical Characteristics:
      (a) Existing topography with contours shown in intervals of two feet for the entire site
      (b) Proposed topography with contours shown in intervals of two feet for the entire site
      (c) Existing off-site topography shown at a maximum of five-foot contour intervals. The off-site topography should extend as follows:

(1) For projects less than one acre in size, off-site topography for a distance of at least fifty feet in every direction

(2) For projects larger than one acre in size, off-site topography for a distance of at least one hundred fifty feet in every direction or as directed by the Town staff.

(d) Approved grading plans (shown at a maximum of five-foot contour intervals) for all adjacent properties which have not yet been constructed

(e) First-floor elevations of any existing or approved structure within one hundred fifty feet of the property line of the project.

(f) Cross-sections as required by the Director of Public Works to illustrate the relationship between the proposed facilities and the existing or approved facilities

(g) All existing wetland areas including their area in acres

2. Existing property lines and easements
3. Streets indicating their ROW width, flow line width, curb type, sidewalk width, and approximate longitudinal slope
4. Existing drainage facilities and structures including irrigation ditches, roadside ditches, cross-pans, drainageways, and culverts. All pertinent information such as material, size, shape, slope, and location shall also be included.
5. Overall drainage basin boundary and sub-basin boundaries
6. The outfall points and flow rates for runoff from the proposed site. Delineation of the off-site flow path to the major drainageway. The drainage facilities necessary to convey the flows to the major drainageway without damaging downstream properties
7. Routing and accumulation of design flows at various critical points for the minor storm runoff using the format shown in Table 202
8. Routing and accumulation of design flows at various critical points for the major storm runoff using the format shown in Table 202
9. Required volumes and release rates for detention pond facilities and general information on the triple stage outlet design
10. 100-year floodplain delineation and corresponding water surface elevations of all existing FHAD and FEMA floodplains affecting the property
11. Locations and elevations (if known) of all existing and proposed utilities affected by or affecting the drainage system design.
12. Routing of off-site drainage flow through the site
13. Legend of map symbols
14. Title block with revision dates in lower right hand corner

162.02 Final Engineering Reports

The following final reports must accompany all final development plans (number of copies to be determined during the application process):

A. Utility Report
B. Phase III Drainage Report
C. Traffic Analysis Report
D. Geotechnical Studies
E. Construction Traffic Routing Plan
F. Additional reports as required by the City of Brighton Municipal Code

162.02.01 Final Utility Report

Final utility reports will include the following information and data as a minimum:

A. Sanitary Sewer
   1. Layout and connection to City sewer
   2. Average and peak flow calculations
   3. Maximum and minimum slope and velocity
   4. Available existing downstream capacity
B. Water
   1. Layout and connection with Town water
   2. Potable water demand (peak and average)
   3. Fire flow demand
   4. Peak instantaneous demand and meter sizing
   5. Available pressure and capacity
   6. Irrigation water demand
   7. Network model of system serving development

162.02.02 Final Traffic Analysis Report:

All subdivision and commercial developments will provide a Traffic Impact Study with their Use-By-Right, Final Development Plan or Final Plat, whichever comes first. This requirement can be waived by the Director of Streets and Fleet or their designee if the applicant demonstrates the proposed project does not exceed 100 trips per day.

Guidelines for Traffic Impact Studies

The purpose of a Traffic Impact Study is to determine existing conditions in the vicinity of the development, forecast the additional traffic that it will generate, and identify internal and external transportation improvements that will be necessary to mitigate the resulting impacts. Following these guidelines when preparing a traffic impact study will present a standard format and facilitate the review process.

The City of Brighton encourages developers to maintain contact with City personnel throughout the development process. Traffic consultants are highly encouraged to discuss projects with the City and its representatives prior to study startup. An early meeting may be appropriate for large projects to identify the study area and specific roads and intersections that will be analyzed. The study report should identify the individual who conducted the study.

All traffic impact studies shall contain, as a minimum, the following information:

A. Summary of the existing conditions in the vicinity of the project
   1. Current use of the site and surrounding area (include map showing the general vicinity of the site)
   2. Existing roadway system and traffic (daily and peak hour volumes) on roadways and intersections that will be affected (include graphic). Field traffic count data should be included in an appendix.
   3. Analysis of current traffic operations (include computer printouts - to appropriate level of detail - in appendix).
   4. Recent traffic accidents may need to be investigated and the effect of the proposed development determined.
   5. Discussion of other potential developments in the study area that might also affect traffic. Traffic forecasts from traffic impact studies of nearby developments may need to be included in the analysis.

