

12.0 DRAINAGE

The Project shall include all Work for the modification of existing drainage facilities, construction of new drainage facilities, construction of Permanent Stormwater Quality Facilities (PSQFs) required to accommodate design flows, meet Project design criteria, and comply with the terms and conditions of the CDOT MS4 Permit and Book 2, Section 19 (Sections 101, 107, and 208).

The Contractor shall design and construct a complete storm-drainage system to intercept and remove surface runoff from the highway and local streets, and maintain surface, channel, and conduit flow through the ROW. The Contractor shall utilize the 120th Avenue Connection Master Plan Drainage Report as the basis for the storm-drainage system. The Contractor shall also design and construct the storm-drainage facilities to limit drainage-related hazards within and outside the ROW, while minimizing future operation and maintenance costs, public inconvenience, flood damages, and water-quality impacts during construction.

All existing drainage facilities the Contractor intends to leave in place for continued use shall be:

1. Evaluated and verified to have adequate hydraulic capacity.
2. Evaluated and documented to be in acceptable existing condition suitable for the intended use.
3. Evaluated and verified to be structurally adequate if subjected to additional embankment, and/or live loading.

The materials included in the Reference Documents provide information regarding drainage concepts and permanent detention and water quality features.

All existing culverts, storm sewer, and drainage appurtenances to be abandoned shall be removed or plugged and filled with flow-fill.

All drainage facilities of the Project shall be constructed to meet Project design criteria. Where the hydraulic capacity or existing condition of drainage facilities upstream or downstream of the Project are inadequate, the drainage facilities of the Project shall still be constructed to meet Project design criteria, and flow-restriction devices that can be removed in the future when improvements to the existing off-site drainage facilities are made by others, shall be constructed to limit discharges to existing conditions. The Contractor shall obtain approval from Broomfield of all on-site hydrologic analyses for any proposed on-site drainage improvements that are connected to existing storm-drainage systems, upstream or downstream of the Project.

The Contractor shall design drainage facilities compatible with existing or proposed drainage systems on adjacent properties, and shall maintain existing drainage patterns. If existing drainage patterns must be changed due to design of the Project, the Contractor shall design a solution that does not adversely impact property owners outside the ROW and obtain Approval from CDOT prior to construction. Where drainage patterns are changed from existing, the Contractor shall secure all other necessary approvals, permits, and easements.

12.1 Administrative Requirements

12.1.1 Coordination with Other Agencies and Disciplines

The Contractor shall coordinate all water-resource issues with affected regulatory agencies where appropriate. The Contractor shall include CDOT in all contacts with water-resource regulatory agencies.

12.1.2 Permits

The Contractor shall be cognizant of and adhere to the requirements of the various permits that will be necessary for construction and operation of this Project. Unless otherwise indicated, the Contractor shall be required to obtain all permits. Also, the listing herein is not all-inclusive and it shall be the responsibility of the Contractor to determine all of the permits required in order to perform the Work.

12.1.2.1 CDPS - Stormwater Construction Permit

The Contractor shall obtain a CDPS Stormwater Construction Permit from CDPHE for construction of the Project. The Contractor shall adhere to all requirements of the CDPS Stormwater Construction Permit and the Construction Section of CDOT's and City and County of Broomfield's MS4 permits.

Per the permit requirements, the Contractor shall prepare a Stormwater Management Plan (SWMP) detailing BMPs to control erosion and sedimentation, and the discharge of any pollutants that may enter stormwater and be transported to receiving waters during construction of the Project. The Contractor shall install PSQFs for the Project in accordance with the CDOT Erosion Control and Stormwater Quality Guide and UDFCD Criteria.

Where permanent seeding operations are not feasible due to seasonal constraints (e.g., summer and winter months), the Contractor shall have mulch and mulch tackifier applied to disturbed areas to prevent erosion.

The Contractor shall use erosion control blankets on slopes steeper than 3H:1V, newly seeded slopes to control erosion and to promote the establishment of vegetation. Slopes shall be roughened at all times and concrete washout contained.

Non-structural BMPs may include litter and debris control, street sweeping, and landscaping and vegetative practices.

The Contractor shall construct settling ponds for effluent from dewatering operations, if needed.

