STORMWATER RETENTION CAPABILITIES OF STEEP SLOPED, EXTENSIVE GREEN ROOF SYSTEMS

By

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ABSTRACT

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Over the last 50 years, the world has seen a dramatic population shift from rural areas to urban city centers. In the United States, this change in urbanization has created large impervious surface areas, which have altered the natural processes of the earth's hydrologic cycle by increasing the quantity and flow rates of stormwater runoff impacting highly urbanized areas. In urbanized environments of the United States, sloped roofs account for a large portion of total impervious area (TIA) because single family homes, typically built with sloped roofs, represent the majority of building construction. Green roofs are considered one type of best management practice to help manage stormwater in urban areas.

To date, there has been extensive research done on the stormwater performance of flat green roof systems, but limited data exists on the performance of steep sloped green roofs. If the full stormwater management potential of green roofs is going to be realized, there needs to be wide-scale adoption of green roof technology in our residential housing stock.

Data from this study shows that on average, significantly larger volumes of rainwater are retained and released in delayed peak flow scenarios per rain event, when green roofing materials cover a sloped roof than when traditional roofing materials are used. Green roofing materials retained approximately 40% of cumulative rainfall and traditional roofing materials retained approximately 10% of cumulative rainfall.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Urbanization creates numerous environmental impacts while negatively affecting the health and welfare of the general public. Construction of buildings, roads and infrastructure, coupled with the extraction and use of natural resources and increases in pollution, have detrimental effects on the hydrologic cycle, carbon cycle, and biological diversity in a given area. As urbanization occurs, the amount of total impervious area (TIA) in a watershed increases, effectively altering the natural hydrology of the watershed. This modification of land use from vegetated groundcovers and forest land prohibits natural patterns of rainwater infiltration into the receiving soil profiles and creates stormwater runoff. Stormwater runoff has become a major area of concern for developing communities due to water supply contamination, peak flow events that create severe flooding and threaten lives, and disruption of municipal services. As development continues to put pressure on the surrounding environment, watershed managers are looking for new "best management practices" (BMP) to handle the problems associated with stormwater management in urban areas.

Green roofs, or vegetated roofs, are considered a relatively new roofing technology in North America that entails growing plants in a media layer on top of a waterproof membrane. It is widely recognized that one of the greatest benefit green roofs offer is stormwater retention in urban areas (Vanwoert et al., 2005; Berndtsson, 2010). The USEPA has indicated that a typical city block generates more than five times as much runoff than a woodlot of the same size (USEPA, 2003). Green roofs can mitigate impervious surfaces created on building rooftops by providing stormwater retention in these spaces, essentially restoring the vegetation that existed in that space before the

development occurred. This is critically important in urban areas where space is limited for conventional stormwater BMP's such as detention ponds. Green roofs are becoming increasingly popular as a sustainable design strategy because of the numerous environmental, economic, and social benefits that they provide.

There has been extensive research done on the numerous ecosystem services of green roofs which include stormwater retention, increased building energy efficiency, extended roof life, reduced heat island effect, etc. However, most of the green roof research to date has been limited to flat roofs. Only a few studies examine how the performance of a green roof changes under steep slope conditions. This oversight is important because typical construction of residential structures in the northern climate of the United States have steep (>10%) sloped roofs to prevent snow accumulation. Because most residences in the United States occupy approximately 30% of a standard one acre lot, this could represent a significant reduction in the amount of TIA in urban and suburban areas. This reduction could have major implications for watershed hydrology if green roof technology were applied to large portions of a community.

In this paper, the author provides an overview of the impacts of urbanization on the hydrologic cycle and specifically interprets and analyzes differences in stormwater retention data under steep (>10%) sloped conditions between green roofs and conventional roofing materials. The study further investigates differences in stormwater retention on steep sloped green roofs under three different treatments: unvegetated (growing media only), sedum vegetated and native grass vegetated, and why differences occurred. The purpose of this analysis is to begin to generate performance data on

different types of green roof vegetation and their ability to increase a green roof's stormwater retention capabilities.

This study addresses baseline stormwater retention performance data for an extensive (<6" (15.2cm)) green roof system only versus conventional roofing materials. The limits of analysis will be confined to the specific green roof system described in the experimental design. This paper will not investigate other types of green roof systems for comparison (eg. intensive >6" (15.2cm)) nor will it interpret or model the potential effects of community-wide adaption of green roof technology on stormwater management in urban and suburban areas. While it is important for these issues to be further addressed, the results of this study are meant to provide baseline data on semi-intensive, sloped green roofs that could be used in such future research endeavors.

In the context of this paper, there are several important terms that need to be defined in order to help the reader understand the problem being investigated. The term extensive, sloped green roof refers to a green roof system with less than six inches (15.2cm) of growing media, while intensive green roofs have >6" (15.2cm) depth. Most conventional sloped roofs in the United States employ 4:12 trussing system giving them a 33 degree slope. Normally, the conventional roofing materials used to cover these roofs are steel roofing panels or fiberglass shingles. Independent rain events are defined as precipitation events that were separated by six or more hours. In the event runoff was still occurring six hours after the initial rainfall event, the two events were combined. Stormwater runoff is defined as the amount of rainfall released from the roofing system after a storm event; peak flow refers to the highest level of stormwater runoff recorded for a given rain event during a 5 minute time period. The term total impervious area

(TIA) means all areas within the urban matrix that are impervious and restrict rainwater infiltration and includes building, roads, parking lots, etc.

LITERATURE REVIEW

Urbanization and its Affect on Ecosystem Services.

Throughout human history, the majority of the world's population has lived in rural areas. However, the last half of the 20th century has seen a shift in human population from rural areas to urban areas. According to the United Nations, the world's urban population has reached 2.3 billion as of the year 2000, a figure nearly four times as large as that estimated for 1950 (United Nations, 2006). This rapid increase in urban population has detrimental effects on the surrounding environment. Natural, undeveloped lands are typically more pervious, allowing rainwater to infiltrate back into the soil profile and groundwater. Impervious surfaces cause an increase in the total volume of stormwater runoff and also increase the rate in which stormwater is delivered to a receiving body of water. Both the National Oceanic and Atmoshpheric Administration (NOAA) and Pennsylvania State University estimate that there are 25 million acres of impervious surfaces in the continental United States (Beach, 2002). In urban areas, it is not uncommon for impervious surfaces to account for 45% or more of the land cover (Kloss, 2006). Studies show that hydraulic and biological changes to streams occur when 10 to 20 percent of a watershed has impervious surfaces (Clar, 2004). As urban development continues to sprawl, the conversion of land cover changes from forested and vegetated lands to impervious surfaces disrupts the natural hydrologic cycle (Figure 1) and creates stormwater management problems.

Urbanization has a profound affect on how water travels both above and below the earth's surface following a storm event by limiting rainwater infilitration and increasing stormwater runoff quantities. Urban development has contributed greatly to the pollution of our nation's waters because increased quantities of stormwater carry large amounts of suspended and/or dissolved pollutants to waterways. These pollutants include bacteria, metals, nutrients, oils and grease, pesticides, sediment, and trash. Under natural conditions, the amount of rain that is converted to runoff is less than 10% of the rainfall volume (United States Environmental Protection Agency, 2003). Unlike agriculture, which can display significant interchange with forest cover over the time scales of a century, there is no indication that once-urbanized land ever returns to a less intensive, naturalized state (National Research Council, 2009). Therefore the construction activities associated with urbanziation such as clearing vegetation, stripping topsoil, and increasing impervious areas through hardscaping will have detrimental impacts on the surrounding environment.

Ecosystem Services (ES) are the benefits provided to humans by ecosystems. These include *provisioning* services (food, water, timber, etc.), *regulating* services (climate, flooding, water quality), *cultural* services (recreation, aesthetics, spiritual fulfillment), and *supporting* services (soil formation, pollination, nutrient cycling). Urbanization strongly impacts an ecosystem and the services it provides to humans in an area. Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history; this change is largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel (Millennium Ecosystem Assessment, 2005).

The earth holds vast amounts of water beneath its land surface, on its surface, and in its atmosphere. This water is in constant motion and is known as the hydrologic cycle. The hydrologic cycle is comprised of three main phases: (1) precipitation and runoff; (2) infiltration and storage; and (3) evaporation and transpiration (Achuthan, 1974). Water moves through various aspects of the hydrologic cycle and eventually reaches the oceans where it will be evaporated back into the atmosphere to repeat the cycle again (Figure 2). Precipitation that reaches the earth's surface either infiltrates into the earth's surface or becomes surface runoff. The volume and speed of runoff depends on the size of the storm (how much water falls in a certain amount of time) and the land features of the site (Clar, 2004). Transpiration is the process by which plants take up water via their roots in the soil and release it to the atmosphere in the form of water vapor through the process of photosynthesis. Evaporation occurs when water is transformed from a liquid to a gas and moves back into the atmosphere. It is often times difficult to distinguish between transpiration and evaporation effects occurring in the hydrologic cycle. Therefore, these two processes are often viewed as one process called evapotranspiration (ET). This includes water that is used by plants during transpiration and water that is evaporated from plants or earth surfaces.

The hydrologic cycle is a regulating service provided by ecosystems and is critical in protecting the health and safety of the general public. Wetlands, forests, and other vegetated lands help manage rainwater by intercepting, infiltrating, and filtering rainwater as it reaches the earth. Trees with mature canopies can absorb the first half inch of rainfall during a storm event (Casey, 2012). This regulating, ecosystem service is greatly reduced by urban development and increased imperviousness because of the

elimination of vegetation that acts to absorb rainwater. Instead of absorbing rainwater and infiltrating it, large amounts of impervious surfaces in urban areas increase the volume and rate of stormwater runoff.

Soils also play a dominant role in the hydrologic cycle because soils usually absorb, store, and release precipitation (Saxton, 1990). This is important because urban development greatly impacts the natural soil profiles by compacting soil structure, creating uniform grades (through site elevation changes) that reduce natural low spots for water collection, and by removing vegetation. Plants at the earth's surface provide natural conduits for rainwater through their root systems. Likewise, groundcover foliage absorbs much of the impact of raindrops hitting the soil, thereby reducing soil erosion. Small organisms like worms, insects and burrowing animals also improve the collecting capabilities of the earth's mantle by creating/maintaining pore space and keeping the soil in the top horizons friable.

Water Management Services Provided by Green Roofs

Reintroducing some of the natural components of the hydrologic cycle, that encourage infiltration and storage, can be partially fulfilled by implementing green roofs. Green roofs, by reintroducing soil and vegetation into areas that are impervious, have the capacity to partially reverse the degradation to drainage systems that increased stormwater runoff, erosion, siltation, and/or bacterial contamination causes. Many consider stormwater runoff mitigation to be the primary benefit of green roofs in the task of reversing failing stormwater management infrastructure (Liptan, 2003). Green roofs have been reported to retain 39 to 100 percent of rainfall, with an average retention just under 78 percent (Carter, 2006). Even though green roof systems retain stormwater,

runoff will still occur once the green roof becomes saturated. However, there is a delay in stormwater runoff because it takes time for rainwater to move through the vegetation and media layers; this is due to the additional time needed to saturate the media and reach the roof's water carrying capacity. This delay is beneficial to municipal sewer systems because it helps reduce peak storm water volumes and flow rates, and thus, increase the time interval between a storm and release of water to the receiving watershed. Green roofs can delay runoff between 34 minutes (Carter and Rasmussen 2006) and four hours (DeNardo et al., 2005), compared to reference roofs where runoff was nearly instantaneous. Water retention is a function of product design including factors like substrate depth, media composition, and plant selection which determines root morphology; other factors thought to affect green roof performance include roof slope, weather factors such as rainfall frequency, intensity and duration, and climate.