B. Description of the proposed development
   6. Development proposal - Parcel size(s), proposed land use, number of units, size of developed area, density, etc. A site plan detailing uses, locations, and internal roads should be included if possible.
   7. Trip generation tabulation. Trip generation shall be based on average rates contained in the most recent edition of the Institute of Transportation Engineers' Trip Generation. The City shall approve any estimated rates that deviate from ITE averages or for uses where ITE information is not available. Rate and trip information shall be provided in tabular form. Any trip reductions should be calculated based on procedures outlined in ITE's Trip Generation Handbook, 1998 and fully documented in the report.
   8. Alternative modes (transit, pedestrian, and bicycle) should be considered, as appropriate.
   9. The City's latest transportation master plan should be reviewed to determine the project conformance with it and any deviations that are proposed.

C. Traffic Forecasts
   10. All project-generated traffic shall be assigned to existing and planned facilities in a manner consistent with accepted traffic patterns and approved by City staff. A graphic should be included to illustrate the assumed trip distribution.
   11. Traffic volumes (peak hour and ADT) in graphical format should illustrate current year, short-term or build-out year, and long-term (20 year) traffic volumes for site-generated and total traffic. Phased development volumes and background traffic forecasts may also be appropriate. Long-range

forecasts of background traffic may be based on the current Regional Transportation Plan from DRCOG.

D. Traffic Operations Analysis

12. The operational analysis should show impacts on the existing roadway system, the expected future roadway system, and any interim roadway system that may correspond to expected development phases.
13. There should be graphical presentation(s) of the results of the level of service (LOS) analysis for intersections and/or roads, plus tabulations if necessary to show delays or v/c percentages. Output from the computer analysis should be included in an appendix.
14. Signal warrants should be investigated at locations where signals are proposed.
15. Progression and micro-simulation analysis may be required depending on project needs and complexity.

E. Improvement recommendations

16. Roadway and intersection improvements necessary to mitigate the impacts of the project should be summarized in written format with supplemental tabulations and/or figures, which illustrate the locations and relationships of the recommendations.
17. Proposed roadway cross-sections and auxiliary lanes at intersections are of particular concern. Storage and deceleration/acceleration lengths for turn lanes should be determined according to guidelines found in the State Highway Access Code, or other recognized reference.
18. The use of low volume local road cross section within residential subdivisions should be justified.
19. Access to arterial roadways generally follows guidelines set forth in the State Highway Access Code. Regional Arterials are classified by CDOT, Principal Arterials are considered equivalent to NR-A, and Minor Arterials are comparable to NR-B.

162.02.03 Final Geotechnical Report

Geotechnical and soils investigation studies are required for foundation design and pavement design. These two categories may be combined into one report when the purpose of the investigation includes both facets of design. A subsurface investigation for foundation and/or pavement design shall include the following information and data as a minimum:

A. General Information

1. Past and present land uses and features
2. Proposed use of the land when developed
3. Structure type
4. Groundwater
5. Surface drainage characteristics
6. A general geologic report on the area and a discussion of the soil profiles and subsurface features
7. Potential slope instability

B. Investigation Details
   1. Type of equipment used in obtaining data
   2. Date of drilling
   3. Boring logs which show the elevation of the existing ground, the elevation of the top of each soil stratum encountered and the soil classification of each stratum encountered, the water level at the time of boring and the level at a later date and standard penetration test results for each soil stratum. Each hole shall be referenced to a fixed benchmark.
   4. A sketch of the tested area accurately showing the locations of the borings.

C. Site Conditions/Foundation Design
   1. Specific information including swell potential of the soil and the effect on foundations.
   2. A recommendation as to foundation types and any special procedures that may pertain to construction.
   3. The effect of ground water on construction and methods to deal with any problems that may exist.
   4. Recommended allowable soil bearing pressures and unconfined shearing strength.
   5. Methods of prevention of swell and shrinkage of expansive soils and minimizing their effect on structures.
   6. Natural moisture content of the soil strata.
   7. Specifications for any unusual or special construction materials required.

D. Unusual Land Uses/Conditions
   1. Report which identifies all unusual land uses such as landfills, open dumps, wetlands, leach fields, areas of natural springs, faults, mines, etc. These shall be presented in a written and graphical format of suitable scale.