The Contractor shall be responsible for temporary drainage of the Project area during construction of the Project. The Contractor shall keep all existing storm drainage systems used for temporary drainage of the Project in operating condition during construction. Prior to the start of construction, the Contractor shall locate and clean all existing storm drainage systems. Throughout the duration of the permit, the Contractor shall continually protect inlets from sediment and pollutants and, if needed, shall remove any material deposited in the systems as a result of the Contractor's activities. All inlets shall be identified on the SWMP site map.

12.1.2.2 Municipal Separate Storm Sewer System (MS4) Permit

CDOT has obtained an MS4 Permit for the storm sewer systems that it owns and maintains (included in Book 3). The Contractor shall be responsible for complying with the terms and conditions of the CDOT MS4 Permit that pertain to the Project.

The Preliminary Plans included in the Reference Documents and the 120th Avenue Connection Master Plan Drainage Report provide information regarding drainage concepts and permanent detention and water quality features which determined, at a conceptual level, the feasibility of implementing PSQFs for the Project.

The findings included in these documents can be used as a starting point to develop and design a more detailed permanent stormwater quality improvement plan. The conceptual recommendations included in the report describe the type and location of PSQFs that could be implemented. Based on the conceptual assessment, it is practical to intercept and provide 100-year detention and stormwater quality treatment for the upper portion of the City Park Basin prior to crossing under US 36. For the Airport Creek Basin, it is practical to intercept and provide 10-year detention and stormwater quality treatment.

In addition, the design of all ponds shall provide a storage volume for 100 percent of Water Quality Capture Volume (WQCV) and an outlet structure shall be designed to release the WQCV over the required drain time. Both the WQCV and the outlet structure shall be designed in accordance with Urban Drainage & Flood Control District (UDFCD) criteria.

Ponds for the Project shall include extended detention basins with a pre-sedimentation forebay, concrete low-flow channel, and a micropool. Underground facilities which require confined-space entry for routine maintenance shall not be used. Alternate PSQFs as defined in CDOT's Erosion Control and Stormwater Quality Guide (Chapter 6) may be used with approval from CDOT. Ponds shall not be installed in a floodplain.

The Contractor shall immediately notify CDOT and Broomfield of any suspected illicit or improper connections or discharges into any storm-sewer system which have been discovered during design or construction of the Project. CDOT and Broomfield will be responsible for investigation of the suspected illicit connection and implementing corrective action. The Contractor shall not maintain, reconnect, or otherwise allow discharge of improperly disposed materials into the storm-sewer system within the limits of the flows leaving the Project.

12.1.2.3 Construction Dewatering Permit

See Section 5

12.1.2.4 USACE Section 404 Permit

See Section 5

12.2 Design Requirements**12.2.1 Drainage Design Software**

The following software (most recent versions) shall be used in performing drainage design calculations.

1. CUHP/SWMM
2. USACE, HEC-RAS
3. Haestad Methods, StormCAD
4. Haestad Methods, Flow Master
5. Haestad Methods, Culvert Master
6. FHWA, HY-8

12.2.2 Data Collection

The Contractor shall identify all water-resource issues, utilizing available data, including requirements imposed by Local, State, and Federal government regulations, and official documents concerning the Project, such as the Environmental Assessment. Water-resource issues include, but are not limited to, areas with historically inadequate drainage (as evidenced by recorded flooding or citizen complaints), environmentally-sensitive areas, drainage-maintenance problems, and areas known to contain hazardous waste.

The Contractor shall obtain existing storm-drainage improvement plans, drainage planning studies, and drainage reports for the Project area from Broomfield, Urban Drainage & Flood Control District, and CDOT.

The Contractor shall obtain existing and projected future land uses from Broomfield and shall design facilities to be compatible with drainage systems, existing or proposed, on adjacent properties.

The Contractor shall perform detailed mapping and surveys as required to verify locations of existing drainage features necessary for the proposed drainage design. The Contractor shall verify or identify boundaries, flow patterns, and land uses of drainage basins based on field observations.

The Contractor shall resolve all conflicts between Utilities and proposed drainage improvements in accordance with Section 7.

12.2.3 Surface Hydrology

The Contractor shall perform hydrologic analyses for all on-site drainage basins, and for all off-site drainage areas immediately adjacent to the Project that contribute runoff directly to the on-site drainage basins, based on projected future land uses.

The on-site hydrologic analyses shall identify the impacts to the existing storm-drainage systems caused by the connections and proposed combined peak design discharges for the overall systems.