The USEPA (2009) identifies numerous techniques, known as stormwater Best Management Practices (BMP), that are used to control and manage stormwater runoff. The design and use of specific stormwater BMP's is a function of site conditions (i.e., topography, soil types, vegetative cover, building footprint size, overall site acreage, etc.) and the need for treatment of water quality parameters. Stormwater BMP's are divided into two categories of control: structural and non-strucutral. Structural BMP's are management techniques that use engineered systems to control stormwater runoff. While some of these techniques include built structures like retention and detention ponds, many structural BMP's use the natural processes of interception, infiltration, and evaporation. Non-structural BMP's align more with planning techniques. These are decisions that are made early in the site design process such as reducing building

footprints, reducing parking lot sizes, planning the use of a green roof, etc. Green roofs can be considered to be a structural and non-structural best management practice. They are most effective when they are part of a wholistic site design approach where the planning of the green roof can reduce the need for other stormwater BMP's on the ground. However, the actual green roof is an engineered system that is constructed on the site; therefore it can be classified as a structural BMP also. As green roofs begin to emerge as a viable stormwater BMP, their effectiveness as a control is based on the scale (i.e., amount of area) at which green roofs are applied.

Using the Tanyard Branch watershed in Georgia as a case study, hydrologic modeling suggests that green roofs alone cannot provide complete stromwater management at the watershed scale (Carter, 2006). However, in scenarios like this, green roofs can certainly help to complement other stormwater BMP's. Also, in highly developed watersheds where limited space constrains the ability to use detention/retention ponds, green roofs are an effective strategy that uses the roof space not only as part of the building envelope, but also as a space for stormwater detention. While green roofs cannot function alone as a stormwater BMP at the watershed scale, green roofs do have the potential to replicate portions of the predevelopment hydrograph which may be lost after urbanization (Carter, 2006). By functioning to intercept and evaporate rainfall before it reaches the ground, green roofs can re-establish that part of the predevelopment hydrograph that slows water transfer to receiving surface water bodies during a rain event, and thus, they reduce the potential for flooding and/or sewer overflow conditions.

However, there has been minimal research completed which investigates if the stormwater management benefits are realized when the green roof system is placed on a steep slope. Getter (2007) reports that increasing slope decreases the stormwater retention abilities of a green roof system. Her studies show that for overall rainfall a test roof with a 2% slope retained 85.2% of rainfall while a test roof with a 25% slope retained only 75.3% of rainfall. When rainfall was separated into light (<2.0mm), medium (2.0-10.0mm) and heavy (>10.0mm) categories percent retention was 93.3%, 92.2% and 71.4%, respectively. Vanwoert (2005) suggests similar findings that roof slope does influence the stormwater retention capabilities of green roof systems. He reports that a test roof with 2% slope retained 70.7% of rainfall while a test roof with a 6.5% slope retained 65.9% of overall rainfall. When rainfall was separated into light (<2.0mm), medium (2.0-6.0mm) and heavy (>6.0mm) categories percent retention with a 2% slope was 97.1%, 85.5% and 65.1%, respectively, while a 6.5% slope was 94.9%, 83.1% and 59.5%, respectively. The difference between the results of these two studies could be attributed to the age of the green roof media. Getter's study was taken from a green roof that had been established for 3 years. She found mature substrate exhibited greater values for porosity, free airspace, organic matter, and water holding capacity. Due to the fact that the majority of building construction in urban areas utilizes sloped roofs, it is critical to understand stormwater performance and how to best design steep sloped green roof systems to optimize stormwater performance.

Other Ecosystem Services Provided by Green Roofs Throughout History.

Many people believe green roofs to be a part of the "green" movement associated with today's building and construction industry. However, green roofs date back to

ancient civilizations in the Middle East. Arguably, the most famous ancient (and possibly mythical) green roof occurred in Mesopotamia and was known as the Hanging Gardens of Babylon (700 B.C.). These roof gardens were purported to occupy four acres of planted and irrigated vegetation and reached 300 feet above the Euphrates River Valley. Green roofs in ancient times typically used indigenous materials to construct a waterproof membrane and then placed surrounding soil and natural vegetation on the roof. People of these ancient civilizations used "green roofs" as a climate regulatory service to protect themselves from the extremes of temperatures found in desert environments, where insulation against heat and cold was more important than water management.

In Europe, almost every major western civilization adapted some form of the green roof system seen in the Middle East. However, unlike Middle Eastern societies, which used green roofs for climate regulation to protect themselves from the extreme desert climate, early European green roofs provided more cultural services to society. In some societies, roof gardens were meant to display wealth, sophistication, and power (e.g., the Italians who constructed villas with extensive terracing and roof gardens in the 1500's). In other cases, green roofs were used as an inexpensive, long-lived solution to roofing for barn or home buildings (e.g., Northern European countries and Scandinavian countries). Similar to the Middle East, these societies used green roofs to regulate the climate and provide protection from the outdoor environment. In Norway, many of these structures date back to the 16th century and still stand today. These latter roofs were typically intensive, sod roofs with 6+ inches (15.2cm) of soil and a waterproof membrane constructed of multi-layered birch bark. Sod removed from the building footprint often

was placed directly on the waterproof membrane (Figure 3). These roofs were constructed in small towns and rural areas because they were cheap to build, used local materials, and had adequate waterproofing and insulating properties. Because the building construction during this time period typically was timber frame construction, the heavy structural members could support the additional weight of the green roof plus any moisture common to their temperate climates. Sod covered houses and farms in the Great Plains of North America (which typically were homesteaded by Scandinavian immigrants), suggest that the technique was transferred from the Old World to the New World as late as the mid 1800's (Osmundson, 1999).

The contemporary green roofs seen today are primarily used to alleviate environmental problems, and restore ecosystem services lost by high density, urban development. The modern green roof originated at the turn of the 20th century in Germany, where vegetation was installed on roofs to mitigate the damaging effects of solar radiation on the roof structure (Oberndorfer et al., 2007). These roofs helped regulate climate change by reducing heat islands in urban areas and were typically shallow, extensive green roofs that were inaccessible to foot traffic. This type of green roof largely replaced the more intensive (deep) rooftop gardens that were used previously because they have a reduced roof load. By the middle of the 20th century, progressive thinking about environmental concerns in urban areas led to increased research in the use of green roofs, mainly in Germany and Switzerland. In Germany, green roof technology has been incorporated into public policy and technical guidelines have been developed as early as 1982 by the Landscape, Research, Development and Construction Society (FLL, 1995). Because of this, green roofs have now become widely accepted, and they

constitute an estimated 14% of all new flat roofs in Germany (Haemmerle, 2002). As the 21st century approached, green roofs made their transition to North America, and research focused more intensely on green roof performance. Organizations such as the Leadership in Energy and Environmental Design (LEED) provided design guidelines for energy efficient buildings and have helped to increase awareness and the use of green roof technology in the United States.

It is likely that green roofs will continue to gain momentum in North America because of other environmental, economic, and social benefits. Green Roofs for Healthy Cities (GRHC) publishes an annual industry survey on the growth of the green roof market. In 2011, they concluded that the green roof industry grew by a staggering 115% compared to 28.5% growth recorded in 2010 in terms of square footage of green roof installed. These numbers show a positive growth trend in the market and point to an industry that has the potential to sustain itself in the future.

Other benefits of green roofs include their ability to increase the lifespan of roof membranes (Getter and Rowe, 2006). The growing media and vegetation layer in a green roof system protect the underlayment from solar exposure and radiation. The green roof system also regulates the temperature of the membrane surface. The reduction in extreme temperature variations help to extend roof membrane life by reducing the expansion and contraction of membrane material which can lead to degradation. One study demonstrated diurnal temperature fluctuations for a non-green roof to be 50°C (122° F), while green roof diurnal temperature fluctuations were only 3°C (37.4°F) (Connelly, 2005). Peck et. al. (1999) estimated that temperature moderation can extend the membrane life two to three times. This increased life span helps recover initial upfront

costs associated with green roofs and makes the life cycle costs of green roofs more economically viable than the life cycle costs of more conventional roofing materials.

A second and third benefit of green roofs is energy conservation and the reduction of the urban heat island effect, respectively (Getter and Rowe, 2006). Green roofs provide shade and an extra insulation layer that help to make buildings more energy efficient by increasing the R-value of the roofing system. Media depth, shade from plant material, and transpiration can reduce solar energy gain by up to 90% compared to non-shaded buildings (Getter and Rowe, 2006). In addition to reducing surface temperatures on the roof membrane, green roofs also reduce the ambient air temperatures surrounding the building. This reduction in ambient air temperatures can help reduce the urban heat island effect, a natural phenomenon where highly urbanized areas, due to impervious structures, absorb solar incidence and act as a heat sink after solar incidence subsides. Air temperatures above the building have been shown to be 30°C (86°F) lower when a vegetated green roof is in place compared to a conventional roof (Wong et al., 2003), resulting in up to 15% annual energy consumption savings. Since buildings consume 36% of total energy use and 65% total electricity consumption, green roof implementation on a wide scale could significantly impact energy use in an area. Most of the energy savings from green roofs will occur during the summer months because of reduced electricity consumption from air conditioner usage (Kula, 2005). This is because the insulation properties of media are greater when air space exists as opposed to when the media is saturated – which typically occurs during the winter months. A University of Michigan study compared the expected costs of a 23,000 square foot conventional roof with the cost of the same size green roof. The study took into consideration all of the

benefits afforded by green roof technology such as stormwater management, increased roof life, energy conservation, etc. to determine the life cycle cost comparison. The green roof would cost $129,000 more to construct. However, over its lifetime, the green roof would save about $200,000 with nearly two-thirds of the savings coming from reduced energy needs for the building (Foster, 2011).

Practical Aspects of Green Roof Design on Ecosystem Services.

Green roofs are typically classified as intensive or extensive; however increasingly the term semi-intensive is used to define a green roof with characteristics at an intermediate level between intensive and extensive green roofs. The difference between these two types of green roofs is primarily the depth of the soil media, plant selection, accessibility and maintenance. Intensive green roofs are typically classified as having greater than 6 inches (15.2cm) of media. This allows for the use of a wide-range of plants, with deeper and more extensive root systems. Many plants traditionally found in landscapes on the ground including ornamental grasses, trees, shrubs, and herbaceous perennials are found in intensive green roofs. On flat roof environments, these roofs are often designed to be rooftop gardens that function as a social space for users of the building.

Extensive green roofs are classified as having less than 6 inches (15.2cm) of growing media. These roofs often serve a specific function, such as microclimate control or stormwater retention, and they generally are not designed to be accessible by the public. Sometimes these gardens are not visible to the public. This type of green roof is lighter in weight and is often used on existing buildings with low roof load capacities. The shallow media depth restricts the species of plants grown on the roof. These plants

often include herbs, a limited number of grasses, mosses, and drought tolerant succulents such as *Sedum* (Getter, 2006).

