



Stormwater Engineering: Studies - Master Plans

- Stormwater
- Combined Sewers
- Flood Waters

WEI has performed many agency and watershed-wide stormwater, floodwater, and combined sewer masterplans. Projects have been for cities, counties, drainage and flood control districts, and masterplanned communities.

Selected Projects

Sand Creek Drainageway, Bonneville County, ID

Performed hydrologic & hydraulic masterplan of the Sand Creek Drainageway through the City of Ammon and in Bonneville County. Project involved runoff from 5 canyons that discharge to the valley floor, of which 13.5 miles were analyzed hydrologically and hydraulically. Involved FEMA update LOMR, CLOMR, and LOMR.

Combined Sewer Separation Master Plan, Grand Junction, CO

Analyze 3.75 square miles of downtown Grand Junction for separation of combined sewers and stormwater management masterplan. Project involved modeling and analysis of 10 subbasins with approximately 60,000 feet of pipeline and \$12,000,000 in improvements. The Masterplan required coordination with the City, railroad company, utility companies, and several state and federal agencies.

Stormwater Management Masterplan, Yuma County, AZ

Gerald Williams, owner of WEI, was project engineer on study involving stormwater and groundwater for an 80 square mile area. Coordination was required between three municipalities, county, state, federal and other agencies. Designed, analyzed, or supervised work involving 14.6 miles of U.S.B.R. pipe and 22.5 miles of U.S.B.R. open channel drains, 585 drainage basins, 309 catch basins, 19 retention basins, 36 pumps, 57,144 feet of existing storm drain pipe, 168,840 feet of proposed storm and groundwater pipe, and seven bridges.

Comore Loma Subdivision, Bonneville County, ID

Performed a hydrological and hydraulic masterplan involving over 2000 onsite acres and a large drainage basin from Euchre Canyon.

Fairway Peaks, Flagstaff, AZ

Performed drainage design and analyses for a master planned community involving 2,083 acres. Used USACE computer programs.

Grand Valley Stormwater Management Master Plan, Grand Junction, CO

Prepared base mapping and provided hydrological and hydraulic stormwater analyses and master plans on five major basins. Included 100 & 500 year floodplain analyses on several washes, drains, and creeks, involving bridges, culverts, and 444 cross sections.

Fruita Stormwater Management Master Plan, Fruita, CO

Prepared base mapping, hydrological and hydraulic analyses, and stormwater masterplan. Included 100 & 500 year floodplain analyses on Little Salt Wash involving 9 bridges and 110 cross sections.

29 Road Drainage Master Plan, Grand Junction, CO

Performed hydrological and hydraulic modeling and analyses and made recommendations for regional drainage facilities to be constructed as part of the 29 Road Corridor Project.

Blackhawk Subd., Bonneville County, ID

Performed drainage and floodplain masterplan for 3500-acre foothill community. Project included two creeks.

City-Wide Floodplain Determination and Stormwater Masterplan, Central City, CO

Performed hydrological and hydraulic study which assessed existing conditions and delineated floodplain areas for the entire City, analyzed effectiveness of various improvements, and prepared a cost-effective improvement program, prepared proposed condition floodplain maps, and prepared application for a Letter of Map Revision (LOMR). CWCB and FEMA were reviewing agencies.

Orchard Mesa Stormwater Management Masterplan, Mesa County, CO

Performed hydrological and hydraulic modeling and analyses and made recommendations for regional drainage facilities. This was an update of the original masterplan prepared by WEI for the Grand Valley SWMMP.





Stormwater Engineering: Studies - Regional Watersheds

- Mountain & Desert
- Urban & Rural
- Interconnected Detention Basins
- Masterplan Updates



WEI has performed many regional watershed hydrological and hydraulic drainage studies for cities, counties, and drainage and flood control districts. Conditions range from mountains to rocky mountain slopes, flat lands and deserts, urbanized and rural areas, and wetlands and marshes. Analyses have involved stormwater collection and conveyance systems and detention facilities, and the updating of masterplans.

Selected Projects

Fortuna Wash Bridge, Yuma Cnty, AZ

Analyzed runoff from a 23 square mile area and hydraulics through a proposed county bridge and existing interstate bridges over Fortuna Wash. Used USACE computer programs.