162.02.04 Phase III Drainage Reports

Drainage report calculations and supporting data required as set forth herein shall be prepared in accordance with the UDFCD Urban Storm Drainage Criteria Manual.

The purpose of the Phase III Drainage Report is to finalize the proposed drainage system discussed in the Phase II Drainage Report and to present the final design details and calculations. This report shall contain sufficient detail to be self-explanatory and shall include all reports referenced. (i.e., possession of the Phase I Drainage Report or Phase II Drainage Report is not necessary to understand the Phase III Drainage Report).

The Phase III Drainage Report shall be submitted with the final construction drawings. The Phase III Drainage Report (which updates the Phase II Drainage Report) must be reviewed and accepted by the Engineering Division before the final development plan will be signed by the City.

The Phase III Drainage Report shall include a Permanent Stormwater Best Management Practices Maintenance Agreement.

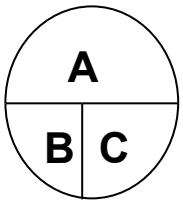
The Phase III Drainage Report shall be prepared in accordance with the outline shown in Section 162.01.04 Phase II Drainage Report - **Report Contents** with the exception of Part VII-B. For the Phase III Drainage Report, Part VII-B shall read as follows:

B. Hydraulic Computations
   1. Existing and proposed culvert capacities
   2. Storm sssewer profiles including energy grade line (EGL) and hydraulic grade line (HGL) elevations with the associated hydraulic computations
   3. Gutter and street cross-section capacities compared to the maximum allowable street flows
   4. Storm inlet capacity including inlet control rating at connection to storm sewer
   5. Open channel design: depth, capacity, velocity, and Froude number calculations
   6. Check drop and/or channel drop structure design calculations
   7. Detention area, volume, design depths, and outlet capacity
   8. Detention pond outlet design
   9. Downstream drainage system capacity to the major drainageway
   10. Rip-rap design calculations

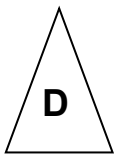
The report drawings shall follow the requirements presented in Section 162.01.04 Phase II Drainage Report - **Drawing Contents** with the following three items added to Part III-A:

   15. Proposed gutter type, street capacity, roadside ditch, slope, flow directions, and cross-pans.
   16. Proposed storm sewers including inlets, manholes, culverts, and other appurtenances
   17. Proposed open channels with rip-rap protection

Table 202
Drawing Symbol Criteria and Hydrology Review Table



A = Basin Designation
B = Area in acres
C = Composite Runoff Coefficients
D = Design Point Designation



Summary Runoff Table
(To be placed on the drainage plan)

Design Point	Contributing Area (acres)	Runoff Peak 5-year event (cfs)	Runoff Peak 100-year event (cfs)

170.00 DEFINITIONS AND ABBREVIATIONS

171.00 Definitions

Whenever the following terms are used in these STANDARDS AND SPECIFICATIONS, they will be defined as follows:

Bonds – financial guarantees in the form of cash escrow, performance, permit, or subdivision bonds, irrevocable standby letters of credit, and other instruments of security furnished by the Developer or Contractor and his surety in accordance with the permits, Development Agreements or other Agreements with the City.

City - the City of Brighton acting through the Director(s) or authorized designee.

City Municipal Code - the latest, officially adopted City of Brighton Municipal Code.

Common Facilities - facilities serving or held in common title by the owners or occupants of two or more dwelling units or commercial or industrial enterprises and covered by these STANDARDS AND SPECIFICATIONS.

Contractor - a person that undertakes to construct, alter, move, demolish, repair, replace, excavate or add to any public improvements or common facilities covered by these STANDARDS AND SPECIFICATIONS.

Contractor of Record – the responsible contractor as listed a general or primary contractor on a permit

Days - calendar days unless otherwise specified.

Developer - the person or persons legally responsible to the City for construction of improvements within a subdivision.

Director(s) - The City of Brighton department Directors or their authorized designees.

Equipment - all machinery and equipment, together with the necessary supplies for upkeep and maintenance, and tools and apparatus necessary for the proper construction and acceptable completion of the work.