Green roofs can be designed to create wildlife habitat in urban areas where vegetation and natural habitat have been destroyed due to building development. Widespread application of green roofs in urban areas could establish "green" corridors to help facilitate bird migration patterns. In northern Switzerland, nine orchid species and other rare and endangered plant species exist on a green roof installed a century ago (Brenneisen, 2004). In addition, many birds have been recorded utilizing green roofs in Germany, Switzerland, and England (Brenneisen, 2003; Gedge, 2003). Green roofs that can offer more complex landscape structure are likely to attract more bird and insect species. Extensive green roofs that lack species diversity and landscape structure will have a reduced capacity to support bird and insect communities. For building owners interested in recreating lost habitat on green roofs, reputable ecologists often can assist designers in creating green roof systems with appropriate plant selection, soil moisture conditions, and habitat structures to encourage birds and other wildlife.

Green roofs also have the ability to improve air quality by filtering air-borne pollutants and reducing ambient air temperatures. Nearly one-quarter of the people in the U.S., live in communities where unhealthy short term levels of particle pollution exist, and roughly one in ten people live where there are unhealthy levels year-round (Rowe, 2010). It is well known that plants can remove air pollution by taking up gaseous pollutants through their stomates, intercept particulate matter with their leaves, and break down organic compounds in their plant roots (Baker, 1989). Therefore, the addition of

green roof plants in an urban ecosystem can improve air quality by introducing new vegetation to areas that typically had no value in terms of ecosystem services.

Finally, green roofs can provide social benefits in terms of improved aesthetics. Intensive green roofs are often designed to be "rooftop gardens" where building occupants have the access to additional space for socializing. Addition of rooftop gardens can increase property values for building owners and in turn allow them to charge more for rent. When humans view green plants and nature, beneficial health effects, such as reducing stress, lowering blood pressure, releasing muscle tension, and increasing positive feelings (Ulrich, 1986), have been shown to occur. This has led to many hospitals installing green roofs to provide their patients with more pleasant visual surroundings.

HYPOTHESES

This study involves a field experiment calling for a comparison between stormwater flow emitting from conventional roofing materials (ie., steel roofing or fiberglass shingles) and three green roof treatments (ie., sedum, native grass, and bare soil). The same slope marks all five roof treatments.

Null Hypothesis 1:

There is no relationship between roof treatment and the percent rainwater retained on a standard sloped roof of 33%.

Hypothesis 1a:

There is a significant ($p \geq 0.05$) relationship between conventional and green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with

conventional roofing materials retaining significantly less rainwater than green roof or bare soil roofing surfaces.

Hypothesis 1b:

There is a significant ($p \geq 0.05$) relationship between green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with the grass roofing treatment retaining significantly more rainwater on a sloped roof than sedum roofing treatment.

Hypothesis 1c:

There is a significant ($p \geq 0.05$) relationship between green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with the grass roofing treatment retaining significantly more rainwater on a sloped roof than the bare soil roofing treatment.

Null Hypothesis 2:

There is no significant ($p \geq 0.05$) relationship between conventional roof treatments (i.e., steel or fiberglass shingle) and percent rainwater retained on a standard sloped roof of 33%.

Hypothesis 2a:

There is a significant ($p \geq 0.05$) relationship between conventional roof treatments (i.e., steel or fiberglass shingle) and percent rainwater retained on a standard sloped roof of 33%., with the fiberglass shingle roofing treatments retaining significantly more rainwater on a sloped roof than the steel roofing treatment.

MATERIALS AND METHODS

Site Description. The study was conducted at the Michigan State University, Landscape Architecture Alumni Research Site on the Old Mission Peninsula, Grand Traverse County, MI. The site is located approximately 14.5 kilometers (9.0 miles) north of Traverse City on a cherry farm, in an open field adjacent to several barn structures and a chestnut orchard (Figure 4). The climate of the site is influenced by the fact that it is surrounded on two sides by East and West Grand Traverse Bay. Consequently, the area experiences cool springs, mild summers, warm falls and high snowfall winters. The weather patterns in turn create sudden and large amounts of precipitation during the seasonally active periods. Weather data was collected on-site by a weather station that monitored precipitation, wind, and solar incidence. Measurements were complimented by another weather station located approximately 8.0 kilometers (5 miles) north of the study site on the Old Mission Peninsula; this station also is run by Michigan State University.

Roof Testing Platforms. Five sloped green roof study platforms with dimensions of 4.0 ft x 8.0 ft (1.22 m x 2.44 m) were constructed to replicate what could be considered a typical sloped (4:12 pitch) roof on a single family home in Michigan. The platforms were constructed by MSU Environmental Design graduate students at the site in Traverse City, MI. Roof trusses were built with conventional 2" x 4" (5.0cm x 10.1cm) boards mimicking typical roof construction found on homes in Michigan due to the heavy snowfall recorded during the winter months. Roof decking was constructed out of 4' x 8' (1.22m x 2.44m) sheets of marine plywood and fastened to the roof trusses. Each platform was framed and then partitioned into three equal sections using 2" x 6" (5.0cm x

15.2cm) cypress boards. Each 4'x8' (1.22m x 2.44m) sheet of marine plywood was partitioned into 3 zones with dimensions of 2.5 ft x 4.0 ft (0.76 m x 1.22 m) for a total surface area of 10.0 ft^2 (0.93 m^2)/partition zone that drained separately from one another. Each partition zone was lined with a 0.045mm EPDM rubber membrane (Figure 5). The roof platforms were built on a post structure to a height of 0.91 meters (3 ft.), which allowed room for monitoring equipment to be installed under the drains of each partition. The aspect of the study plots was oriented due north to minimize the negative effects of solar incidence.

Drainage System and Water Retention. A 2.54 cm (1 in) drain was cut out of the bottom of each individual partition to allow it to drain separately. Traditional plastic gutters and end caps were custom fit to the opening in each partition, and each directed stormwater runoff into a downspout that ran directly into a tipping bucket (Figure 6). On top of the liner in each roof partition that was to contain green roof media, a 0.75 cm (0.26 in) water retention fabric (Xeroflor XF158) was placed. The water retention fabric was placed to cover the outlet drains so it functioned as a water filter as well. No formal drainage layer was used at the base of the partitions containing a green roof system treatment; this was done to retain as much moisture in the substrate as possible.

Substrate Type, Vegetation Type and Roofing Materials. Nine partitions were set aside to contain the green roof system. These were filled with 15.2 cm (6") of an engineered substrate mix containing 80% heat-expanded slate, 15% sand, and 5% organic matter to the specifications listed in Rowe et al. (2006). One set of three partitions contained only engineered substrate as described above. Two different types of green

roof vegetation were planted in each set of remaining green roof system partitions: Vegetation consisted of either sedum species or native grass species. Five species of sedum were planted, including *S. kamsatchatkum, S. album, S. reflexum, S. acre, and S. ellacombianum.* Plants were cultivated using cuttings supplied by Hortech, Inc. (Spring Lake, MI) and applied at a rate of 0.9 kg (2 lb) per square meter. The sedum partitions had approximately 90% plant coverage with abundant growth of *S. kamsatchatkum* on the bottom of the partitions (Figure 7). The Michigan native grasses included *Buchloe dactyloides* and *Bouteloua gracilis*. These plants were planted from 7.62cm (3") plugs supplied by Nature Hills Nursery (Omaha, NE) and planted on 10.16 cm (4") centers in a randomized pattern. Native grass partitions had approximately 95% plant coverage and also displayed abundant plant growth on the bottom of the partitions; neither native grass species dominated the other (Figure 7). Plants were irrigated twice a day for the first three weeks to encourage root establishment. No further irrigation was used after the establishment period, and no fertilizers were applied. The sedum and grass partitions had 90% and 95% coverage, respectively, when data collection began immediately after the establishment period. Therefore, nine partitions containing 3 replicates of bare media, bare media plus sedum species or bare media plus native grasses, were compared for rainwater retention, respectively.

Two different conventional roofing materials were used in the remaining partitions with 3 partitions in a set containing three-dimensional (30 year) fiberglass shingles, respectively, and three replicates in a set containing galvanized steel roofing. The conventional roof materials were supplied by Ace Roofing (Traverse City, MI) and

were used to represent typical roofing materials found on homes in the Midwest (Figure 8).

Treatments. Fifteen partitions and a total of 5 treatments (3 partitions/treatment) were tested during the study. These included conventional steel roofing, conventional three dimensional (30 year life) fiberglass/asphalt shingles, engineered soil media only, engineered soil media plus native grasses, and engineered soil media plus sedum. The treatments were arranged in a stratified design with the conventional roofing treatments occupying two platforms in an alternate pattern, and each of the three green roof treatments found on three platforms in a rotated manner (Figure 9). The objective of the study was to quantify the difference in stormwater retention between the 5 different roofing treatments as discussed above.

Data Collection. Rainfall and runoff were recorded on a CR-1000 datalogger (Campbell Scientific Inc., 2009) that was placed along with two AM16T multiplexers and one SDM-SW8A switch enclosure. A review of National Oceanic and Atmospheric Administration (NOAA) annual precipitation records suggested that high intensity rain events in this part of Michigan occurred frequently, so each partition area was fitted with a TB-4 tipping bucket rain gauge (Campbell Scientific Inc., 2009). These buckets were placed under each partition and runoff was collected directly from the downspouts. A sixteenth tipping bucket was located adjacent to the weather station on the study site as a control to collect rainfall. The fifteen tipping buckets were covered with 25.4cm (10") round plastic plant saucer that contained a hole that was cut to fit the size of the downspout draining the roof partitions. Accuracy of the rain gages, as reported by the

manufacturer, are ±1%, +0 and -2.5%, and +0 and -3.5% for rainfalls of <25.4 mm•h-1, 25.4 to 50.8 mm•h-1, and 50.8 to 76.2 mm•h-1 (Campbell Scientific Inc., 2009).

Data was recorded beginning in April 2010 for a period of two years with the likelihood of snow events approaching zero. The data in this study represents that part of the year when precipitation occurred as rainfall (April 1, 2010, until October 31, 2011). The datalogger was programmed to collect data values every minute and total them every 5 minutes, 24 hours a day over the study period.

Data Analysis. The data logger recorded data from each tipping bucket, respectively. This data was then subtracted from the total rain fall recorded for each rain event at the control tipping bucket (#16). The difference in the two data recordings was the "retention data" for that particular partition. Retention data were analyzed from all rain events that occurred during temperatures above 0°C (32°F) as a percentage of total rainfall for each rain event. Independent rain events were defined as precipitation events that were separated by six or more hours. In the event runoff was still occurring six hours after the initial rainfall event, the two events were combined. A review of annual NOAA rain events suggests that rain events in this part of Michigan could be categorized as light (< 5mm), medium (5 - 14 mm), or heavy (>14 mm); this was an arbitrary categorization set by the author to facilitate data analysis.

Data were analyzed as mean percent retention per rain event using an ANOVA model with roof treatment and rainfall category as independent variables. Significant differences between treatments were determined using multiple comparisons with Tukey-Kramer adjustments (PROC MIXED, SAS version 9.2, SAS Institute, Cary, NC).

