

Centre Avenue Bridge at Spring Creek Fort Collins, Colorado

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Anderson Consulting Engineers, while previously affiliated with Lidstone & Anderson, Inc., was contracted by the Colorado State University Research Foundation (CSURF) to perform all hydrologic and hydraulic evaluations necessary for designing the Centre Avenue crossing of Spring Creek, as well as the Centre Avenue roadway embankment across the Spring Creek floodplain/floodway. Spring Creek is subject to both City of Fort Collins floodplain regulations, and Federal Emergency Management Agency (FEMA) regulations as part of the National Flood Insurance Program (NFIP).

Due to physical constraints and local transportation requirements, the Centre Avenue alignment crosses Spring Creek in an area which is within the large detention pond formed by the Burlington Northern Railroad (BNRR) embankment; thereby dividing the pond into two portions, one each upstream and downstream of Centre Avenue. Detention storage within the BNRR Pond is recognized by both the City and FEMA such that Spring Creek discharges downstream of the pond could not be increased as a result of the Centre Avenue project. In addition, regulatory constraints dictated that water surface elevations within the portion of the pond between the BNRR and Centre Avenue embankments could not be increased. Finally, it was required that the Spring Creek Trail, a major recreational facility within the City, pass under Centre Avenue adjacent to Spring Creek. Final design of drainage facilities for Centre Avenue included two large three-sided reinforced concrete box culverts (22'Wx10'H and 20'Wx10'H); the smaller of which was used as passage under the road for the Spring Creek Trail.

Hydrologic analyses were conducted using SWMM in order to define detailed inflow hydrographs for each of the two portions of the detention pond, for both existing (FEMA) and fully-developed (City) conditions. The City of Fort Collins regulates to the higher discharges associated with fully-developed conditions in order to minimize future flood potential along the Spring Creek corridor.

The detention system, which in addition to the two ponds includes several outlet facilities through the BNRR embankment and the proposed box culverts under Centre Avenue, was modeled using the Extended Transport Block of the U.S. EPA's Storm Water Management Model (EXTRAN). EXTRAN, a dynamic flow routing model was used to design the box culverts in order to ensure an adequate hydraulic connection between the ponds while meeting all downstream and onsite floodplain requirements by both the City and FEMA.



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Application for a Letter of Map Revision (LOMR) was prepared and submitted following the completion of all roadway and drainage improvements. This LOMR has been adopted by FEMA.