12.2.3.1 Design Frequencies

The design frequency for the drainage facilities on 120th Avenue for the Project shall comply with CDOT requirements for the various hydraulic structures. The design frequency for drainage facilities for all other roadways in the Project area shall comply with Broomfield criteria or as stated in the 120th Avenue Connection Master Plan Drainage Report. Drainage systems for the

basins which outfall to the Airport Creek pond must accommodate 100-year future developed flows with no on-site detention in the remaining private property parcels.

The storm sewer outfall from the Airport Creek pond to 116th Avenue and the outfall ditch to the BNSF Railroad ROW must accommodate 100-year interim conditions flows.

12.2.3.2 Precipitation

For rainfall duration of less than one hour, rainfall intensity shall be obtained from Rainfall Intensity Curves included in the Broomfield criteria.

12.2.3.3 Hydrologic Methods

The Contractor shall perform the necessary hydrologic analyses using the following methods:

Areas greater than 160 acres shall be evaluated using the CUHP/SWMM procedure.

Areas less than 160 acres shall be analyzed for peak flow only. Areas less than 90 acres may be evaluated using the Rational Method.

The hydrologic analyses shall be based on fully-developed conditions for the drainage basins.

12.2.4 Hydraulic Structures

12.2.4.1 Roadways

Roadway component geometric configurations shall be designed to provide adequate drainage and minimize hydroplaning and icing problems. Cross slopes shall be in accordance with the requirements of Book 2, Section 13

Roadway Profile

Longitudinal grades shall be in accordance with the requirements of the Roadway Section. Where minimum profile grades cannot be obtained in sag vertical curves, additional inlets shall be constructed in the curb and gutter, or adjacent to the solid barrier guardrail, as required in the CDOT drainage design manual.

Allowable Flow Spreads and Depths

For a normal crown section, the allowable flow spreads for 120th Avenue shall be to the shoulder line (edge of the 4-foot bike lane) for the 5-year return frequency peak discharge, and 4 feet beyond the shoulder line for the 50-year return frequency peak discharge. For a superelevated section, the allowable flow spreads for 120th Avenue shall be 5 feet beyond the curb flowline for the 5-year return frequency peak discharge, and 9 feet beyond the curb flowline for the 50-year return frequency peak discharge. The allowable flow spreads and depths for the other streets of the Project shall comply with Broomfield criteria.

Edge Treatment

In areas where the roadway pavement discharges runoff to a slope steeper than 4:1, asphalt curb, Type 3 guardrail with asphalt curb, or Type 7 guardrail shall be used to collect flow from the roadway and convey it to inlets or rundowns to prevent erosion of the embankment.

Roadside Ditches and Open Channels

For roadside ditches along all existing and proposed roadways, the water surface profile shall not exceed edge of shoulder for the 100-year return frequency peak discharge. Open channels within the Project shall be designed to capture and convey the 100-year return frequency. Capacity shall be determined using Manning's Equation. All ditches and swales with a grade exceeding 2% shall be constructed with a turf reinforcement mat. Flexible channel linings shall be designed in accordance with FHWA HEC-15, Design of Stable Channel with Flexible Linings. Riprap channel lining shall be designed in accordance with FHWA HEC-11, Use of Riprap for Bank Protection. The geometric layout shall be in accordance with the AASHTO Roadside Design Guide, and shall consider hydraulics, safety, maintenance, long-term permanent erosion control, landscaping, and aesthetics.

12.2.4.2 Culverts

Culverts for 120th Avenue and collector-distributor roads shall be designed for the 100-year return frequency peak discharge. Hydraulic design of culverts shall be based on the procedures included in FHWA HDS No. 5, Hydraulic Design of Highway Culverts. Hydraulic design data shall be listed on the Final Design Plans for each culvert, including drainage area, peak discharges, allowable headwater elevation, and design headwater elevation.

The minimum allowable pipe size for cross culverts shall be 36 inches unless approved by CDOT. End sections, or headwalls with beveled edges and wingwalls shall be provided for all culverts regardless of size. To minimize culvert barrel sizes, improved culvert inlets may be utilized. Improved inlets shall be designed based on FHWA HEC-13, Hydraulic Design of Improved Inlets for Culverts. Allowable headwater elevation for the 100-year return frequency peak discharge shall be limited to the minimum of the following:

1. Non-damaging to upstream or adjacent property
2. Below edge of roadway shoulder elevation.
3. Headwater/depth ratio requirements as shown in the CDOT Drainage Design Manual (except for existing concrete box culverts).
4. Elevation that would cause overflow to another drainage basin.