RESULTS

During the study (April 1, 2010 – October 31, 2011), there was a total of 63 measured rain events (>0 mm) recorded (Figure 10). Precipitation totals ranged from 0.76 mm to 66.29 mm for individual rain events. A histogram of measured rain events used in the study shows the distribution of rainfall (Figure 11). Of the 63 measured rain events, there were 25 light (<5mm), 21 medium (5 – 14 mm), and 17 large (>17 mm) rain events. Daily low temperatures ranged from -18.2°C to 23°C and daily high temperatures ranged from -12.2°C to 34.2°C (Figure 12).

The ANOVA model showed rain category and roof treatment, as well as the interaction of both, to be significant (Table 1). Representative hydrographs (Figure 13) and cumulative hydrographs (Figure 14) from a selected rain event within each rainfall category illustrate the effect of roof treatment on percent retention as well as the overall delay of runoff.

During a selected light rain event (3.56mm) on June 8, 2011, average percent retention was 18.4%, 11.4%, 100.0%, 100.0%, 100.0% for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum and engineered substrate plus grass treatments, respectively. The start of runoff for the fiberglass asphalt shingle roof treatments and the steel roof treatments occurred almost instantaneously after the rainfall started. In contrast to this, the engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments. All retained 100% of rainfall and no runoff occurred during the rain event. Average peak flow volumes during a five minute interval for the fiberglass asphalt shingles and steel roof treatments were 0.83 mm and 0.89 mm, respectively. There were no peak flow measurements for

the engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass because no runoff occurred.

During a selected medium rain event (8.38mm) on August 14, 2010, average percent retention was 16.0%, 11.4%, 42.0%, 65.0%, 66.8% for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments, respectively. The start of runoff for the fiberglass asphalt shingle roof treatments and the steel roof treatments occurred almost instantaneously after the rainfall started. The engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments delayed the start of runoff for 10 minutes after the initial rainfall. However, runoff was spread out over time for all three green roof treatments. Average peak flow volumes within a five minute interval were 2.27 mm, 2.60 mm, 0.29 mm, 0.14 mm and 0.10 mm for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments, respectively.

During a selected heavy rain event (20.83 mm) on June 11, 2011, average percent retention was 3.6%, 2.2%, 18.0%, 29.2%, 34.3% for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments, respectively. The start of runoff for the fiberglass asphalt shingle roof treatments and the steel roof treatments occurred almost instantaneously after the rainfall started. The engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments delayed the start of runoff for 10 minutes after the initial rainfall. However, runoff was spread out over time for all three green roof treatments. Average peak flow volumes within a five minute interval were 2.20 mm, 2.02 mm, 1.11

mm, 0.97 mm and 0.69 m for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments, respectively.

These representative results concur with early findings of Getter (2006) and Vanwoert (2004) from their respective sloped green roof research projects. Getter concluded that there was minimal delay in runoff from the vegetated roof platforms tested. Vanwoert concluded that there was a delay of runoff, usually less than an hour. These results are concurrent because there was a minimal (approximately 10 minute) delay in initial runoff from the green roof test platforms during this study. However, some of the other findings from these two studies contradict some of the results of this study which show that runoff was eliminated completely for some light rain events. It is likely that the intensity and frequency of the rainfalls, when coupled with antecedent soil moisture conditions in the partitions could explain the difference in findings. Also, the green roof system design could be affecting the stormwater retention performance. In this study, 15.2cm (6") of engineered substrate was placed on top of a water retention fleece to maximize stormwater retention; in the earlier studies, a thinner engineered substrate was used.

Runoff was spread out over time for all green roof treatments. For the engineered substrate only treatment there was no runoff recorded for the selected, light rainfall event (June 8, 2011). However, the final runoff was recorded 18 hours 5 minutes and 11 hours 25 minutes for selected medium (August 14, 2010) and heavy (June 11, 2011) rainfall events, respectively. For the engineered substrate plus sedum treatment there was no runoff recorded for the selected, light rainfall event. However, the final runoff was

recorded 10 hours 35 minutes and 11 hours 20 minutes for selected medium (August 14, 2010) and heavy (June 11, 2011) rainfall events, respectively. For the engineered substrate plus grass treatment there was no runoff recorded for the light rainfall category. However, the final runoff was recorded 18 hours 5 minutes and 12 hours 45 minutes for selected medium and heavy rainfall events, respectively. For the fiberglass asphalt shingle treatment, final runoff stopped shortly after the rainfall ended for light, medium and, heavy rainfall events. For the steel roofing treatment, final runoff stopped shortly after the rainfall ended for light, medium, and heavy rainfall events.

Over the two year study period; there was 701.54 mm of cumulative rainfall from the 63 measured rainfall events. The fiberglass asphalt shingle roof treatment retained 99.18 mm (14.1%), the steel roof treatment retained 68.72 mm (9.8%), the engineered substrate only treatment retained 179.33 mm (25.6%), the engineered substrate plus sedum roof treatment retained 291.80 mm (41.6%), and the engineered substrate plus grass roof treatment retained 281.40 mm (40.5%).

When total rainfall from all light rain events was combined (66.04 mm), the engineered substrate plus grass roof treatment retained the highest percentage of rainfall (94.0%), while the engineered substrate plus sedum roof treatment retained the next highest amount (93.1%). The engineered substrate only retained 82.5%; the fiberglass asphalt shingle roof treatment retained 17.6%; and the steel roof treatment retained 9.8%.

When total rainfall from all medium rain events was combined (189.74 mm), the engineered substrate plus sedum roof treatment retained the highest percentage of rainfall (70.5%), while the engineered substrate plus grass roof treatment retained the next

highest amount (67.4%); the engineered substrate only retained 47.0%; the fiberglass asphalt shingle roof treatment retained 11.7%; and the steel roof treatment retained 8.0%.

When total rainfall from all heavy rain events was combined (445.77 mm), the engineered substrate plus grass roof treatment retained the highest percentage of rainfall (29.1%), while the engineered soil media plus sedum roof treatment retained the next highest amount (28.3%). The engineered substrate only retained 12.7%; the shingle roof treatment retained 13.8%; and the steel roof treatment retained 9.9% (Table 2).

When rainfall was separated into distinct rain events and retention percentages from each rain event were averaged together, all means were different with retention percentages of 14.6%, 9.2%, 51.8%, 68.1% and 67.6% for the fiberglass asphalt shingles, steel, engineered substrate only, engineered substrate plus sedum, and engineered substrate plus grass treatments, respectively. However, when the rain events were categorized into light, medium and heavy rain events, the results showed that not all means were different. For light rain events the engineered substrate plus sedum and engineered substrate plus grass treatments were not significantly different from each other. The engineered substrate only treatment was significantly different from the engineered substrate plus grass treatment, but not the engineered substrate plus sedum treatment. The steel and fiberglass asphalt shingle treatments were significantly different from all green roof treatments (Table 3), but not significantly different from each other. For medium rain events the engineered soil media plus sedum and engineered soil media plus grass treatments were not significantly different from each other, but they were different from the engineered soil media only, fiberglass asphalt shingle and steel roof treatments. Engineered soil media only was significantly different from all other

treatments. Steel and shingle treatments were not significantly different from each other, but were different from all other treatments (Table 3). For heavy rain events, the engineered substrate plus sedum and engineered substrate plus grass treatments were not significantly different, but were different from all other treatments. The engineered substrate only, fiberglass asphalt shingle and steel roof treatments were not significantly different from each other, but they were different from the engineered substrate plus sedum and engineered substrate plus grass (Table 3). The lowest retention percentage for all treatments occurred during heavy rain events where 13.8%, 9.9%, 12.7%, 28.3% and 29.1% was retained for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum and engineered substrate plus grass, respectively. The highest retention percentage for all treatments occurred during light rain events where 17.6%, 9.8%, 82.5%, 93.1% and 94.0% was retained for the fiberglass asphalt shingle, steel, engineered substrate only, engineered substrate plus sedum and engineered substrate plus grass, respectively. All green roof treatments retained 100% of rainfall from a rain event on several occasions. This occurred 2, 5 and 6 times on the engineered substrate only, engineered substrate plus sedum and engineered substrate plus grass treatments, respectively. The heaviest rainfall in which 100% retention was achieved was 3.56 mm by the all three green roof treatments

DISCUSSION

This study was designed to quantify differences between conventional roofing material and vegetated roofs, and between different plant coverages on a green roof system. Originally, it was assumed that the conventional roofing materials, steel and shingle roofing, would yield considerably more runoff than the bare engineered soil

media and vegetated roofing. However, it was unclear what different plant species would do in terms of stormwater retention and delayed peak flow phenomena, as this had not been studied previously.

The original hypotheses for this study were stated as follows:

Null Hypothesis 1 (Ho1):

There is no relationship between roof treatment and the percent rainwater retained on a standard sloped roof of 33%. Findings: Reject

Hypothesis 1a:

There is a significant ($p \geq 0.05$) relationship between conventional and green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with conventional roofing materials retaining significantly less rainwater than green roof or bare soil roofing surfaces. Findings: Accept

Hypothesis 1b:

There is a significant ($p \geq 0.05$) relationship between green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with the grass roofing treatment retaining significantly more rainwater on a sloped roof than sedum roofing treatment. Findings: Reject

Hypothesis 1c:

There is a significant ($p \geq 0.05$) relationship between green roof treatments and percent rainwater retained on a standard sloped roof of 33%, with the grass roofing treatment retaining significantly more rainwater on a sloped roof than the bare soil roofing treatment. Findings: Accept

Null Hypothesis 2 ($No2_)$:

There is no significant ($p \geq 0.05$) relationship between conventional roof treatments (i.e., steel or fiberglass shingle) and percent rainwater retained on a standard sloped roof of 33%. Findings: Reject

Hypothesis 2a:

There is a significant ($p \geq 0.05$) relationship between conventional roof treatments (i.e., steel or fiberglass shingle) and percent rainwater retained on a standard sloped roof of 33%., with the fiberglass shingle roofing treatments retaining significantly more rainwater on a sloped roof than the steel roofing treatment. Findings: Accept

Based on the results of this study, I reject my null hypothesis Ho1 and Ho2, and I accept my testable hypotheses H1a, H1c, and H2 that there would be significant differences in stormwater retention capabilities between conventional roof treatments and green roof treatments and within conventional and green roof treatments. The data supports these hypotheses across all rainfall categories by showing statistically significant differences in percent retention. Also, I reject my testable hypothesis H1b which states that the grass treatments would retain significantly more rainwater than the sedum treatments. There were no statistically significant differences between sedum and grass treatments across all rainfall categories. However, the grass treatments did have higher means in the light and heavy rainfall categories, but the differences were not significant. Furthermore, I accept my testable hypothesis which states that the grass treatments would retain significantly more rainwater than the bare soil roofing treatments. The data supports this hypothesis across all rainfall categories by showing statistically significant differences in percent retention. Finally, there were significant differences between the sedum/grass and media only treatments in the medium and heavy rainfall categories.

This demonstrates that within certain rainfall categories, there is a significant difference between the vegetated green roof systems and the media only system. This contradicts earlier findings of Vanwoert et. al. (2005) who found that vegetation has a minimal effect on stormwater retention. However, the data did not show significant differences between sedum and native grasses across all rainfall categories although the grass partitions had slightly higher averages for percent retention during light and heavy rain events. This could be attributed to several factors within this study. The native grasses were planted as plugs in their first growing season (2010) and the plants may not have been fully established in the study plots. Perhaps, after a full growing season the root systems had become more developed and therefore use more of the rainwater that enters the soil, showing significantly greater retention. Also, as the grasses become larger and cover more surface area in the study plots; they could intercept more rainfall and trap it on the surface where it would be evaporated back into the atmosphere.

