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Flood Hazard News

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District Construction Projects Win Awards

by

Richard Borchardt, Bryan Kohlenberg and David Bennetts, all Urban Drainage and Flood Control District; and Vince Auriemma, City of Golden

The District's Design, Construction, and Maintenance Program had several construction projects win awards in 2009. Below are brief descriptions and a few photographs of each project.

Utah Park

The Utah Park project received an Honor Award from the Colorado Association of Stormwater and Floodplain Managers (CASFM) for 2009. This project also received the 2009 American Public Works Association – Colorado Chapter – Public Works Project Award for Drainage and Flood Control in a Large Community.

Utah Park artfully integrated flood control and drainage improvements with multiple recreation uses and park renovations. The project included a detention pond that provided 157 acre-feet of storage that removed 40 homes from the Westerly Creek floodplain. Westerly Creek and the Jewell Tributary were removed from culverts and returned to the surface through the construction of new channels within the park. The natural streams and lake provided with these improvements revitalized the park and enhanced the park user's experience with nature. Park improvements included the addition of a picnic pavilion overlooking the lake, a performance stage, renovation



Utah Park – Drainage and Park Improvements working in concert (lake area, trail crossing, and park pavilion are shown)

Information Services and Flood Warning Program Notes

Kevin Stewart, PE, Program Manager

2009 Flood Season Unusually Active

What a contrast between the 2008 and 2009 flood seasons! Flash Flood Prediction Program (F2P2) meteorologists recorded twice the number of flood threat days in 2009 compared to the previous year (52 vs. 26). These past two years also represent the program's most and least active years since the F2P2 first began in 1979.



Although opportunities for flooding were many, annual streamflow peaks failed to capture 2009 news headlines. The July 20 late evening severe storm that caused nearly \$400 million in damages in

Arvada, Wheat Ridge and Lakewood from the high winds and hail was arguably the year's biggest weather news story in the District. The District (DCM Program's contract maintenance crews) was publically acknowledged for assisting Wheat Ridge with debris removal along Clear Creek after the storm.

While rainfall was plentiful, nearly all of the flooding this past year might best be categorized as nuisance events, unless you talk with residents from Denver that had their



apartments flooded on two separate occasions (June 25 and July 3) or the unfortunate owner of 4x4 pickup truck that somehow got parked in a bad spot in Parker on June 23.

The first five weeks of the F2P2 operational season (15 Apr – 15 Sep) passed without incident but then the last week in May began showing signs that a busy flood season might lie ahead. In June and July, flood threat messages were issued for more than half the days in both months. August and September were also highly active compare to prior years.

The District was impacted by National Weather Service (NWS) flash flood warnings on three days (see table for dates), but no flash flood watches were issued for the District during 2009. This may have been another first for the District and was due to the relatively low predicted storm rainfall amounts. For highlights of the more notable events, read the flood season recap later on in this section of *Flood Hazard News*.

Although storm rainfall totals were low (generally less than 2-inches), high rainfall intensities were quite common

and widespread during 2009 as illustrated by the large number of rainfall rate alarms generated by the ALERT System (see table). The discussion on extreme rainfall later in this section may help explain this observable fact and provide some clarity on why so-called "rare events" seem to happen so often. This may be a good opportunity to consider changing how we attempt to make clear our understanding of flood risk when talking with other professionals and communicating with the public.

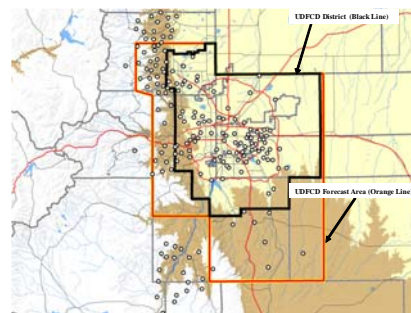
52 days with flood potential ties 31-year record

May	22, 23, 24, 25, 30, 31	6
June	1, 4, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 23, 24, 25, 26	16
July	2, 3, 4, 5, 6, 10, 11, 12, 13, 20, 21, 22, 25, 26, 27, 28, 29	17
August	5, 6, 9, 10, 13, 17, 18, 25, 26	9
September	5, 8, 9, 13	4

Red dates denote days when rainfall measured by automated gages exceeded alarm thresholds. Yellow highlighted alarm dates indicate that the measured heavy rainfall only impacted the 2002 Hayman Burn Area. Red boxes designate NWS flash flood warnings that affected the District.