Existing culverts that do not meet the criteria of this section shall be removed and replaced with new culverts. Improved inlets or additional barrels may also be constructed for existing culverts in order to meet the criteria of this section. The existing conditions at a culvert for headwater and flow path (both into and from the existing culvert) shall be documented in the drainage report. Improvements to existing culverts shall maintain existing headwater elevations and flow paths. Analysis of the consequences to adjacent properties shall be provided if modifications to headwater elevation or flow path are proposed.

12.2.4.3 Storm Sewer System

Runoff from within the limits of the Project and stormwater draining onto the Project, collected and conveyed in a storm sewer system, shall be designed for the 5-year return frequency peak discharge for 120th Avenue. Storm sewer system within the Airport Creek basin portions of Commerce Street, 118th Avenue, and Wadsworth Boulevard shall be designed to accommodate future 100-year fully developed flows from contributing areas as described in the Master Plan

Report. The storm sewer system shall be designed to not worsen the existing conditions for properties outside the ROW. Ponding will not be permitted within the Project, except at specifically designed stormwater detention facilities. The storm sewer system generally consists of a trunkline, laterals, inlets and manholes.

Hydraulic analyses and plans for storm sewers that are connected to existing storm sewer systems upstream or downstream of the Project must be approved by Broomfield. The hydraulic analyses shall identify impacts to the existing storm sewer systems caused by the connections and proposed combined peak-design discharges for the overall systems.

Hydraulic Design of Storm Sewers

Storm sewer design shall be performed using hydraulic gradient analysis to account for all friction and minor losses. Friction losses shall be calculated using Manning's Equation. Minor losses at junctions, manholes, bends, and other appurtenances shall be calculated based on design procedures in the FHWA HEC-22, Urban Drainage Design Manual.

Storm sewers under 120th Avenue, collector-distributor roads, and city arterial roadways, shall be designed with the hydraulic gradient below the top of pavement and inlet grates for the 5-year return frequency peak discharge. The hydraulic gradient shall be plotted with the storm sewer profile.

The flow velocity of storm sewers shall not be less than 3 feet per second for the 5-year return frequency peak discharge and shall not be greater than 22 feet per second for the major storm discharge (100-year). Broomfield criteria shall be followed for storm sewer system design outside of CDOT ROW.

Storm Sewer Alignment, Profile, and Size

Storm sewer alignments shall be straight between structures wherever possible.

Profiles of all storm sewers shall be straight grades between structures.

The minimum pipe size for storm sewer within CDOT ROW shall be 18-inch diameter. The Contractor shall comply with Broomfield criteria for storm sewer outside CDOT ROW.

Inlets

CDOT M&S Standard inlets shall be used within CDOT ROW. Type C and Type D inlets shall not be allowed within the roadway pavement limits unless used in conjunction with rundowns. Broomfield inlets shall be used on all city streets. Inlets shall be designed for HS-20 or interstate alternate live loading. Bicycle-safe grates are required for inlets on 120th Avenue. Pedestrian-safe grates shall be used in pedestrian areas. All inlet locations shall be shown on the SWMP site map.

Inlet hydraulic efficiency and spacing shall be determined based on design procedures in the FHWA HEC-22, Urban Drainage Design Manual. Bypass flows shall be considered in all storm-drain calculations. Maximum inlet spacing shall be designed based on allowable flow spread or the manhole spacing criteria, whichever is less.

The low point of sag vertical curve inlets shall be designed for the 50-year return frequency peak discharge for 120th Avenue. At sump locations on 120th Avenue, flanking inlets shall be

constructed on each side of the sump to provide relief should the sump inlet clog. The flanking inlets shall be located so that the design criteria for ponding are met even if the sump inlet is completely clogged.

To prevent crossroad flow, inlets shall be located 10 feet upstream of the point where the roadway cross-slope begins to superelevate towards the opposite side.

Inlets shall be designed using the clogging factors in the CDOT Drainage Design Manual.

Manholes and Junction Structures

Manholes and junction structures shall be incorporated into the storm sewer system to provide access for inspection, cleaning, and other maintenance activities. Manholes shall be constructed at all junctions, changes in pipe size, drops, and grade changes. Manholes shall be provided at any change in horizontal alignment greater than 2 degrees. Inlets may be used in lieu of manholes, where approved by CDOT. Manholes shall not be located in traveled-way areas of 120th Avenue.