The green roof treatments delayed peak flows and reduced peak flow volumes when compared to the conventional roof treatments. This has important implications for residential areas that experience problems with flooding and sewer overflows. This study implies that sloped green roofs could be considered a stormwater "best management practice" by attenuating stormwater runoff which can reduce flooding by not overwhelming municipal sewer systems.

Ultimately, this study provides baseline stormwater retention data that proves the ability of green roofs to retain rainwater on steep slopes. The findings in this study show that sloped green roofs retain less stormwater compared other flat green roof studies. Although, sloped green roofs may not retain as much water as flat green roofs they are

still a viable option for stormwater management in urban areas. There is a significant difference in amount of stormwater runoff when green roofs are compared to conventional roofing materials on a steep slope. Perhaps the most profound result of this study is the ability of green roofs on steep slopes to manage heavy rainfall events. Both sedum and grass partitions retained approximately 30% of the rainfall from various events and delayed runoff by at least several hours. This data will be useful in modeling the potential of green roofs to manage stormwater when applied to different percentages of roof structures in urban areas, based on housing style and roof configurations, and it lends support to green roof application as a best management practice in the construction of residential structures.

Steep slope green roofs provide new opportunities for stormwater management, especially in residential areas. There are difficulties associated with growing green roofs on steep slopes. Specific concerns must be addressed relative to roof exposure, solar incidence, moisture retention, erosion control/slumping, and micro-climate management to ensure the vitality of steep sloped green roofs. If these concerns are properly addressed during the design and installation of green roof systems, then green roofs will become a viable option on steep sloped structures and an effective stormwater management tool in urban areas.

APPENDIX

Table 1.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F-Statistic	P-Value
Model	14	341031.5	24359.4	96.5	<.0001
Rain Category_z	2	83865.1	41932.6	166.1	<.0001
Roof Treatment_y	4	171194.6	42798.7	169.6	<.0001
Category*Treatment	8	51900.0	6487.5	25.7	<.0001
Error	300	75720.8	252.4		
Corrected Total	314	416752.3			

zRoof surface treatments were sedum, grass, media, steel, shingle.
yRain event categories were light (<5.0 mm) (n=25), medium (5.0-14.0 mm)
(n=21), and heavy (>14.0 mm) (n=17), and overall (n=63).

ANOVA table for rainfall retention over 2 growing season (1 May 2010 to 31 October 2011) from five roof platform treatments replicated three times. Retention is the dependent variable. Roof treatment and rain category are independent variables.

Table 2.

Light Rainfall (0-5mm)				
Media	Sedum	Grass	Steel	Shingle
82.5%	93.1%	94.0%	9.8%	17.6%
Medium Rainfall (5-14mm)				
Media	Sedum	Grass	Steel	Shingle
47.0%	70.5%	67.4%	8.0%	11.7%
Heavy Rainfall (>14mm)				
Media	Sedum	Grass	Steel	Shingle
12.7%	28.3%	29.1%	9.9%	13.8%

Average percent retention, organized by rainfall category, over 2 growing seasons (1 May 2010 to 31 October 2011) from 5 roof treatments replicated 3 times. A total of 63 measured rain events are included with 25 light (<5mm), 21 medium (5 – 14 mm), and 17 large (>14 mm) rain events respectively.

Table 3.

Means with the same letter are not significantly different			
Treatment	**Light**	**Medium**	**Large**
Grass	94.0 A	67.4 A	29.1 A
Sedum	93.1 AB	70.5 A	28.3 A
Substrate Only	82.5 B	47.0 B	13.8 B
Shingle	17.6 C	11.7 C	12.7 B
Steel	9.8 C	8.0 C	9.8 B

N = 25, 21, and 17 for light, medium, and heavy rainfall events, respectively.

Tukey's Studentized Range (HSD) Test for percent retention for light, medium, and large rainfall categories over 2 growing seasons (1 May 2010 to 31 October 2011) from five roof treatments replicated three times.

Table 4.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
4/3/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 11:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 13:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 14:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 15:00	3.302	0.245	0.117	0.192	0.192	0.192	0.000	0.064	0.000	0.000	2.796	2.668	3.020	2.796	2.678	2.646
4/3/2010 16:00	1.778	0.299	0.181	0.309	0.288	0.224	0.064	0.139	0.011	0.000	1.739	1.622	1.825	1.889	1.675	1.718
4/3/2010 17:00	0.762	0.149	0.085	0.171	0.149	0.096	0.021	0.075	0.032	0.000	0.662	0.640	0.726	0.822	0.683	0.726
4/3/2010 18:00	0	0.000	0.000	0.011	0.021	0.011	0.011	0.011	0.032	0.000	0.011	0.000	0.011	0.000	0.011	0.011
4/3/2010 19:00	0	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.032	0.000	0.000	0.000	0.000	0.011	0.000	0.011
4/3/2010 20:00	0	0.000	0.000	0.011	0.000	0.000	0.000	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/3/2010 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	5.842	0.694	0.384	0.704	0.651	0.523	0.096	0.363	0.213	0.000	5.207	4.930	5.580	5.516	5.047	5.111

Data from rain event on 4/3/2010.

Table 5.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
4/25/2010 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 2:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 3:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 6:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 7:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.032	0.053	0.000	0.000	0.000
4/25/2010 8:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
4/25/2010 9:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 11:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 12:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.363	0.331	0.395	0.213	0.224	0.224
4/25/2010 13:00	2.286	0.043	0.032	0.011	0.032	0.021	0.021	0.011	0.000	0.000	1.974	1.835	2.081	2.027	2.017	1.889
4/25/2010 14:00	1.27	0.032	0.032	0.032	0.043	0.021	0.021	0.096	0.000	0.128	1.163	1.131	1.248	1.195	1.174	1.056
4/25/2010 15:00	0.762	0.032	0.053	0.288	0.021	0.021	0.021	0.320	0.000	0.363	0.832	0.790	0.843	0.822	0.822	0.768
4/25/2010 16:00	0.254	0.469	0.405	0.523	0.000	0.000	0.011	0.309	0.000	0.341	0.181	0.160	0.171	0.181	0.203	0.171
4/25/2010 17:00	0	0.309	0.213	0.267	0.000	0.000	0.000	0.181	0.000	0.203	0.011	0.000	0.000	0.000	0.000	0.000
4/25/2010 18:00	0	0.149	0.075	0.128	0.000	0.000	0.000	0.107	0.000	0.107	0.000	0.000	0.000	0.000	0.011	0.000
4/25/2010 19:00	0	0.075	0.021	0.043	0.000	0.000	0.000	0.064	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 20:00	0	0.032	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000
4/25/2010 21:00	0	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/25/2010 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	5.080	1.142	0.832	1.312	0.096	0.064	0.075	1.110	0.000	1.206	4.556	4.289	4.802	4.439	4.449	4.108

Data from rain event on 4/25/2010.

Table 6.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
4/30/2010 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/30/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4/30/2010 23:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.619	0.630	0.694	0.501	0.555	0.512
5/1/2010 0:00	9.14	1.515	1.771	2.049	0.064	0.053	0.075	0.000	0.000	0.000	7.650	7.245	7.736	7.522	7.117	7.714
5/1/2010 1:00	4.318	3.564	3.062	3.340	1.665	1.312	2.049	1.494	0.000	1.718	3.393	3.254	3.564	3.244	3.116	3.265
5/1/2010 2:00	0.254	1.366	1.366	1.291	1.195	1.227	1.227	1.408	0.000	1.003	0.373	0.341	0.395	0.309	0.341	0.373
5/1/2010 3:00	0	0.672	0.683	0.694	0.640	0.651	0.662	0.886	0.000	0.662	0.021	0.011	0.021	0.021	0.011	0.021
5/1/2010 4:00	0	0.384	0.405	0.427	0.384	0.373	0.416	0.608	0.000	0.459	0.011	0.011	0.000	0.000	0.011	0.011
5/1/2010 5:00	0	0.256	0.277	0.267	0.256	0.224	0.267	0.448	0.000	0.341	0.000	0.000	0.000	0.000	0.000	0.000
5/1/2010 6:00	0	0.181	0.203	0.213	0.181	0.160	0.181	0.352	0.000	0.277	0.000	0.000	0.000	0.000	0.000	0.000
5/1/2010 7:00	0	0.128	0.160	0.149	0.128	0.107	0.139	0.267	0.000	0.213	0.000	0.000	0.000	0.000	0.000	0.000
5/1/2010 8:00	0	0.096	0.117	0.117	0.096	0.075	0.107	0.224	0.000	0.171	0.000	0.000	0.011	0.000	0.000	0.000
5/1/2010 9:00	0	0.064	0.096	0.085	0.075	0.064	0.085	0.181	0.000	0.149	0.000	0.000	0.000	0.000	0.000	0.000
5/1/2010 10:00	0	0.043	0.064	0.064	0.053	0.043	0.064	0.139	0.000	0.117	0.011	0.000	0.000	0.000	0.000	0.000
5/1/2010 11:00	0	0.021	0.043	0.032	0.032	0.043	0.032	0.096	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000
5/1/2010 12:00	0	0.000	0.011	0.011	0.000	0.021	0.011	0.043	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	14.220	8.291	8.259	8.739	4.769	4.353	5.314	6.146	0.000	5.218	12.078	11.492	12.420	11.598	11.150	11.897

Data from rain event on 4/30/2010.

Table 7.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/2/2010 6:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/2/2010 7:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/2/2010 8:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.267	0.299	0.331	0.160	0.181	0.181
5/2/2010 9:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.576	0.544	0.576	0.512	0.544	0.523
5/2/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011
5/2/2010 11:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
5/2/2010 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.854	0.843	0.907	0.672	0.736	0.715

Data from rain event on 5/2/2010.

Table 8.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/4/2010 6:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/4/2010 7:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.035	1.056	1.120	1.003	0.864	0.939
5/4/2010 8:00	0.508	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.427	0.363	0.395	0.437	0.373	0.416
5/4/2010 9:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.053	0.064	0.064	0.053	0.064
5/4/2010 10:00	0	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
5/4/2010 11:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/4/2010 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
Totals (mm)	1.524	0.053	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	1.536	1.483	1.579	1.504	1.302	1.419

Data from rain event on 5/4/2010.