Colorado National Monument, Mesa County, CO

Prepared hydrological models and studies for 6 canyons coming off the rocky steep Monument under flash flood with high sediment load conditions, evaluating the hydraulic conveyance through natural and man-made channels on the base slopes. Performed erosion control evaluations and provided recommendations.

Sundance Crossing, Grand Junction, CO

Evaluated and critiqued previous subdivision studies, and prepared a regional hydrological and hydraulic drainage study that encompassed the subdivision. Included multiple interconnected detention basins.

Grand Mesa Center, Grand Junction, CO

Performed regional hydrological study for the Grand Mesa Center. Project included three proposed interconnected regional detention basin. Grades are such that each is affected by downstream pond "tailwater" conditions and flows can be both directions between ponds depending upon the time period in the runoff event.

Lazy Triple Creek Ranch, Madison County, ID

Performed regional hydrological study involving 4 creeks and 1165 acres and evaluated crossings at existing and proposed roadways.

Orchard Avenue Storm Drain, Grand Junction, CO

Performed hydrological analysis of the Logan Drain system and modeled and designed a proposed drainage system with up to 60" outfall pipes.

Elusive Acres, AZ.

Analyzed a 21 square mile watershed and calculated floodplain limits for flows exceeding 11,000 cfs using NRCS TR-20 and USACE computer programs.

Linden Ave. Subdivision, Mesa Cnty, CO

Updated the Orchard Mesa Stormwater Management Master plan with respect to Linden Avenue subdivision and provided subdivision drainage study.

32.5 Road Regional Watershed Study, Mesa County, CO

Performed regional basin-wide stormwater hydrological study and evaluated detention basin feasibility and requirements.

Cotton Woods 3 Subdivision, Fruita, CO

Performed a hydrological and hydraulic study for the subdivision and the entire Murray Drain system, updating the City of Fruita and GJDD SWMMP.

Powder Ridge Development, Mesa County, CO

Performed hydrological and hydraulic drainage study for a mountain subdivision near a ski resort. Included wetlands and springs.



Stormwater Engineering: Reservoirs and Regional Detention

- **Dams & Spillways**
- **Multi-Use Detention & Retention Basins**
 - **Parks & Irrigation**
 - **Lakes & Fish Ponds**
 - **Water Quality**
- **Interconnected Ponds**

WEI has designed small earth dams, spillways, and outlet works facilities that are state dam engineer regulated. WEI has designed many regional and retrofit detention facilities for cities and counties, including multi-use facilities for parks, irrigation, recreational lakes and ponds with and without fish, and water quality. Detention facilities have included up to 75 acres of lake where stormwater replaced evaporation losses. WEI has modeled and designed several interconnected pond and basin systems where flow reversal and backwater effects influence inflow and outflow.

Selected Projects



Sand Creek Drainageway, Bonneville County, ID

For a regional watershed involving 55 square miles, designed 13 flood control detention basins involving 2851 acre-feet of storage volume and 810,216 square feet of underground subdrain and groundwater recharge systems.

Purdy Mesa Reservoir, Grand Jct., CO

Performed probable maximum flood hydrologic runoff and hydraulic flow routing analyses through two inter-connected reservoirs of the City of Grand Junction's municipal water system. Designed spillway down steep hillside that required approval by the state dam engr.

Fruita Reservoir #1, Fruita, CO

Feasibility study and design for dam remediation and repair for State Dam Engineer.

25 Rd. Drainage System, Grand Jct, CO

Analyzed 100-year storm conditions for the 25 Road area at the bottom of the Ranchman, Buthorn & Ligrani drainage watersheds. Designed collection system and a detention basin.

Fruita Reservoir #3, Fruita, CO

Performed probable maximum flood hydrologic runoff and hydraulic flow routing analyses through City-owned reservoir and prepared Engineering Basis of Design for and designed reservoir dam improvements and new spillway and outlet works. All work was subject to approval by the State Dam Engineer.

West Lake Detention & Water Quality, Grand Junction Drainage District, CO

Analyzed and redesigned West Lake pond to be a 16 acre-foot water quality and 13 acre-foot detention basin, with automated controls to allow available pond volume to function as one or the other. Designed outlet works, controls, and backup power systems.