A lateral that is less than half the size (diameter) of the trunkline and no more than 75 feet long may be connected to the trunkline with a prefabricated pipe wye or tee connection. Larger laterals shall be connected to the trunkline with a manhole.

The spacing of manholes shall be in accordance with the criteria identified in the CDOT Drainage Design Manual. The spacing of manholes outside of CDOT right-of-way shall be in accordance with Broomfield criteria. For storm sewer sizes larger than 60-inch diameter, manholes shall be located considering site conditions that provide for staging of large scale maintenance activities.

Manhole and junction structure floors shall be shaped to fit the pipe inverts.

12.2.4.4 Culvert and Storm Sewer Outfalls

Culvert and storm sewer outfalls shall be designed so that the outlet elevation is as close as possible to the receiving drainageway flowline to prevent erosion. Outfalls shall be oriented in a downstream direction, as much as practical, unless a physical obstruction prohibits in which case energy dissipaters shall be used. Permanent erosion protection shall be provided at all outfalls and along the drainage flowlines. Energy dissipaters shall be designed in accordance with the FHWA HEC-14, Hydraulic Design of Energy Dissipators for Culverts and Channels. Outfalls shall be designed to minimize all existing habitat disturbances during construction.

The effects of the tailwater in the receiving drainageway on the hydraulics of the outfall shall be evaluated. The design frequency of the tailwater of the receiving drainageway shall be based on the comparison of design discharge frequencies for coincidental occurrence included in the FHWA HEC-22, Urban Drainage Design Manual.

12.2.4.5 Sub-Drainage Systems

Sub-drainage systems (e.g. underdrains) shall be designed in accordance with the CDOT Drainage Design Manual. Sub-drainage systems shall be discharged to the stormwater system in compliance with regulations for groundwater-discharge and control of water quality.

Groundwater was encountered during the construction of the 120th Avenue and Wadsworth intersection and mitigation was required during construction. Groundwater is anticipated to be encountered again during construction of this Project. Refer to subsurface analysis in Section 10 of this manual.

12.2.4.6 Stormwater Detention Facilities

The Contractor shall evaluate the need for stormwater-detention facilities in open areas of the Project to reduce peak discharges and limit impacts to downstream facilities. Stormwater detention facilities for the Project shall be designed according to Urban Drainage and Flood Control District criteria. 100 percent of the water quality capture volume (WQCV) shall be incorporated into the design of stormwater detention facilities.

The elevation of the emergency spillway shall be at the elevation of the routed 100-year water surface. The emergency spillway shall have the capacity to convey the routed 100-year peak discharge. Detention-pond embankments shall provide a minimum of one foot of freeboard above the routed 100-year water surface elevation through the emergency spillway.

For the Airport Creek pond, 100-year future developed flows in excess of the pond storage capacity shall be diverted to a bypass pipe in a manner that will prevent overflow from the pond. An overflow structure for flows in excess of the 10-year future developed event shall be incorporated into the pond design. The bypass pipe shall be connected to the storm sewer outfall from the pond outlet.

The low-level outlet shall include a debris rack with a total opening size at least twice the size of the low-level outlet. Low-flow channels to convey nuisance flows shall be provided for all detention ponds, from inflow locations to the primary low-level outlet. Minimum grades within the basin shall not be less than 0.5 percent.

Detention basin slopes and bottom shall be protected against erosion from inflows and circulation within the basin. Slopes of earth embankments for detention facilities steeper than 4:1 will not be Accepted by CDOT or UDFCD. Slopes in detention facilities shall be planted with a grass mix that minimizes maintenance requirements.

Existing unintended detention storage volume at the entrance to existing culverts or storm sewer systems shall not be considered to reduce peak discharges downstream.

12.2.4.7 Bridges and Deck Drainage

Deck-drainage systems are required for highway bridges when flow spread due to the design storm are exceeded, and to limit flow across expansion joints to less than 1 cubic foot per second for the 10-year return frequency peak discharge. Stormwater flowing toward the bridge shall be intercepted prior to the approach slab. Stormwater flowing away from the bridge shall be intercepted prior to leaving the approach slab. This stormwater shall be directed to an appropriate outfall. Bridge deck drainage systems shall be designed in accordance with the FHWA HEC-21 Bridge-Deck Drainage Systems.