Table 9.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/4/2010 23:00	1.016	0.032	0.011	0.021	0.032	0.021	0.032	0.011	0.000	0.000	1.078	0.950	1.110	1.056	0.971	0.886
5/5/2010 0:00	5.588	1.867	0.608	1.056	0.085	0.149	0.096	0.064	0.000	0.085	5.730	5.399	5.442	5.943	5.218	5.794
5/5/2010 1:00	2.54	2.049	1.910	2.209	0.256	0.043	0.160	0.405	0.000	0.662	2.347	2.294	2.401	2.390	2.177	2.390
5/5/2010 2:00	0.508	1.590	1.697	1.739	0.854	0.363	0.779	0.992	0.000	0.950	0.555	0.534	0.523	0.544	0.534	0.555
5/5/2010 3:00	0	0.768	0.822	0.800	0.598	0.555	0.576	0.630	0.000	0.523	0.021	0.011	0.021	0.021	0.000	0.011
5/5/2010 4:00	0	0.491	0.491	0.523	0.427	0.405	0.416	0.491	0.000	0.395	0.011	0.011	0.000	0.000	0.000	0.011
5/5/2010 5:00	0	0.352	0.341	0.363	0.320	0.277	0.309	0.384	0.000	0.320	0.011	0.011	0.011	0.000	0.000	0.000
5/5/2010 6:00	0	0.267	0.245	0.267	0.235	0.213	0.235	0.309	0.000	0.256	0.000	0.000	0.000	0.000	0.000	0.000
5/5/2010 7:00	0.254	0.224	0.203	0.213	0.192	0.160	0.181	0.267	0.000	0.224	0.139	0.160	0.181	0.107	0.085	0.128
5/5/2010 8:00	0.762	0.256	0.267	0.267	0.181	0.160	0.203	0.309	0.000	0.267	0.630	0.619	0.704	0.651	0.598	0.640
5/5/2010 9:00	0.762	0.480	0.523	0.555	0.352	0.320	0.309	0.480	0.000	0.469	0.811	0.790	0.822	0.875	0.758	0.811
5/5/2010 10:00	0	0.405	0.405	0.459	0.267	0.267	0.277	0.373	0.000	0.341	0.011	0.011	0.011	0.000	0.011	0.011
5/5/2010 11:00	0	0.277	0.288	0.309	0.213	0.192	0.224	0.299	0.000	0.267	0.000	0.011	0.000	0.000	0.000	0.011
5/5/2010 12:00	0	0.192	0.192	0.203	0.171	0.149	0.192	0.235	0.000	0.192	0.000	0.000	0.000	0.000	0.000	0.000
5/5/2010 13:00	0	0.139	0.128	0.128	0.107	0.107	0.139	0.171	0.000	0.149	0.011	0.000	0.000	0.000	0.000	0.000
5/5/2010 14:00	0	0.096	0.075	0.075	0.075	0.064	0.096	0.117	0.000	0.096	0.000	0.000	0.000	0.000	0.000	0.000
5/5/2010 15:00	0	0.053	0.043	0.043	0.021	0.043	0.064	0.064	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000
5/5/2010 16:00	0	0.032	0.011	0.000	0.000	0.021	0.011	0.021	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
5/5/2010 17:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	11.430	9.592	8.259	9.230	4.385	3.510	4.300	5.623	0.000	5.271	11.353	10.798	11.225	11.588	10.350	11.246

Data from rain event on 5/5/2010.

Table 10.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/13/2010 10:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/13/2010 11:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/13/2010 12:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.790	0.811	0.939	0.715	0.747	0.726
5/13/2010 13:00	3.81	0.309	0.032	0.021	0.032	0.021	0.032	0.000	0.000	0.000	1.568	1.440	1.622	1.504	1.611	1.558
5/13/2010 14:00	1.778	0.480	0.011	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.213	0.203	0.213	0.181	0.245	0.181
5/13/2010 15:00	0.508	0.768	0.096	0.469	0.064	0.096	0.085	0.043	0.000	0.000	3.745	3.468	3.863	3.660	3.468	3.820
5/13/2010 16:00	0.254	2.443	2.155	2.486	0.341	0.085	0.203	0.630	0.000	0.790	1.985	1.750	1.942	1.953	1.536	1.921
5/13/2010 17:00	1.27	0.971	1.099	1.056	0.587	0.405	0.480	0.822	0.000	0.651	0.427	0.384	0.437	0.384	0.288	0.416
5/13/2010 18:00	0.762	0.672	0.704	0.736	0.480	0.395	0.437	0.576	0.000	0.501	0.224	0.213	0.235	0.203	0.149	0.213
5/13/2010 19:00	0	0.896	0.843	0.886	0.576	0.534	0.534	0.662	0.000	0.651	1.206	1.142	1.270	1.184	1.067	1.227
5/13/2010 20:00	0.254	0.832	0.832	0.864	0.566	0.544	0.566	0.672	0.000	0.630	0.864	0.832	0.907	0.843	0.651	0.864
5/13/2010 21:00	0	0.715	0.726	0.747	0.512	0.523	0.523	0.630	0.000	0.566	0.053	0.053	0.053	0.043	0.043	0.053
5/13/2010 22:00	0.254	0.491	0.501	0.534	0.405	0.427	0.437	0.480	0.000	0.437	0.267	0.235	0.288	0.224	0.181	0.224
5/13/2010 23:00	1.524	0.427	0.416	0.459	0.352	0.363	0.373	0.437	0.000	0.395	0.064	0.043	0.043	0.043	0.032	0.064
5/14/2010 0:00	0	0.352	0.309	0.352	0.288	0.288	0.320	0.363	0.000	0.331	0.171	0.171	0.203	0.160	0.139	0.149
5/14/2010 1:00	0	0.672	0.619	0.630	0.459	0.491	0.459	0.523	0.000	0.555	1.504	1.462	1.547	1.536	1.398	1.601
5/14/2010 2:00	0	0.630	0.640	0.662	0.469	0.491	0.469	0.576	0.000	0.544	0.064	0.043	0.064	0.043	0.043	0.053
5/14/2010 3:00	0	0.427	0.459	0.480	0.363	0.395	0.384	0.448	0.000	0.416	0.000	0.011	0.000	0.011	0.000	0.021
5/14/2010 4:00	0	0.331	0.320	0.341	0.299	0.331	0.331	0.363	0.000	0.341	0.011	0.000	0.011	0.000	0.000	0.000
5/14/2010 5:00	0	0.256	0.224	0.267	0.235	0.267	0.277	0.309	0.000	0.277	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 6:00	0	0.203	0.171	0.203	0.203	0.213	0.224	0.256	0.000	0.235	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 7:00	0	0.171	0.149	0.181	0.171	0.181	0.203	0.213	0.000	0.203	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 8:00	0	0.149	0.117	0.149	0.139	0.149	0.160	0.192	0.000	0.181	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 9:00	0	0.117	0.107	0.128	0.117	0.128	0.139	0.171	0.000	0.149	0.000	0.000	0.000	0.000	0.011	0.000
5/14/2010 10:00	0	0.107	0.096	0.107	0.096	0.117	0.117	0.149	0.000	0.139	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 11:00	0	0.085	0.085	0.096	0.096	0.107	0.117	0.128	0.000	0.107	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 12:00	0	0.075	0.064	0.075	0.075	0.085	0.085	0.107	0.000	0.096	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 13:00	0	0.064	0.053	0.053	0.043	0.064	0.075	0.075	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 14:00	0	0.043	0.032	0.043	0.043	0.053	0.064	0.053	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 15:00	0	0.043	0.021	0.032	0.021	0.043	0.043	0.032	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 16:00	0	0.032	0.011	0.021	0.011	0.032	0.021	0.032	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 17:00	0	0.021	0.000	0.011	0.000	0.021	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 18:00	0	0.021	0.000	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
5/14/2010 19:00	0	0.011	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 10 (cont'd)

5/14/2010 20:00	0	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/14/2010 21:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	13.208	12.836	10.894	12.153	7.053	6.882	7.192	8.963	0.011	8.387	13.167	12.260	13.636	12.687	11.609	13.092

Data from rain event on 5/13/2010.

Table 11.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/21/2010 15:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/21/2010 16:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/21/2010 17:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.662	0.726	0.768	0.555	0.672	0.608
5/21/2010 18:00	1.524	0.021	0.011	0.000	0.021	0.000	0.011	0.000	0.000	0.000	0.960	0.971	0.992	0.864	0.886	0.939
5/21/2010 19:00	0.254	0.021	0.021	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.640	0.576	0.640	0.576	0.587	0.576
5/21/2010 20:00	0	0.427	0.043	0.021	0.032	0.021	0.032	0.011	0.000	0.000	1.750	1.665	1.825	1.675	1.633	1.654
5/21/2010 21:00	0	0.608	0.011	0.235	0.000	0.000	0.011	0.011	0.000	0.000	0.203	0.203	0.213	0.181	0.192	0.203
5/21/2010 22:00	0	0.235	0.213	0.299	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.011	0.011	0.011	0.011
5/21/2010 23:00	0	0.107	0.149	0.192	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
5/22/2010 0:00	0.254	0.053	0.075	0.117	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/22/2010 1:00	0.254	0.032	0.064	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000
5/22/2010 2:00	0	0.032	0.053	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.171	0.171	0.085	0.064	0.096
5/22/2010 3:00	0	0.053	0.053	0.075	0.011	0.011	0.000	0.000	0.000	0.000	0.256	0.235	0.267	0.245	0.235	0.224
5/22/2010 4:00	0	0.064	0.075	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.043	0.043	0.021	0.043	0.043
5/22/2010 5:00	0	0.043	0.064	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.011	0.011	0.021
5/22/2010 6:00	0	0.032	0.043	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.000
5/22/2010 7:00	0	0.032	0.032	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.011
5/22/2010 8:00	0	0.021	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000
5/22/2010 9:00	0	0.011	0.032	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
5/22/2010 10:00	0	0.011	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
5/22/2010 11:00	0	0.011	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/22/2010 12:00	0	0.011	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	4.572	1.825	1.035	1.526	0.085	0.053	0.075	0.021	0.000	0.000	4.705	4.620	4.972	4.236	4.343	4.407

Data of rain event on 5/21/2010.

Table 12.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/4/2010 12:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/4/2010 13:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
6/4/2010 14:00	0	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.523	0.501	0.608	0.459	0.448	0.405
6/4/2010 15:00	0.254	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.277	0.331	0.299	0.309	0.277
6/4/2010 16:00	2.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.032	0.043	0.032	0.032	0.032
6/4/2010 17:00	2.032	0.011	0.011	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.320	0.299	0.309	0.235	0.213	0.235
6/4/2010 18:00	0	0.043	0.053	0.021	0.021	0.021	0.021	0.000	0.000	0.000	2.102	1.899	2.177	2.027	1.921	1.985
6/4/2010 19:00	0	1.024	0.992	0.800	0.096	0.043	0.043	0.032	0.000	0.000	2.113	1.910	2.081	2.049	1.910	2.027
6/4/2010 20:00	0	0.512	0.598	0.651	0.011	0.000	0.032	0.053	0.000	0.000	0.075	0.064	0.064	0.064	0.075	0.053
6/4/2010 21:00	0	0.149	0.192	0.256	0.011	0.011	0.000	0.053	0.000	0.000	0.021	0.011	0.000	0.000	0.011	0.011
6/4/2010 22:00	0	0.064	0.096	0.128	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
6/4/2010 23:00	0	0.021	0.043	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.000
6/5/2010 0:00	0	0.011	0.021	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
Totals (mm)	5.334	1.857	2.006	1.963	0.160	0.075	0.107	0.160	0.000	0.000	5.527	4.994	5.623	5.175	4.919	5.036

Data from rain event on 6/4/2010.