Early Prediction, Notification and Threat Assessment

The meteorological support team of Genesis Weather Solutions and Skyview Weather provided local governments with heavy precipitation forecasts and flood threat notifications for the third consecutive year. Project manager and chief meteorologist Bryan Rappolt completed his 16th year of service. Bryan is the president and founder of GWS. Skyview Weather's CEO is Tim Tonge. Brad Simmons with Skyview served his third operational flood season as one of the team's lead forecasters. Met-tech Chris Anderson spent many hours during his second F2P2 season monitoring weather conditions from the District's Flood Prediction Center at Diamond Hill.



The F2P2 operates from April 15 through September 15. The forecast services focus primarily on heavy rain and flash flood threats over an approximate 3,000 square mile area (see orange boundary on

map). During the snowmelt runoff season—late spring to early summer—rivers and mountain streams usually overflow their banks. Although the program's prediction services are less directed toward this type of flooding, corresponding

flood information is disseminated to affected local governments when the NWS issues its flood watches and warnings. The program meteorologists also relay information concerning reservoir releases made by the U.S. Army Corps of Engineers from Chatfield, Bear Creek Lake and Cherry Creek Lake. The F2P2 works in close partnership with the NWS Forecast Office located in Boulder.

For the past three years the District has employed the services of JP Consulting (Judy Peratt) to evaluate F2P2 performance and user perceptions. Judy is a former Jefferson County Director of Emergency Management and resides in Windsor. Judy meets individually with her former counterparts from each of the jurisdictions that receive direct communications from GWS/Skyview. She also interviewed 911 dispatch supervisors and public works officials to get their feedback on the program. This process has been tremendously helpful to the District in its relentless effort to improve services. The District would like to thank the many local government officials that participated in the survey process.

A web-based product generator developed by the District was used operationally for the first time in 2009. This greatly simplified the process for creating and disseminating flood outlooks and other forecast products. The Internet application coupled with a District-supported email subscription service allows users to control the type of information they receive, e.g. long content or short abbreviated text messages designed for smart phones and other handheld devices. The retention of forecast products including flood threat notifications (aka Messages), storm tracks, daily outlooks, etc. was also made easier with access to the archive now open to all users (see f2p2.udfcd.org).

Future program changes will focus on improving communications by using more plain language and less technical jargon. To help all parties understand each other better and provide another opportunity for feedback, a new training initiative tailored primarily for dispatchers will be conducted early in 2010 before the flood season begins. More emphasis will also be placed on delivery of electronic information, which may eventually lessen the requirements for voice contacts concerning alerts of so-called nuisance flood potentials.

Douglas County took some innovative steps in 2009 toward assessing potential flood threats and corresponding impacts in real-time. Working with the consulting firms of HDR Engineering and Water & Earth Technologies, County Engineering developed a GIS-driven Flood Hazard Inventory Tool (FHIT). This database is capable of supporting countywide access to flood information available from the Internet or County LAN connections, and then translate the flood info into potential impacts, e.g. roadway overtopping, trail inundation, buildings at risk, etc. The District is investigating possibilities for regional implementation of this idea using open source database technologies.

CoCoRaHS Update

The Community Collaborative Rain, Hail and Snow network is operated by the Colorado Climate Center at



Colorado State University in Fort Collins. The network now covers all 50 states (see article by CoCoRaHS National Coordinator Henry Reges in this issue of *Flood Hazard News*). The District has been a sponsor of CoCoRaHS since 2001 and routinely makes use of this valuable data source including many innovative ways of displaying the data. CoCoRaHS is truly a community-based initiative that would not be possible without the help of people just like you. So please consider becoming a CoCoRaHS volunteer or sponsor today, and visit www.cocorahs.org for the latest news.

EMWIN-Denver Update

The Emergency Managers Weather Information Network continues to gain popularity under the leadership of the steering committee chaired by Rick Newman with the Adams County Office of Emergency Management. EMWIN-Denver was developed as a reliable source of weather alerts for local governments in the 10-county North Central All-Hazards Region, which includes Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin and Jefferson Counties. Weather alerts for the region are automatically sent by email to affected jurisdictions. The District maintains the email list server where interested parties can subscribe.

In 2009 a good neighbor policy was implemented allowing emergency managers and response agencies from 22 Colorado counties to sign up for the weather alerts. This area corresponds to the region serviced by the NWS-Boulder Forecast Office. For more information about EMWIN-Denver visit emwin.udfcd.org.