32 1/2 Road Regional Watershed Study, Mesa County, CO

Perform regional basin-wide stormwater masterplan and evaluated detention basin feasibility and requirements.

Val Vista Lakes, Gilbert, AZ

Designed several detention facilities for an 800-acre master planned community with 4 lakes covering 75 acres. Design provided lake recharge with stormwater for a total water management approach.

Grand Mesa Center, Grand Junction, CO

Analyzed three proposed interconnected detention basins. Each pond is affected by other pond "tailwater" conditions with bi-directional flows between ponds depending upon the time period in the runoff event.

Monument Glen 1 & 2 Homeowners Association, Fruita, CO

Designed retrofit of failing detention basin.



Intermountain Veterans Memorial Park, Mesa County, CO

Performed regional hydrological and hydraulic study for the park and surrounding areas and designed regional County-owned detention facilities.

Matchett Drainage, Grand Junction, CO

Analyzed and designed regional City-owned detention facility.



Stormwater Engineering: Floodplain Engineering

- **Bridges, Culverts, & Multiple Openings**
- **CLOMR's & LOMR's**
- **City, County, State, & FEMA Approvals**
- **Floodplains and Floodways**
- **Levee Certification Reports & Studies**
- **1-D & 2-D Analyses**



WEI has modeled floodplains in mountain streams, flat valleys, and on alluvial fans for detailed floodplain and floodway mapping. Models have been in wildland, rural, and urban settings. WEI performs steady, unsteady, 1-dimensional, and 2-dimensional analyses.

Selected Projects

Portneuf River, Pocatello, ID

Performed updated hydrology, hydraulics, field inspection, structural and geotechnical evaluations, O&M manual, Field Maps, and high stage and emergency operation plans for 7.2-mile levee per FEMA and U.S. Army Corps of Engineers criteria. Work included interior (landside) local runoff floodplain.

Pocatello Creek, Pocatello, ID

Updated hydrology and hydraulics to remap floodplain and floodway in urbanized area.

Gibson Jack and Johnny Creeks, Bannock County, ID

Updated hydrology and performed 2D hydraulics on alluvial fans, obtained LOMR.

North Fork Teton River, Madison Cnty, ID

Updated and refined the floodplain model and mapping for 1.44 miles from Hwy 20 to west of 1000 East. Project involved 3 bridges. Obtained LOMR from FEMA.

South Fork Teton River, Madison Cnty, ID

Updated and refined the floodplain model and mapping for 6 miles from Quail Hollow to upstream of Moody Hwy. Project involved 4 bridges and a LOMR with FEMA.

Mill Creek CLOMR, Moab, UT

Performed hydraulic analyses, delineated floodplains and floodway in breakaway channels on an alluvial fan and submitted Conditional Letter of Map Revision to FEMA. Involved 5 bridges and 116 cross sections.

No Thoroughfare Canyon, Mesa Cnty, CO

Evaluated floodplain along County road and was expert witness in floodplain litigation.

Fruita Stormwater Management Master Plan, Fruita, CO

Prepared base mapping, provided stormwater analyses & master plan. Included 100 & 500 year floodplain analyses on Little Salt Wash involving 9 bridges and 110 cross sections.

Leach Creek, Mesa County, CO

Established floodplain delineation and water surface elevations for Leach Creek involving several bridge crossings under existing and proposed conditions.

Sand Creek Drainageway, Bonneville County, ID

Alluvial fans, shallow flows, breakout flows, and storage losses are very prevalent 55 square mile watershed with no incised channel. Analyzed 13.5 miles of drainageway using 2-dimensional floodplain modeling. Prepared existing and proposed condition masterplan modeling. Project involved update LOMR, CLOMR, and final LOMR with FEMA.

Buffalo & No-Name Creek, Bannock Cnty, ID

New hydrology and floodplain mapping.

Teton River Remapping, Madison Cnty., ID

For 2 cities and county, performed technical objection to FEMA-proposed remapping.

Henry's Fork Snake River, Madison Cnty, ID

Performed detailed study from 2 miles downstream to ¼ mile upstream from the Egin Hwy bridge. The river channel is like ribbon candy in this area and the floodplain very wide. Project involved 1 bridge and a LOMR with FEMA.