Table 13.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/5/2010 20:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/5/2010 21:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/5/2010 22:00	2.794	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.288	0.309	0.341	0.192	0.171	0.213
6/5/2010 23:00	2.54	0.181	0.043	0.032	0.043	0.043	0.043	0.011	0.000	0.000	1.942	1.739	1.867	1.729	1.686	1.803
6/6/2010 0:00	1.27	1.462	1.366	1.280	0.053	0.160	0.053	0.128	0.000	0.107	2.977	2.796	2.913	2.849	2.625	2.817
6/6/2010 1:00	0	1.921	2.209	2.155	1.302	1.152	1.483	1.078	0.000	0.928	2.390	2.315	2.294	2.337	2.091	2.326
6/6/2010 2:00	0	1.665	1.622	1.665	1.462	1.590	1.601	1.206	0.000	0.928	1.601	1.558	1.440	1.440	1.312	1.504
6/6/2010 3:00	1.778	1.046	0.928	0.992	0.896	0.982	0.950	0.864	0.000	0.758	0.149	0.139	0.128	0.139	0.128	0.149
6/6/2010 4:00	0.254	0.544	0.405	0.469	0.405	0.437	0.437	0.480	0.000	0.437	0.032	0.011	0.011	0.011	0.011	0.011
6/6/2010 5:00	0.254	1.120	0.811	1.024	0.704	0.715	0.694	0.694	0.000	0.726	2.305	2.283	2.294	2.102	1.942	2.294
6/6/2010 6:00	2.794	1.056	1.035	1.152	1.014	0.971	1.067	0.960	0.000	0.907	0.395	0.395	0.405	0.395	0.309	0.437
6/6/2010 7:00	0	0.630	0.566	0.640	0.544	0.566	0.598	0.619	0.000	0.587	0.117	0.139	0.139	0.107	0.085	0.139
6/6/2010 8:00	0	2.038	1.878	1.953	1.729	1.931	1.782	1.504	0.000	1.419	2.956	2.785	2.806	2.881	2.443	2.881
6/6/2010 9:00	0	0.832	0.790	0.886	0.864	0.875	0.907	0.992	0.000	0.896	0.021	0.021	0.011	0.021	0.021	0.021
6/6/2010 10:00	0	0.501	0.395	0.469	0.373	0.405	0.427	0.566	0.000	0.534	0.011	0.011	0.000	0.000	0.000	0.000
6/6/2010 11:00	0	0.320	0.267	0.299	0.235	0.245	0.277	0.373	0.000	0.341	0.000	0.000	0.011	0.000	0.000	0.011
6/6/2010 12:00	0	0.224	0.181	0.213	0.160	0.181	0.181	0.256	0.000	0.256	0.000	0.000	0.000	0.000	0.000	0.000
6/6/2010 13:00	0	0.171	0.128	0.149	0.107	0.128	0.128	0.203	0.000	0.181	0.000	0.000	0.000	0.000	0.011	0.000
6/6/2010 14:00	0	0.128	0.107	0.128	0.085	0.096	0.096	0.149	0.000	0.149	0.011	0.000	0.000	0.000	0.000	0.000
6/6/2010 15:00	0	0.107	0.096	0.096	0.064	0.085	0.075	0.128	0.000	0.117	0.000	0.000	0.000	0.011	0.000	0.000
6/6/2010 16:00	0.762	0.085	0.075	0.085	0.032	0.064	0.064	0.107	0.000	0.107	0.000	0.011	0.000	0.000	0.000	0.000
6/6/2010 17:00	0	0.064	0.053	0.075	0.043	0.053	0.032	0.096	0.000	0.075	0.043	0.085	0.085	0.000	0.000	0.011
6/6/2010 18:00	0	0.256	0.192	0.235	0.128	0.107	0.160	0.203	0.000	0.192	1.014	1.035	1.014	0.928	0.758	0.992
6/6/2010 19:00	0	0.277	0.224	0.267	0.107	0.107	0.128	0.181	0.000	0.181	0.032	0.021	0.021	0.021	0.021	0.000
6/6/2010 20:00	0	0.139	0.139	0.181	0.064	0.075	0.096	0.107	0.000	0.117	0.011	0.000	0.000	0.000	0.000	0.000
6/6/2010 21:00	0	0.085	0.096	0.107	0.021	0.064	0.032	0.075	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000
6/6/2010 22:00	0	0.053	0.053	0.064	0.021	0.043	0.043	0.053	0.000	0.053	0.011	0.000	0.000	0.000	0.000	0.000
6/6/2010 23:00	0	0.032	0.021	0.043	0.000	0.032	0.021	0.043	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000
6/7/2010 0:00	0	0.032	0.021	0.032	0.000	0.021	0.000	0.021	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	14.224	14.981	13.700	14.693	10.467	11.129	11.374	11.097	0.000	10.137	16.304	15.653	15.781	15.162	13.615	15.610

Data from rain event on 6/5/2010.

Table 14.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/8/2010 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.139	0.203	0.064	0.053	0.053
6/8/2010 22:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.032	0.021	0.021	0.064	0.032
6/8/2010 23:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.011	0.000
6/9/2010 0:00	1.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.299	0.320	0.405	0.277	0.267	0.277
6/9/2010 1:00	0.508	0.011	0.021	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.875	0.800	0.864	0.811	0.736	0.800
6/9/2010 2:00	2.286	0.235	0.032	0.011	0.032	0.032	0.032	0.011	0.000	0.000	1.312	1.195	1.323	1.206	1.174	1.216
6/9/2010 3:00	4.318	0.448	0.011	0.096	0.011	0.021	0.011	0.000	0.000	0.000	0.598	0.619	0.662	0.544	0.512	0.587
6/9/2010 4:00	2.032	0.928	0.459	0.640	0.043	0.171	0.053	0.032	0.000	0.000	3.286	3.201	3.340	3.212	3.009	3.329
6/9/2010 5:00	1.27	3.404	3.500	3.532	1.195	1.014	1.483	1.558	0.000	1.633	3.180	3.233	3.233	3.222	2.934	3.414
6/9/2010 6:00	0	2.081	1.835	1.931	1.707	1.707	1.739	1.526	0.000	1.344	2.305	2.401	2.401	2.369	2.113	2.422
6/9/2010 7:00	0.254	1.931	1.878	1.910	1.793	1.825	1.803	1.739	0.000	1.601	0.928	0.982	0.982	0.971	0.843	0.971
6/9/2010 8:00	0	1.078	1.003	1.056	0.992	0.982	0.960	1.440	0.000	1.120	0.277	0.256	0.288	0.288	0.245	0.277
6/9/2010 9:00	0	0.651	0.619	0.630	0.587	0.587	0.566	0.843	0.000	0.758	0.149	0.160	0.181	0.149	0.117	0.171
6/9/2010 10:00	0	0.437	0.448	0.448	0.384	0.395	0.384	0.576	0.000	0.544	0.064	0.043	0.053	0.032	0.021	0.043
6/9/2010 11:00	0	0.309	0.320	0.320	0.256	0.277	0.277	0.427	0.000	0.395	0.021	0.021	0.011	0.011	0.011	0.021
6/9/2010 12:00	0	0.224	0.224	0.245	0.181	0.213	0.192	0.320	0.000	0.309	0.000	0.000	0.011	0.000	0.011	0.000
6/9/2010 13:00	0	0.171	0.181	0.171	0.117	0.149	0.139	0.245	0.000	0.235	0.000	0.011	0.000	0.000	0.000	0.000
6/9/2010 14:00	0	0.128	0.107	0.117	0.043	0.096	0.053	0.171	0.000	0.160	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 15:00	0	0.085	0.064	0.064	0.011	0.043	0.021	0.107	0.000	0.107	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 16:00	0	0.075	0.032	0.032	0.000	0.021	0.011	0.053	0.000	0.064	0.011	0.000	0.000	0.000	0.011	0.000
6/9/2010 17:00	0	0.043	0.011	0.032	0.000	0.000	0.000	0.021	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 18:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 19:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 20:00	0.254	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 21:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/9/2010 22:00	0	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.085	0.139	0.139	0.053	0.032	0.053
6/9/2010 23:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.011	0.000	0.000	0.011	0.000
6/10/2010 0:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
Totals (mm)	13.462	12.324	10.755	11.246	7.362	7.554	7.725	9.070	0.011	8.301	13.647	13.562	14.116	13.241	12.174	13.668

Data from rain event on 6/8/2010.

Table 15.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/11/2010 15:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/11/2010 16:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/11/2010 17:00	0	0.064	0.043	0.011	0.043	0.032	0.021	0.000	0.000	0.000	2.956	2.913	3.116	2.796	2.593	2.828
6/11/2010 18:00	0	0.832	0.000	0.224	0.000	0.000	0.000	0.000	0.000	0.000	0.235	0.192	0.181	0.192	0.203	0.181
6/11/2010 19:00	0	0.224	0.181	0.267	0.000	0.011	0.011	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.011	0.011
6/11/2010 20:00	1.27	0.096	0.107	0.160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/11/2010 21:00	1.016	0.032	0.043	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/11/2010 22:00	5.334	0.171	0.117	0.128	0.021	0.000	0.011	0.000	0.000	0.000	1.067	1.099	1.163	0.950	0.907	0.939
6/11/2010 23:00	11.18	0.373	0.331	0.320	0.011	0.021	0.021	0.107	0.000	0.085	1.547	1.590	1.633	1.526	1.451	1.536
6/12/2010 0:00	21.08	5.324	5.068	5.164	2.966	2.860	3.606	1.739	0.000	2.924	7.672	7.704	7.576	7.757	7.160	8.152
6/12/2010 1:00	10.67	22.364	20.977	21.703	21.756	22.428	22.674	2.187	0.000	21.255	25.971	26.142	26.270	20.134	22.482	25.917
6/12/2010 2:00	0.508	12.836	10.894	12.441	10.766	11.652	10.691	1.814	0.000	13.145	1.814	1.707	1.899	2.134	1.291	2.134
6/12/2010 3:00	0	1.729	1.568	1.718	1.323	1.494	1.259	1.291	0.000	1.942	0.043	0.021	0.021	0.021	0.000	0.032
6/12/2010 4:00	0	0.843	0.758	0.886	0.630	0.683	0.640	1.067	0.000	1.024	0.011	0.011	0.000	0.000	0.000	0.021
6/12/2010 5:00	0	0.534	0.512	0.608	0.373	0.405	0.384	0.886	0.000	0.662	0.011	0.000	0.011	0.000	0.000	0.000
6/12/2010 6:00	0	0.384	0.352	0.427	0.245	0.277	0.267	0.736	0.000	0.469	0.000	0.011	0.000	0.000	0.011	0.011
6/12/2010 7:00	0	0.288	0.267	0.309	0.171	0.203	0.171	0.576	0.000	0.341	0.011	0.000	0.000	0.000	0.000	0.000
6/12/2010 8:00	0	0.235	0.203	0.235	0.117	0.149	0.139	0.427	0.000	0.277	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 9:00	0	0.181	0.171	0.192	0.096	0.117	0.085	0.331	0.000	0.203	0.011	0.011	0.000	0.000	0.000	0.011
6/12/2010 10:00	0	0.149	0.117	0.149	0.064	0.085	0.075	0.267	0.000	0.160	0.000	0.000	0.000	0.011	0.000	0.000
6/12/2010 11:00	0	0.128	0.107	0.096	0.043	0.075	0.043	0.213	0.000	0.117	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 12:00	0	0.085	0.085	0.096	0.032	0.053	0.043	0.171	0.000	0.107	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 13:00	0	0.107	0.085	0.085	0.032	0.053	0.032	0.149	0.000	0.107	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 14:00	0	0.085	0.064	0.085	0.032	0.043	0.021	0.117	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 15:00	0	0.085	0.064	0.053	0.000	0.043	0.021	0.117	0.000	0.064	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 16:00	0	0.064	0.043	0.053	0.011	0.032	0.000	0.085	0.000	0.043	0.011	0.000	0.000	0.000	0.000	0.000
6/12/2010 17:00	0	0.043	0.021	0.032	0.000	0.021	0.011	0.096	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 18:00	0	0.053	0.021	0.021	0.000	0.011	0.000	0.096	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 19:00	0	0.032	0.011	0.021	0.000	0.011	0.000	0.096	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.011
6/12/2010 20:00	0	0.043	0.011	0.011	0.000	0.011	0.000	0.085	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 21:00	0	0.021	0.000	0.000	0.011	0.011	0.000	0.021	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 22:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/12/2010 23:00	0	0.011	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/13/2010 0:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	54.360	47.460	42.221	45.572	38.743	40.781	40.226	12.708	0.000	43.096	41.368	41.400	41.880	35.520	36.107	41.784

Data from rain event on 6/11/2010.