ALERT System News

The District's ALERT system currently collects hydrologic data in real-time from over 200 stations including 8 radio repeaters, 186 rain gages, 92 stream gages and 24 weather stations. Eleven new



ALERT stations and upgrades were installed in Douglas County in 2009. Locations include: Russelville Gulch on E. Tomichi Road SE of Franktown; East Cherry Creek Road in the SE corner of Douglas County; Spring Valley Road weather station upgrade in the upper Cherry Creek basin; Douglas County Public Works in Castle Rock; Indian Creek near Louviers; Rampart Range Road in the foothills south of

Roxborough State Park (pictured); Dakan Road in the upper West Plum Creek basin; Tomah Road weather station upgrade north of Larkspur; and West Creek weather station in the Pike National Forest southwest of Larkspur; Stroh Road rain/stream gage on Cherry Creek in Parker; and the Cottonwood Park rain/stream gage on Cherry Creek at the Apache Plume confluence near the northern Douglas County border.

Douglas County also installed a webcam and staff gauge at the State Highway 105 crossing of East Plum Creek. These JPG images are updated every 10 minutes. Check out the following link for current conditions:

www.wunderground.com/webcams/WETInc/1/show.html

OneRain, Inc. (formerly DIAD) of Longmont completed their 18th consecutive year of field maintenance services. OneRain also provides the District with automated daily and weekly monitoring reports (Excel worksheets) that indicate the overall health of the ALERT system and target stations that may require an unscheduled service call.

Water and Earth Technologies (WET) of Fort Collins provided their second year of maintaining Douglas County gages and preparing monthly QA/QC reports. The area-wide system performance reports include maps showing total rainfall amounts for the month and data transmission statistics along with plots of average and peak hourly data rates. A supplemental monthly rainfall intensity analysis by WET has helped the District quantify rainfall magnitude and frequency.

OneRain completed installation of a parallel prototype data delivery system by deploying new equipment on repeaters and implementing a separate receiver platform at the District. The new method is expected to increase the efficiency of ALERT radio communications substantially and remedy data losses that have been experienced in recent years caused by the large size of the expanding gaging network. Early testing of the new data protocol, now commonly known as ALERT-2, appears promising as the radio traffic loading approached 300,000 reports per month during 2009. The City of Overland Park, Kansas is conducting similar tests.

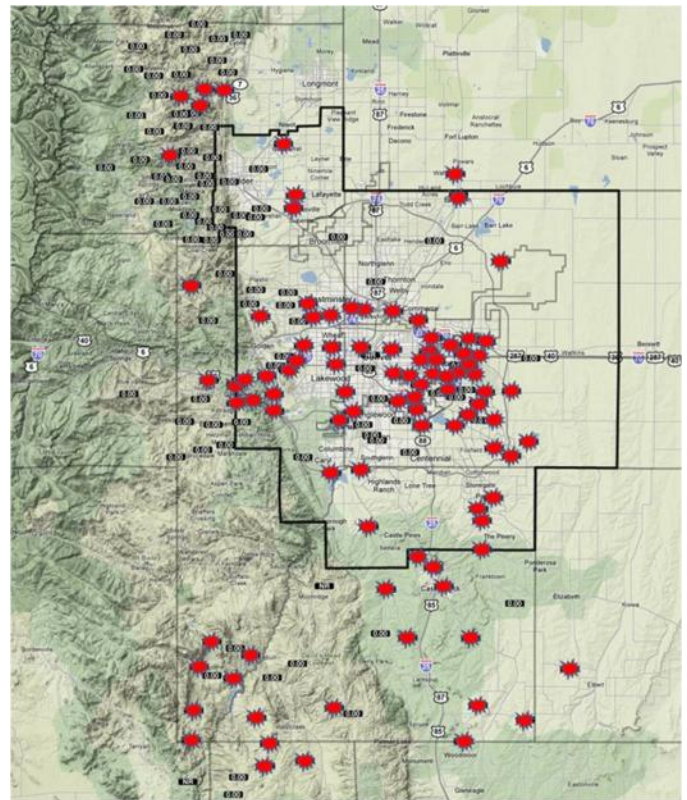
Leonard Rice Engineers (LRE) continued to support real-time hydrologic models for Boulder Creek in Boulder County; Lena Gulch in Jefferson County; and Harvard Gulch and Goldsmith Gulch in Denver, and the upper Cherry Creek basin in Douglas County. The models activate automatically whenever flood threat notifications are issued by the F2P2 meteorologist. Graphical enhancements supported by LRE include an AHPS-like interface patterned after the NWS Advanced Hydrologic Prediction Service and a "Hydrologic Data Service" that integrates data from various sources.