Island Park Reservoir, Fremont County, ID

Established FEMA-approved 1% flood level.

City-Wide Floodplain Determination and Masterplan, Central City, CO

Performed hydrological and hydraulic study which assessed existing conditions and delineated floodplain areas for the entire City, prepared proposed condition floodplain maps, and prepared application for a Letter of Map Revision (LOMR). CWCB and FEMA were reviewing agencies.

Colorado River, Parachute, CO

Corrected and updated two miles of FEMA floodplain with LOMR and removed land from floodplain with CLOMR and LOMR.

Henrys Fork Snake River, Fremont Cnty, ID

Evaluated two miles of river under peak runoff conditions and winter flows with ice cover and ice jams. Obtained LOMR from FEMA.

Fortuna Wash Bridge, Yuma County, AZ

Analyzed 23 square mile watershed and hydraulics through a proposed county bridge and existing interstate bridges.



Stormwater Engineering: Conveyance Facilities

- **Natural Channel Improvements**
- **Man-Made Channels**
- **Box & Round Pipelines to 96"**
- **Inverted Siphons**
- **Bridges & Culverts**

WEI has designed drainage conveyance facilities ranging from detailed onsite systems, including roof drains and parking and landscaping areas, to large round and box section pipelines and inverted siphons up to 96 inches. Designs include hydraulic channels, both man-made and natural channel conveyance, erosion, and stability improvements, box culverts and bridges, along with associated hydraulic structures and erosion protection. Special attention is given to materials and construction characteristics, adequate flow velocities, erosion and scour, water quality, aesthetics, functionality, cost, and maintenance.

Selected Projects

The Villas Subdivision, Ammon, ID

Designed interception channel for 2000 cfs Sand Creek Drainageway for CLOMR/LOMR.

25 Road Storm Drain, Grand Jct., CO

Design Ranchman's Ditch overflow and 25 Road local area drainage system with drain pipes up to 60" in diameter.



Mesa County Fairgrounds Drainage Improvements: Phases 1&2, Mesa Cnty, CO

Design involved approximately 4500 LF storm drain up to 24" in diameter, 30 inlets, and 42 connections to roof drains at County Fairgrounds.

Rock Hollow Creek, Bonneville County, ID

Evaluated existing and proposed floodplain with rerouted channel. Site soils are very erosive silts. Provided permanent bioengineering erosion protection. Involved FEMA LOMR.



32.5 Rd. Storm Drain, Mesa County, CO

Design of 2000 lineal feet of 36 inch storm drain, with many conflicting utilities and a canal crossing. Project included replacement of a concrete ditch with a pipe irrigation system and related appurtenances.

Roadway Reconstruction & Drainage Project, Collbran, CO

Design of reconstruction of over two miles of local residential streets and collectors with 27 intersections and provide drainage improvements.

South Avenue Reconstruction 5th St. to 9th St., Grand Junction, CO

Roadway contained 24", 21", and 15" parallel combined sewers. Designed for combined sewer separation using existing lines plus new 48" storm drain. Special challenges were other utilities in the same street - two active waterlines, a medium pressure 10" gas line, 12" high pressure gas line, two banks of underground electric, overhead high voltage lines, irrigation pipeline, and underground telephone all in 80' of R.O.W.

State Hwy 77, ADOT, AZ

Drainage Engineer for the Show Low-Taylor project involving a 6.5 mile stretch of highway.

Butler Avenue Interchange, ADOT, AZ

Design drainage system upgrade for an existing facility at Butler Avenue Interchange which was improved from two lanes to five lanes.



Squaw Peak Parkway, Phoenix, AZ

Performed hydraulic evaluations and designs related to truncation of existing systems caused by the proposed Squaw Peak Parkway, including pipes and siphons up to 96 inches.

Redlands Grove, Mesa County, CO

Evaluate and design channel for Colorado Nat'l Monument runoff through a subdivision. Design included HEC-11, HEC-14, HEC-15, and HDS-5 for flow conveyance, flexible lining, bend, and drop structure.

Orchard Ave. Drain, Grand Jct., CO

Analyzed drainage in the Logan Drain system, design proposed systems up to 60" outfalls.