Field Order – are issued in writing when there is to be a change from what is shown on the plans and/or what is called for in the specifications, can be upgraded to a change order or construction modification order (extra work order) if costs are involved

Inspector - the authorized representative of the Director(s) assigned to make detailed inspections of construction work to assure compliance with these STANDARDS AND SPECIFICATIONS and the plans as approved by the City.

Plans - profiles, cross sections, drawings, and supplemental drawings, accepted by the City that show the locations, character, dimensions or details of the work.

Public improvements - improvements under the ownership or control of the City including but not limited to the components of the water system, sewer system, street system, park system, public landscape improvements, and storm drainage system covered by these STANDARDS AND SPECIFICATIONS. The term also includes similar improvements being built in connection with a subdivision that are intended to be dedicated to the City.

PVC (Polyvinyl Chloride) - a strong, tough plastic based on resins made by the polymerization of vinyl chloride or co-polymerization of vinyl chloride with minor amounts (not over 50%) of other unsaturated compounds, which are fashioned into sheets, tubing, pipe, conduit, containers, insulation, etc.

Regular working hours - Seven (7) A.M. until seven (7) P.M. of the same day, Monday through Friday. Arterial Streets - Eight (8) A.M. until four (4) P.M. of the same day, Monday through Friday unless approved by the Director(s).

Special provisions - special directions, provisions or requirements peculiar to the project and not otherwise detailed or set forth in the specification.

Standards and Specifications - the body of directions, provisions, and requirements contained herein, describing the method or manner of construction and the qualities and quantities of the materials and work to be furnished.

Substantial Completion/Construction Acceptance - that date, as determined by the Director(s), when the construction project or a specified part thereof is sufficiently completed, in accordance with these STANDARDS AND SPECIFICATIONS, so that the project or a specified part can be utilized for the purposes for which it is intended and when the warranty period begins.

Supplier - an individual, firm or corporation having a direct contract with a developer or contractor or with any subcontractor for the manufacture or furnishing of any part of the supplies and/or materials to be used at or incorporated in, work at the site.

172.00 Abbreviations

AASHTO - American Association of State Highway and Transportation Officials

ACI - American Concrete Institute

AISC - American Institute of Steel Construction

ANSI - American National Standards Institute

APWA - American Public Works Association

ASA - American Standards Association

ASTM - American Society for Testing and Materials

AWG - American Wire Gauge

AWWA - American Water Works Association

BPR - Bureau of Public Roads

CDOT - Colorado Department of Transportation

CDPHE - Colorado Department of Public Health and Environment

FCC - Federal Communications Commission

gpcd - gallons per capita per day

gpm - gallons per minute

GRC - galvanized rigid conduit

IMSA - International Municipal Signal Association

IPCEA - Insulated Power Cable Engineers Association

ITE - Institute of Transportation Engineers

MGD - million gallons per day

MUTCD - Manual of Uniform Traffic Control Devices

NAPA - National Asphalt Paving Association

NEC - National Electrical Code as approved by the American Standards Association

NEMA - National Electrical Manufacturers Association

NFPA - National Fire Protection Association

psi - pounds per square inch

UBC - Uniform Building Code

UDFCD - Urban Drainage and Flood Control District

UPC - Uniform Plumbing Code

UL - Underwriters Laboratories, Inc.

USDA - United States Department of Agriculture

173.00 Terms

Whenever, in these STANDARDS AND SPECIFICATIONS, the words "as ordered", "as directed", "as required", "as permitted", "as allowed", or words or phrases of like import are used, it will be understood that the order, direction, requirement, permission, or allowance of the city is intended.

Similarly, the words "approved", "reasonable", "suitable", "acceptable", "accepted", "properly", "satisfactory", or words of like effect and import, unless otherwise specified herein, will mean approved, reasonable, suitable, acceptable, accepted, proper, or satisfactory in the judgment of the Town. Whenever, in these STANDARDS AND SPECIFICATIONS, the words "Director(s)" are used, it will be understood that the City employees named therein will be whomever the City Manager designates or whoever may be the authorized designee of the Director(s).

174.00 Specifications by Reference

All specifications, i.e., ASTM, ACI, etc. made a portion of these STANDARDS AND SPECIFICATIONS shall be from the latest edition of said reference.

Throughout these STANDARDS AND SPECIFICATIONS, any section referenced shall be deemed to include all sub-sections of that section. Any portion of these STANDARDS AND SPECIFICATIONS that may be applicable to any other section, whether referenced or not, shall apply.