The District's base station software—Novastar4 by HydroLynx Systems of West Sacramento, CA—is nearing its end. This platform currently hosts all District-supported webserver located at the District's main office and the Flood Prediction Center; at The Consolidated Mutual Water

Company (Lena Gulch base station) in Lakewood; at Denver Public Works Wastewater Management Division; and at the Boulder Office of Emergency Management (see alert.udfcd.org). The current version was implemented in 2000...remember Y2K? Now it's time to change once again. The new version—Novastar5—is being tested and will be running parallel with NS4 during 2010. By 2011 the District expects to abandon the old software and move to the new, which runs on a Linux operating system with a PostgreSQL database. This widely used open source database should give the District more flexibility on how webpages are presented and provide others with the ability to build their own creative displays.

2009 Flood Season Recap

Heavy rainfall caused the ALERT system to set off alarms on 32 days in 2009 which is more than five times the prior year's count of 6 days and a record number for the gaging network, shattering the 20-day record set in 1999. The specific alarm dates are shown in the table on the first page of this section. The 2002 Hayman Burn Area in southwestern Douglas and southern Jefferson Counties is given special attention because the area is outside the District's primary area of interest. The map shows gage locations where rainfall alarm thresholds were exceeded in 2009. A number of automated gages experienced alarms on multiple days. The rainfall alarm log for the year tallied 43 occurrences of 1" in 1-hour and 112 incidents of 0.5" in 10-minutes.



The following briefly describes some of 2009's more notable events:

Thursday-Saturday, April 16-18

The first big precipitation event arrived on day two of the 2009 flood season by way of a winter storm. Precipitation totals from a combination of melted snow and rain exceeded 4-inches in SE Boulder County. A number of ALERT stations elsewhere measured more than 3-inches while one gage in Jefferson County (West Metro Fire Station 12) recorded more than 5-inches. Many streams were flowing well above normal and four stormwater detention basins recorded annual peaks: Kelly Road Dam in Denver, Flying-J in Aurora, Gunbarrel in Boulder and Basin 3207/Pond 6 in Broomfield. The Denver Fire Department rescued at least one person that became trapped between the channel walls of Cherry Creek. The storm forced closure of many schools as well as the District's office. No flood watches or warnings were issued for this event.

Friday-Monday (Memorial Day), May 22-25

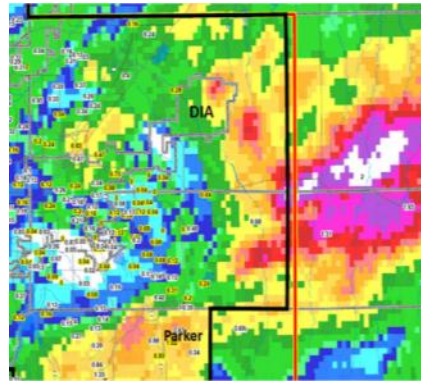
This holiday weekend kicked-off on Friday (May 22) with the year's first heavy rain threat, but that day passed with few incidents worth mentioning within the District. However, a large storm that just missed the District dumped more than 3-inches in rural Arapahoe County according to radar estimates. Saturday (May 23) produced the first ALERT rainfall rate alarms of the year in Wheat Ridge and Louisville accompanied by expected street flooding. Sunday (May 24) brought more heavy rain (1.88" in 30 minutes near 23rd and Youngfield) and some minor flooding to McIntyre Gulch in Lakewood and along Lakewood Gulch through Lakewood and Denver. Bob Jarrett with the USGS estimated a peak flow of approximately 600 cfs on Lakewood Gulch at 10th Avenue in Denver, exceeding the "flash flood" peak that claimed the life of a two-year-old on May 14, 2007. Commerce City and Adams County north of DIA also received heavy rainfall on Sunday. Memorial Day (May 25) brought an end to this first intense rain threat period of the season but not without dropping two-inch plus rains over central Jefferson County, Denver and Aurora. So much for a nice relaxing four-day holiday weekend!

Monday, June 1

After another weekend of heavy rain...that's right—both Saturday and Sunday were active T-storm days with rainfall amounts exceeding two inches on both days...a slow moving thunderstorm moved across east-central Douglas County producing 2 to 3-inches in just 90 minutes. Resulting runoff caused high flows on Cherry Creek through and downstream of Castlewood Canyon State Park. The USGS stream gage at Franktown measured a very rapid 6-foot plus rise with a corresponding peak discharge of 4,370 cfs. According to the USGS, the observed flash flooding in Castlewood Canyon State Park was the third highest event on record since 1940.