Various Subdivisions

WEI designs all pipes and culverts for capacity and scour cleaning, and channels and culvert outlets for scour protection.



Stormwater Engineering: Hydraulic Structures

- Large Vaults & MH's
- Pre-Cast Concrete Transition Fittings
- Pond & Detention Basin Outlet Works
- Levees, Jetties, Erosion
- Protection, & Spillways
- Rock and Concrete Drop Structures
- Energy Dissipation



WEI has performed many hydrology and hydraulic studies and performed follow-up hydraulic structure designs. Facilities include large combination inlet and MH vault structures, inverted siphons up to 96 inches in diameter, precast concrete transitional fittings, sophisticated outlet works for ponds and detention basins, levees, jetties and other river embankment erosion protection, both rock and concrete drop structures for rivers and channels, state engineer regulated reservoir spillways, and energy dissipation devices of many types. Designs have also included culvert structures of all types with aprons, wing walls, and headwalls, with special inlet improvements and outlet erosion control and energy dissipation, and bridge design.

Selected Projects

West Lake Detention & Water Quality Outlet Structure, Grand Junction, CO

Designed outlet facility for the City of Grand Junction and Grand Junction Drainage District to allow a fish pond to use maximum capacity as either water quality volume or detention basin, depending upon the rate of inflow, using sophisticated controls & monitoring system, automated gate, and backup power. Subsequent regional drainage plan changes resulted in completed design not being used. The revised design was for a much smaller amount of inflow, resulting in a combined fish, water quality, and detention pond. The structure was designed for ADA acceptability as a fishing dock, with special attention also provided for obscuring hydraulic function and vandalism control.

Pack Creek, Moab, UT

Design of erosion control drop structure to protect UDOT bridge.

Fruita Reservoir #3, Fruita, CO

Design of reservoir dam improvements and new spillway on State Engineer regulated dam, including energy dissipater at outlet. Remote mountain location necessitated use of prefabricated and pre-cast materials.

Quail Ridge, Ammon, ID

Designed improvements to two street crossings to remove residences from the floodplain.

Mill Creek Flood Control Parkway Project (Phase 2, 4, & 5), Moab, UT

Metric design of concrete bike & pedestrian paths along Mill Creek. Design included jetties, channel improvements, erosion control, creek crossings, and an arterial underpass that doubled as a flood control structure. Project also included a sloping concrete approach and floor at a crossing under UDOT bridges, and permitting.

Mill Creek & 500 West drop structure, Moab, UT

Design a rock drop structure downstream of a Utah Department of Transportation bridge.

Northgate & Ranchman, Grand Jct., CO

Designed a box culvert for an improved roadway crossing of the Ranchman's Ditch/ Horizon Channel.

Fruita Reservoir #2, Fruita, CO

Advised City on spillway improvements.

Purdy Mesa Reservoir, Grand Jct., CO

Hydrologic & hydraulic-analyses for routing through 2 reservoirs & designed spillway down steep slope. Required state dam engineer approval.



Stormwater Engineering: Erosion, Sediment, and Water Quality

- **Water Quality Ponds**
- **Stream Embankment & Channel Erosion Control & Stability**
- **Bio-engineering & Hard/Soft Solutions**
- **Sedimentation & Erosion Control**
- **BMPs & SWPPPs**

WEI has designed a number of facilities relating to water quality, including ponds, hard and soft erosion control facilities, and temporary and permanent best management practice (BMP) facilities. Employees have attended and helped taught dozens of seminars on stormwater quality, erosion and sedimentation control, and best management practices. WEI has prepared stormwater quality manuals and places emphasis on environmental issues in all designs. WEI has substantial experience in preparing SWPPPs for their own projects, contractors, and as a subconsultant.

Selected Projects

West Lake Detention & Water Quality, Grand Junction Drainage District, Grand Junction, CO

Analyzed and redesigned West Lake pond to be a 16 acre water quality and 13 acre feet detention basin, with automated controls to allow available pond volume to function as a first flush water quality pond for low storm runoff, flow attenuating detention basin during high storm runoff, and a fish stocked community pond during non-storm periods. Designed outlet works, controls, and backup power systems.