All bridge-deck drain inlets shall be grated. The bridge-deck drainage system shall be compatible with structural reinforcement, components, and aesthetics of the bridge. Outfalls shall be positioned to avoid corrosion of structural members, and splash on vehicular traffic and pedestrian areas below the bridge. All deck drains shall be piped to the bottom of the slope.

Adequate erosion protection shall be constructed at all outfalls. Downspouts for bridge drains shall be at minimum 10-inch diameter galvanized steel pipe and shall meet the requirements of ASTM A53, Grade B, and standard weight schedule 40. Downspout pipe shall be hot-dipped galvanized after fabrication. Galvanizing shall meet the requirements of AASHTO M111. Metal used in the manufacture of castings shall meet the requirements of ASTM A48, Class 35B. Cleanouts shall be provided for all downspout systems.

12.2.4.8 Stormwater Pumping Stations

The use of stormwater pumping stations is not allowed.

12.3 Construction Requirements

Drainage facilities shall be constructed in accordance with the CDOT Standard Specifications, the CDOT Standard Plans – M & S Standards, and the City and County of Broomfield Standards and Specifications, as applicable.

Drainage facilities shall be designed to accommodate construction phasing of the Project. The Contractor shall provide design and details for Project Work within the Basic Configuration and elements within ARE portions which contribute drainage to the basic system, even if construction of these contributing ARE portions are not awarded.

12.3.1 Project Special Provisions

The following specifications modify and take precedence over the Standard Specifications.

12.3.1.1 Culverts and Sewers

Section 603 of the Standard Specifications is hereby revised for this Project as follows:

Subsection 603.02 shall include the following:

Reinforced concrete pipe shall be used for all pipe culverts and storm sewers on this Project. Existing reinforced concrete pipe that meets Project design criteria may be left in place and utilized in drainage systems.

Subsection 603.07(a) shall include the following:

Joints for all circular reinforced pipe shall be made with confined rubber gaskets. Concrete collars shall be required at all nonstandard joints (not tongue and groove or bell and spigot), and at all connections to existing pipe.

12.4 Deliverables

12.4.1 Master Drainage Plan

The Project has provided a Master Plan Drainage Report for all phases of the Project, included in the Reference Documents for the Contractor's use.

12.4.2 Drainage Design Deliverables

The Contractor shall prepare plans and specifications for all drainage facilities for the Project in a format that facilitates design review by CDOT. The design deliverables for drainage facilities shall include plans, profiles, structure cross-sections, special details, and special provisions that are prepared for items that are not in compliance with the CDOT Standard Specifications and Book 2, Section 12.3.1. Hydrologic and hydraulic design information shall be shown on the drainage plan sheets in accordance with the CDOT Drainage Design Manual.

12.4.3 Drainage Report

Preliminary drainage reports, shall be prepared by the Contractor and submitted for Acceptance prior to the start of final design for areas that contain the subject drainage facilities. Final drainage reports, (or addenda to previously Accepted reports), shall be prepared by the Contractor and submitted for Acceptance prior to issuance of the Release for Construction Documents that contain the subject drainage facilities. The preliminary and final drainage reports shall follow the report outline in the CDOT Drainage Design Manual, and shall include references to relevant design criteria, circumstances influencing design, discussion of all drainage issues and drainage facilities, detailed design calculations, computer printouts, appropriate maps, figures and plans. The report shall include a section documenting PSQF design and shall include the following:

1. Description of land disturbance for the Project.
2. Discussion of how proposed PSQFs satisfy CDOT's and Broomfield's MS4 requirements.
3. Site map showing locations of PSQFs.
4. Relationship of PSQFs to Major Drainageway and Outfall Systems Plans.
5. Detailed description, design criteria, specifications and technical details of PSQFs.
6. Detailed descriptions, design criteria, specifications and locations of stream stabilization measures to be implemented, where required.
7. Discussion of PSQF maintenance requirements, inspection protocols, and maintenance schedule.

The final drainage reports shall be sealed by a Colorado Licensed Professional Engineer. Two copies shall be submitted to CDOT for acceptance, and one copy to Broomfield.

The Contractor shall submit the following to CDOT for review, Approval, or Acceptance:

Deliverable	Acceptance or Approval	Schedule
Preliminary Drainage Reports	Acceptance	Prior to the start of final design
Final Drainage Reports	Acceptance	Prior to issuance of Release for Construction Documents