Thursday, June 11

The Parker area received approximately 1-inch of very intense rainfall (5.2"/hr in 5 minutes) between 1 and 2 p.m. resulting in street flooding. But the big storm of the day occurred in Adams and Arapahoe Counties where, according to radar estimates, rain totals exceeded 3 inches over a rather large area. This was one of the largest short duration



Rain totals for June 11, 2009. White pixels east of District boundary (black line) indicate radar estimates exceeding 3 inches.

rainfall events of the year, but it did not receive much attention because of its rural location. Had this storm happened over the urban area, we would be telling a much different story.

Sunday, June 14

This day caught the media's attention as Rockies fans got to watch a funnel cloud west of Coors Field. It was also the sixth of seven consecutive days of nuisance flooding potential. During this 7-day period the heaviest rains once again made their appearance on Saturday (in Douglas and Elbert counties) and Sunday. *Another weekend!* Sunday's storm occurred along a line from north Lakewood through Wheat Ridge and continuing northwesterly through Adams County west of Brighton. Radar rainfall estimates exceeded 2" with the highest ALERT measurement of 1.5" occurring at Hidden Lake in Adams County. The most intense rainfall of 6.1 inches/hour was recorded during a 5-minute period at the Sloan Lake detention facility near Wheat Ridge City Hall.

Tuesday, Wednesday & Thursday; June 23-25

Finally some midweek storms, two of which resulted in flash flood warnings for the District. The June 23 storm impacted the Parker area between 4 and 5 p.m. while another large storm was dumping on DIA. The severe thunderstorm in northeast Douglas County and Parker also produced 1.5" diameter hail with strong straight-line winds (see photo on first page of this section). The heavy rainfall exceeded 2-inches in just 30-60 minutes in the Parker area prompting the NWS to issue the flash flood warning.

The storm on Wednesday (June 24) was another windy street flooding rush-hour hailer that hit the northwest metro area. The heaviest measured rainfall (1.34") occurred at the Little Dry Creek at 64th Avenue gage in Adams County between 5:30 and 6:00 p.m.



On June 25 a line of moderate to strong thunderstorms developed over the higher terrain of Jefferson County. An outflow boundary from these storms produced additional strong east moving thunderstorms over Denver and western Aurora that caused a downpour of 1.5 to 2.4 inches in 20-45 minutes and prompted the second NWS flash flood warning in this 3-day

period. Four east Denver apartments were flooded by 4 feet of water between 2 and 3 p.m. at 5300 East Cherry Creek Drive South. Rainfall totals exceeded 2 inches at some locations. No major stream flooding was reported.

Friday, July 3

July is when the summer monsoon arrives in Colorado, but somehow it seemed like the monsoon should be over after last month's 3 to 6-inch rain totals, which were well above Denver's average monthly rainfall of 1.8 inches. In preparation for another holiday weekend of rain, this day was the second in a 5-day series of stormy days. Flooding in Denver nearly mimicked what happened on June 25. Fortunately the rainfall amounts from this storm were less as were the impacts.

Friday-Monday, July 10-13

After a nice mid-week break in the weather, the storms returned on Friday for another weekend round. Friday (July 10) was the biggest rain day of the period but the storm rainfall totals throughout this period were much less than prior weekends. Friday's storms triggered many rainfall rate alarms between 8:30 and 10 p.m. in Denver and Aurora causing some minor street flooding.

Monday, July 20

Hard to believe—a weekend without any flooding! This Monday was also a nice day, right up to about 10 p.m. Then without warning, things quickly went from good to bad. A supercell thunderstorm developed across southeast Boulder County and moved quickly to the south producing very intense rainfall, large hail and powerful straight line winds in eastern Jefferson County affecting Westminster, Arvada, Wheat Ridge and Lakewood. Property damages from the wind and hail were high, but only minor nuisance flooding was reported. The photo on the first page of this section taken in Wheat Ridge illustrates the severity of this storm.