Mill Creek Flood Control Parkway Project (Phase 2, 4, & 5), Moab, UT

Design of concrete bike & pedestrian paths, jetties, channel improvements, creek crossing, arterial underpass, and crossing under UDOT bridges, and also permitting. Various erosion protection facilities were designed to protect improvements and mitigate scour and stream erosion and sedimentation under 100 year flows.

Water Quality Control Ponds, Mesa Cnty, CO As part of the Grand Valley, Combined Sewer Separation, Fruita, Orchard Mesa, and 29 Road Masterplans, recommended, sized, and provided preliminary design for 20 water quality control ponds.

Stormwater Management Manual, CO

Prepared manual used by Mesa County, City of Grand Junction, City of Fruita, Town of Palisade, and the Grand Junction Drainage District that provided several hundred pages devoted to erosion, sedimentation, and water quality design guidelines and criteria.

Various Subdivisions

WEI analyzes channel and culvert outlet flows for velocity and tractive shear force, compares that with soil conditions, and designs using vegetation and other liner protection to mitigate erosion. Solutions are not just for construction, but provide permanent protection.

Redlands Grove, Mesa County, CO

Evaluated and designed channel for Colorado Nat'l Monument runoff through a subdivision. Design included HEC-11, HEC-14, HEC-15, and HDS-5 for flow conveyance, flexible lining, bend, and drop structure. Particular attention was given to erosion control on a channel having a natural gradient of 1.84% and non-cohesive soils. The design provided for a vegetated solution.

Purdy Mesa Reservoir, Grand Jct., CO

Designed reservoir spillway and riprap erosion protection down steep tailrace. State dam engineer approval was required.

Drop Structures, Moab, UT

Design of rock erosion control drop structure at 400 East St. on Pack Creek and 500 West St. on Mill Creek to protect UDOT bridges and reduce scour.

Canyon Rim Subdivision, Mesa Cnty, CO

Designed improvements to a natural channel in unstable non-cohesive soils on steep slopes at the base of the Colorado National Monument. Design focused on vegetative solution for erosion control.

Vegetation Buffers, Mesa County, CO

At many site developments, including multi-family sites, encouraged and used vegetative buffers to improve water quality prior to hard conveyance and discharge.

Powder Ridge, Mesa County, CO

Designed for runoff to pass through wetlands and sloughs to improve water quality.

Rock Hollow Creek, Bonneville County, ID

For creek realignment, evaluated tractive forces on straightways and bends, and designed with permanent turf reinforcement and tall natural grasses for bioengineered erosion protection.

Old Staley Springs Resort, Island Park, ID

Designed stormwater quality facility to store and filter the 100 year 24 hour runoff prior to discharge into Henry's Lake.





Stormwater Engineering: Training and Expert Witness

- **Hydrology & Hydraulic Software Training**
- **Hydrology, Hydraulics, Erosion Control, and Floodplain Training**
- **Expert Witness in Hydrology, Hydraulics, & Floodplain Engr.**

WEI has provided formal and informal training in principles and practices of hydrology, hydraulics, erosion control, and floodplain engineering, and has also taught hydrology and hydraulic software training courses. Training sessions have been up to 3 days in duration. Furthermore, WEI has taught a Certified Floodplain Management course and proctored the examination for certification. Moreover, WEI has been hired several times as an expert witness for hydrology, hydraulics, and floodplain engineering.

Selected Projects

Rainfall Event, Rexburg, ID

Performed analysis to determine rainfall frequency as expert witness in lawsuit.

Lyman Litigation, Mesa County, CO

Served as an expert witness in a case involving flooding of a home from an adjacent detention basin. Showed that the original design was deficient on several accounts, and that the situation was exacerbated by improper construction by the developer of the infrastructure and home. Based upon WEI's presentation, engineer was put on probation by the licensing agency and the developer had to pay off the homeowner.

No Thoroughfare Canyon, Mesa Cnty, CO

Served as an expert witness in a floodplain litigation case. Property was sold and represented as being out of the 100-year floodplain. For the courts, showed through analysis that it would be flooded in a 100-year event, and evaluated the cost to remove it from the floodplain.

4th Annual Conference, Colorado Association of Stormwater and Floodplain Manager, Breckenridge, CO

Gave a presentation at the conference and was on the conference committee.