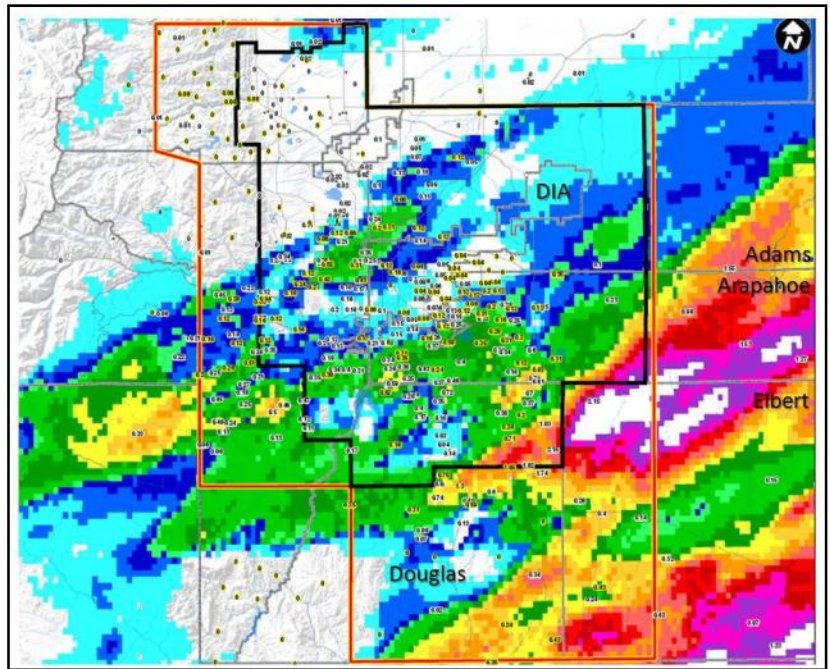
The storm duration at any one point was short but the rainfall intensities were very high. Some of the higher rainfall totals from this storm occurred in the Standley Lake area where one CoCoRaHS observer reported 1.33 inches. The biggest downpour of the evening, however, was not connected to the Jefferson County storm but occurred near Brighton in Adams County where 1.61" fell in under 30 minutes. The peak 5-minute rain rate from this storm was nearly 11 inches per hour making this the most intense rainfall measurement of 2009 from the ALERT system.

Tuesday, July 21

The Hayman Burn Area in Douglas County received heavy rainfall between 8:00 and 9:30 p.m. causing wash outs at points along State Highway 67. A number of private drive crossings including the YMCA Camp access road were also damaged. Events like this have been relatively common since the massive wildfire in 2002.

Monday, August 17

Reminiscent of June 11, this was another too-close-for-comfort late evening big rain event that did not receive much



news media attention. The 1.65 inches measured by an ALERT gage south of Parker in Douglas County does not do justice to what brushed the District's southeast corner. Like the June 11 map, the white pixels at the storm's core represent the area that received more than 3 inches—a quite large area to be sure. I wonder how much longer our good fortune will continue having noted a number of events like this one occurring in recent years with little if any consequence to the District.

Saturday, September 5

The year's flood season would not have been complete without one final weekend flash flood warning on the last month of the program. The storm this day was extremely isolated but it produced an admirable storm total and intensity. The target was located in Aurora where Liverpool Street crosses Piney Creek south of Smoky Hill Road. The rainstorm dropped 2.4" in 1-hour and sustained an impressive rainfall rate of 4 to 5 inches/hour over the first 30 minutes of the storm. Only minor street flooding occurred due to the isolated nature of this storm.

Closing remarks on the 2009 flood season

The District took a big preparedness step this year by conducting its first ever flood disaster tabletop exercise for the entire staff. The drill featured realistic mock TV News on-camera interviews and message injects from local governments. Jefferson County, Lakewood and Morrison participated and helped add realism to the exercise. AMEC Earth & Environmental lead the design and facilitation. Gonder Public Relations conducted the media interviews and professional video recording. The District will use the lessons learned from this experience to improve internal standard operating procedures for 2010.

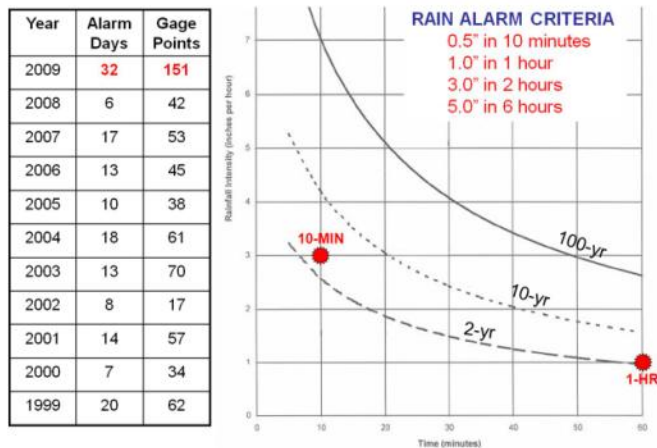
A complete set of storm summary maps can be found at f2p2.udfcd.org. For detailed reports on the ALERT system and F2P2 operations see www.udfcd.org/FWP/ALERT_Reports/ and www.udfcd.org/FWP/F2P2_Reports/.

Extremes Revisited

Have you ever heard someone say – “What if the worst happens and we have a 100-year flood?” I wonder how many people think this way. I suspect that that number is quite large but I know of no research that supports this opinion. A more disturbing question might be...how many professional engineers, floodplain managers and stormwater specialists would agree that the 100-year flood is the worst thing they can imagine? I hope that number is very small, but I have my concerns that the truth might be disappointing.

FEMA, ASFP, NAFSMA, ASCE, USACOE along with other federal agencies and organizations have recently been seeking answers to questions like this. Katrina’s impact has been a major motivating factor, but since that 2005 hurricane a number of other flood events have caused further concern. The National Flood Insurance Program (NFIP) fund is in the red and FEMA wants a better way to address the problem than just continuing along the same unsustainable path.

In the 2007 edition of *Flood Hazard News*, an article entitled “Understanding Extremes” pointed out that alleged rare events actually happen quite often, and data from the District’s ALERT System was used to illustrate this truth. Given the two unusual flood seasons that followed, it seemed like this might be a good time to refresh the 2007 table/chart and keep the dialog going about what really constitutes an extreme event and how we—the so-called flood experts—should communicate our understanding about flood risks when talking with others.

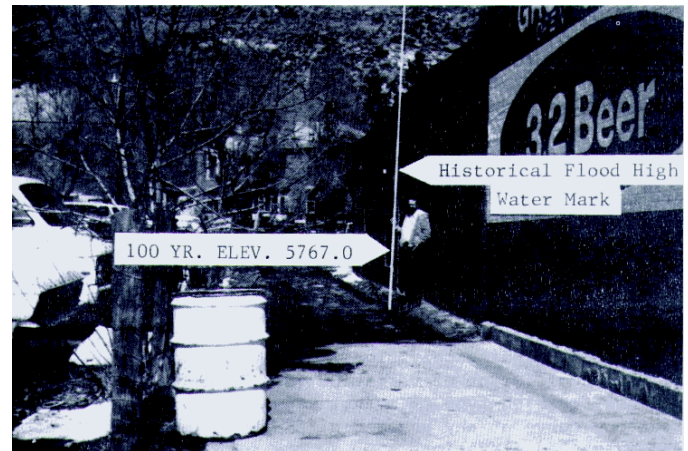


The table shows how 2009 crushed earlier alarm records that date back to 1986. Only the last decade of statistics are provided because, over the years, the ALERT rain gage network coverage has increased substantially thus skewing the comparison. For example, the Hayman network did not come on line until 2003. Regardless, it is fair to conclude that while 2009 is not considered a big flood year; it definitely produced a high number of heavy rain events with intensities exceeding the 2-year frequency.

As floodplain managers and designers of major drainage and flood control facilities we tend to stay focused on engineering design thresholds and in doing so, we talk a lot about that single event. We attempt to communicate flood risk in terms of frequency or probability, e.g. 100-year or 1%

annual chance. Sometimes we try to describe the 100-year flood’s likelihood over a longer period of time like 30 years—the term of a typical home mortgage—as having a one-in-four chance of occurring. While we may well understand what we are saying, our non-technical audience may not fully appreciate how this affects them personally.

Consider this...Knowledge of local flood history can be extremely helpful when trying to make a connection with people and gain their trust. People like to hear and tell stories about past floods. Let others tell their stories whenever the opportunity presents itself. After a short journey through the past, it may be much easier to discuss flood risk in ways people can better comprehend.



Bear Creek flood levels in Morrison between Market Street and Mount Vernon Street downstream of the Mount Vernon Creek confluence. The “Historical Flood High Water Mark” depicts the level of the September 2, 1938 flood.

Sometimes flood history is lacking for a specific location. In this situation remember that extreme floods have certainly occurred somewhere nearby. One good example is the Morrison flood of 1938. That particular flood exceeded the 100-year design flood on Bear Creek through downtown Morrison, but the most noteworthy fact that sticks in my mind is that Bear Creek was not the main source of flooding; rather it was the Mount Vernon Creek tributary that peaked at twice its 100-year discharge. The cause of the 1938 flood is another useful fact to point out—it resulted from a very intense rainstorm that dropped nearly 8-inches of rain at its core, while the design rainfall used for calculating the 100-year flood is less than 3-inches. As engineers we should own up to the fact that even our best flood control projects and land use management practices will fail to protect when too much rain falls.