National ASCE Conference on Water Resources Planning and Management, New Orleans, LA

Gave four presentations at the conference.

1st Annual Conference, Colorado Association of Stormwater and Floodplain Manager, Vail, CO

Conference vice-chair & gave 3 presentations.

Annual Conference, Association of State Floodplain Managers

Co-presented on Yuma Valley, AZ ground water and stormwater study and masterplan.

Stormwater Seminars, ID

WEI has and is providing on-going training to the public and private sectors. Seminars are at least 1/2 day and usually a full day. Topics include: Stormwater Management, Hydrology, Culvert Design, Detention and Retention, Erosion & Sediment Control, and Certified Floodplain Management Exam Preparation and Proctoring. For example, in 2009, 7 full day seminars are presented through the year on the above topics.

Floodplain Seminars, ID

WEI provides on-going floodplain training to the public and private sectors. For example, in October 2008, WEI presented a 3-day course on floodplain management and preparation for taking the national ASFPM certified floodplain manager exam, which course we will be provided again in 2009.

Floodplain Management Workshop 2004, Ammon, ID

Taught two sessions of the day course sponsored by the State NFIP Coordinator.

HEC-1 For Dummies, Grand Junction, CO

Taught full day course on HEC-1. Prepared own materials. Sponsored by the Colorado Association of Floodplain Managers.

HEC-2 For Dummies, Glenwood Springs, CO

Workshop chairman for full day course on HEC-2. Prepared some of the instructional materials. Sponsored by the Colorado Association of Floodplain Managers.

AWRA Symposium on Urban Hydrology, Denver, CO

Gave a presentation at the symposium.





Stormwater Engineering: Criteria Manuals and Ordinance Preparation

- **City, County, and State Agencies**
- **Hydrology, Hydraulics, Erosion Control, & Water Quality**
- **Policy, Criteria, & Technical Reference Material**
- **Ordinance Preparation**

WEI has prepared several storm water management manuals for cities and counties, and has been requested by others to assist as a subconsultant in the preparation of other storm water management manuals. Furthermore, WEI, by invitation, has served on two committees formed by the Colorado Water Conservation Board for the purpose of preparing statewide manuals.

Manuals cover policy, criteria, and technical reference material, some which is refined and enhanced from other sources, and much of which is original material. Hydrology, hydraulics, erosion and sedimentation control, best management practices, and water quality are topics covered.

Selected Projects

Stormwater Design Criteria and Procedures, Madison County, CO

Prepared Stormwater Management manual for Madison County.

Stormwater Management Manual (SWMM) for the City of Grand Junction and Mesa County, CO

Prepared original (not modified or rework) city/county drainage manual (Phases I & II). Manual was later also adopted by the Grand Junction Drainage District, City of Fruita, and Town of Palisade. Manual fills 2.5" D-ring notebook, and consists of four parts: policy, having five sections; criteria, having five sections; technical reference material, having 16 sections; and a miscellaneous division having two sections.

Interim Grading and Drainage Criteria Manual, Grand Junction, CO

This was prepared for the City of Grand Junction.

Submittal Standards for Improvement and Development, Grand Junction, CO

This was prepared for the City of Grand Junction Public Works and Community Development Departments. It outlined, among other things, requirements and standards for all drainage, stormwater, and grading plans and reports.

City of Rexburg, ID

Prepared updated IDF curves.

Guidelines for Determining Flood Peak for Approximate 100-Yr Floodplains, CO

The Colorado Water Conservation Board (CWCB) was the sponsor and primary contributor, but has selected a Hydrology Advisory Committee to assist in manual preparation, of which Mr. Williams of WEI was one of five selected statewide from the private sector.

Colorado Flood Hydrology Manual, CO

Preparation of this manual was sponsored by the Colorado Water Conservation Board (CWCB), with the Army Corps of Engineers being the primary contributor. Mr. Williams of WEI was one of five statewide selected by CWCB from the private sector to serve on a Hydrology Advisory Committee to assist in the preparation of the manual.

Masterplan Stormwater Guidance Documents, Mesa County, CO

Prepared, as part of various masterplan studies, guidance documents for Mesa County, Grand Junction Drainage District, and the City of Grand Junction and City of Fruita.

City of Pocatello, ID

Prepared updated IDF curves.