Catastrophic flooding from events like Hurricane Katrina and worse will occur in the future, but not in the District—right? That’s what we would like to believe but most of us know better. As engineers and “experts” on floods, we should continue to educate ourselves about extreme events and find better ways to more effectively inform others about the true risk of flooding and what individuals and families can do to protect themselves.

IS/FWP Staff Change



Chad Kudym, GIS & Information Systems Administrator, left the District in December for greener pastures in Lincoln, Nebraska where he accepted a high-level position with GIS Workshop. Chad first came to the District in early 2005 and made

significant contributions during his tenure. He guided GIS development activities for all District programs and was the principle architect for many Flood Warning Program web-based applications that are widely admired today. A look back at past issues of *Flood Hazard News* provides an excellent summary of his accomplishments. The District wishes Chad the best in his pursuit of a very promising career.

Information Services Update

The District continues to make progress on creating more efficient ways to obtain information from the Internet. A project known as "Electronic Data Management" was initiated in 2008 with CH2M HILL's development of a MS-Access database and GIS data layers for locating District studies, design drawings and other documents. In 2009 the District hired Julia Bailey and GIS Workshop to help transfer the data to an open source SQL database; develop a web interface for updating and adding records; and to make use of ESRI's GIS Server and Adobe's Flex Viewer with a map frontend to give users an easy way to find and view District documents. The District anticipates that this new browser-driven application will be ready for release by spring of 2010.

Since YouTube™ has become so popular, now might be a good time to introduce UD-Tube (*UD...Urban Drainage*). With our student intern Stephanie LaCrue at the helm, we started a project with Vantage Point Media to convert the District's archive of flood videos for Internet viewing. Historical flood information that predates the invention of television will also be included. Watch for this new feature to appear soon on the flood safety page of our website.

Derrick Schauer has his hands full keeping the District's mission-critical IT infrastructure well-oiled. LAN security, data backups, system monitoring, disaster recovery planning, daily requests for help (*and occasional demands*) from staff, website maintenance; equipment repairs/upgrades; new software installations and patches; OS upgrades and general troubleshooting are some of Derrick's normal duties. No complaints yet about job boredom.

As we move into the second decade of the 21st century, the need for quality information services from the District is expected to grow. The District believes it is well-postured to meet this challenge through the close working relationships we have built with our local government partners; consultants; other federal, state and regional agencies; universities and research organizations; professional associations; local news media; and others. Your ideas on how we might better serve you and the public are always welcome.

Urban Drainage and Flood Control District
ELECTRONIC DATA MANAGEMENT

Document Search Task 3

Lena Gulch

All Document Types All Document Years All Document Drainage Way Years All Document Engineering Firms

Document Name	Document Type	Year	Drainage Way Year	Engineering Firm
Applewood OSP Ph A 2001.pdf	OSP			
Applewood OSP Ph B 2003.pdf	OSP			
Pleasant View OSP Ph A 1997.pdf	OSP			
Pleasant View OSP Ph B 1999.pdf	OSP			
Clear Creek Lower MDP Ph A 1980.p	MDP			
Clear Creek Lower MDP Ph B 1981.p	MDP			
Clear Creek MDP Ph A 2007.pdf	MDP			
Clear Creek MDP Ph B 2008.p	MDP			
Clear Creek Youngfield thro	MDP			
Lena Gulch Lower MDP Ph A	MDP			
Lena Gulch Lower MDP Ph B	MDP			
Lena Gulch Upper MDP Ph A 1	MDP			
Lena Gulch Upper MDP Ph B 1994.p	MDP			
Clear Creek FHAD ADCO 2005.pdf	FHAD			
Clear Creek FHAD ADCO and Jeffco	FHAD			
Clear Creek FHAD Denver and Jeffco	FHAD			
Lena Gulch Lower FHAD 2007.pdf	FHAD			
Lena Gulch Upper FHAD 1993.pdf	FHAD			
South Platte MDP Ph A 1984.pdf	MDP			

Map Aerial Terrain

Zoom To Search

Street Street Intersection

Zoom

Document Results Help

Click on a document in the results list to open up another browser window and begin downloading. You may refine your results by using the drop down filters.

Turn Off Help?

Very Preliminary

Done Internet | Protected Mode: On 100%