Table 16.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/15/2010 17:00	3.048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/15/2010 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/15/2010 19:00	0.254	0.288	0.053	0.043	0.053	0.053	0.032	0.032	0.000	0.000	2.860	2.732	3.062	2.817	2.774	2.593
6/15/2010 20:00	0	0.523	0.000	0.096	0.000	0.011	0.000	0.000	0.000	0.000	0.139	0.107	0.085	0.107	0.117	0.096
6/15/2010 21:00	0	0.160	0.000	0.160	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.149	0.192	0.075	0.085	0.085
6/15/2010 22:00	0	0.139	0.021	0.149	0.011	0.000	0.000	0.000	0.000	0.000	0.171	0.139	0.139	0.139	0.139	0.128
6/15/2010 23:00	2.54	0.085	0.075	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.011	0.011	0.000	0.011	0.011
6/16/2010 0:00	5.842	0.053	0.064	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.011
6/16/2010 1:00	1.524	0.950	0.405	0.501	0.085	0.139	0.107	0.043	0.000	0.203	5.474	5.495	5.644	5.015	5.015	5.314
6/16/2010 2:00	5.842	3.105	3.169	3.500	1.515	0.992	1.718	0.544	0.000	2.241	2.134	2.027	2.123	2.443	2.081	2.305
6/16/2010 3:00	2.032	1.633	1.622	1.718	1.451	1.408	1.654	0.523	0.000	1.398	1.974	2.006	2.038	1.931	1.878	2.123
6/16/2010 4:00	0	4.972	4.385	4.673	4.577	4.503	4.834	0.534	0.000	3.638	5.303	5.207	5.324	5.196	4.919	5.516
6/16/2010 5:00	0.254	3.457	2.881	2.988	3.030	3.137	2.977	0.555	0.000	2.945	1.654	1.675	1.697	1.686	1.536	1.771
6/16/2010 6:00	0	1.761	1.601	1.654	1.504	1.686	1.494	0.512	0.000	1.729	0.107	0.064	0.053	0.064	0.053	0.075
6/16/2010 7:00	0.254	0.960	0.928	0.918	0.758	0.918	0.800	0.491	0.000	1.099	0.128	0.171	0.203	0.139	0.107	0.171
6/16/2010 8:00	0	0.715	0.790	0.704	0.512	0.598	0.576	0.469	0.000	0.843	0.277	0.235	0.267	0.256	0.213	0.277
6/16/2010 9:00	0	0.512	0.544	0.512	0.363	0.437	0.405	0.469	0.000	0.630	0.021	0.032	0.021	0.021	0.011	0.043
6/16/2010 10:00	0	0.395	0.395	0.395	0.256	0.320	0.288	0.469	0.000	0.480	0.021	0.021	0.011	0.000	0.011	0.011
6/16/2010 11:00	0	0.299	0.299	0.320	0.192	0.235	0.213	0.448	0.000	0.384	0.011	0.000	0.000	0.000	0.000	0.000
6/16/2010 12:00	0	0.235	0.224	0.235	0.139	0.171	0.149	0.427	0.000	0.288	0.000	0.011	0.011	0.000	0.000	0.000
6/16/2010 13:00	0	0.181	0.181	0.192	0.107	0.149	0.117	0.405	0.000	0.235	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 14:00	0	0.149	0.139	0.149	0.075	0.117	0.096	0.427	0.000	0.192	0.011	0.000	0.000	0.000	0.011	0.000
6/16/2010 15:00	0	0.128	0.117	0.117	0.064	0.096	0.075	0.416	0.000	0.160	0.000	0.000	0.000	0.000	0.000	0.011
6/16/2010 16:00	0	0.096	0.096	0.096	0.043	0.085	0.043	0.395	0.000	0.128	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 17:00	0	0.085	0.064	0.064	0.021	0.064	0.032	0.405	0.000	0.107	0.000	0.011	0.000	0.000	0.000	0.000
6/16/2010 18:00	0	0.075	0.053	0.053	0.000	0.053	0.011	0.171	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 19:00	0	0.053	0.032	0.032	0.011	0.032	0.000	0.064	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 20:00	0	0.053	0.032	0.021	0.000	0.021	0.000	0.053	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 21:00	0	0.032	0.011	0.011	0.000	0.011	0.000	0.032	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 22:00	0	0.043	0.000	0.011	0.000	0.000	0.000	0.021	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/16/2010 23:00	0	0.032	0.011	0.000	0.000	0.011	0.000	0.021	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/17/2010 0:00	0	0.021	0.000	0.011	0.000	0.000	0.000	0.021	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	21.590	21.191	18.192	19.515	14.767	15.247	15.621	7.949	0.000	16.933	20.454	20.102	20.881	19.889	18.961	20.540

Data from rain event on 6/15/2010.

Table 17.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/22/2010 3:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2010 4:00	4.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2010 5:00	4.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2010 6:00	2.032	0.021	0.032	0.000	0.021	0.021	0.021	0.000	0.000	0.000	3.841	3.767	4.012	3.606	3.638	3.980
6/22/2010 7:00	0	3.809	2.091	3.158	0.085	0.107	0.085	0.128	0.000	0.501	5.431	5.356	5.303	5.580	5.143	5.890
6/22/2010 8:00	0	1.312	1.174	1.259	0.405	0.288	0.683	0.512	0.000	0.726	0.064	0.075	0.064	0.043	0.043	0.064
6/22/2010 9:00	0	0.555	0.523	0.491	0.277	0.331	0.427	0.437	0.000	0.395	0.021	0.011	0.000	0.000	0.011	0.011
6/22/2010 10:00	0	0.320	0.299	0.277	0.171	0.203	0.235	0.363	0.000	0.245	0.011	0.011	0.032	0.011	0.000	0.021
6/22/2010 11:00	0	0.213	0.213	0.171	0.085	0.139	0.149	0.299	0.000	0.149	0.000	0.011	0.000	0.000	0.011	0.011
6/22/2010 12:00	0	0.128	0.128	0.117	0.053	0.096	0.096	0.235	0.000	0.107	0.011	0.000	0.000	0.011	0.000	0.000
6/22/2010 13:00	0	0.085	0.096	0.064	0.011	0.064	0.053	0.107	0.000	0.064	0.000	0.000	0.011	0.000	0.000	0.000
6/22/2010 14:00	0	0.053	0.064	0.053	0.011	0.043	0.043	0.053	0.000	0.043	0.000	0.011	0.000	0.000	0.000	0.000
6/22/2010 15:00	0	0.032	0.032	0.021	0.000	0.032	0.011	0.021	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2010 16:00	0	0.011	0.032	0.011	0.000	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.011
6/22/2010 17:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	10.668	6.551	4.684	5.623	1.120	1.334	1.814	2.166	0.000	2.262	9.379	9.240	9.422	9.251	8.845	9.987

Data from rain event on 6/22/2010.

Table 18.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/23/2010 23:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
6/24/2010 0:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 1:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 2:00	0.762	0.021	0.021	0.011	0.011	0.000	0.011	0.000	0.000	0.000	1.067	1.131	1.216	1.003	0.971	1.024
6/24/2010 3:00	0	1.131	0.736	1.099	0.085	0.107	0.117	0.075	0.000	0.149	5.079	4.940	4.866	5.004	4.780	5.356
6/24/2010 4:00	2.032	1.216	1.291	1.440	0.064	0.000	0.064	0.331	0.000	0.672	0.213	0.149	0.149	0.139	0.149	0.171
6/24/2010 5:00	0.254	0.534	0.608	0.576	0.299	0.011	0.320	0.299	0.000	0.384	0.000	0.000	0.011	0.000	0.000	0.011
6/24/2010 6:00	0	0.341	0.363	0.331	0.213	0.181	0.267	0.267	0.000	0.256	0.107	0.128	0.149	0.107	0.096	0.128
6/24/2010 7:00	0.254	1.184	0.971	1.227	0.640	0.640	0.608	0.256	0.011	0.726	3.148	2.892	2.924	3.030	2.614	3.041
6/24/2010 8:00	0	1.174	1.163	1.227	0.939	0.790	0.982	0.277	0.000	0.779	0.213	0.160	0.171	0.160	0.149	0.192
6/24/2010 9:00	0	0.619	0.619	0.598	0.619	0.523	0.640	0.256	0.000	0.480	0.011	0.000	0.000	0.000	0.000	0.011
6/24/2010 10:00	0	0.416	0.373	0.352	0.352	0.352	0.395	0.245	0.000	0.331	0.000	0.011	0.000	0.011	0.000	0.000
6/24/2010 11:00	0	0.277	0.256	0.235	0.235	0.245	0.277	0.235	0.000	0.245	0.011	0.000	0.000	0.000	0.011	0.000
6/24/2010 12:00	0	0.213	0.192	0.181	0.149	0.192	0.192	0.245	0.000	0.213	0.000	0.011	0.000	0.000	0.000	0.011
6/24/2010 13:00	0	0.160	0.149	0.139	0.128	0.149	0.149	0.256	0.000	0.171	0.011	0.000	0.000	0.000	0.000	0.000
6/24/2010 14:00	0	0.107	0.107	0.107	0.075	0.117	0.096	0.288	0.000	0.117	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 15:00	0	0.075	0.085	0.064	0.032	0.075	0.053	0.309	0.000	0.085	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 16:00	0	0.043	0.053	0.032	0.000	0.043	0.021	0.299	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 17:00	0	0.021	0.021	0.011	0.011	0.032	0.011	0.245	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 18:00	0	0.011	0.011	0.000	0.000	0.011	0.000	0.213	0.000	0.011	0.000	0.011	0.011	0.000	0.000	0.000
6/24/2010 19:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2010 20:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	9.144	7.544	7.021	7.629	3.852	3.468	4.204	4.321	0.011	4.716	9.870	9.432	9.496	9.454	8.771	9.944

Data from rain event on 6/24/2010.

Table 19.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/26/2010 4:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 5:00	3.048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 6:00	4.826	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 7:00	4.572	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.408	1.419	1.611	1.387	1.248	1.387
6/26/2010 8:00	3.556	0.864	0.363	0.555	0.128	0.235	0.117	0.021	0.000	0.096	6.349	5.997	6.199	6.114	5.740	6.573
6/26/2010 9:00	2.286	10.521	10.659	10.830	8.248	8.131	8.749	0.235	0.000	7.320	11.097	11.364	11.257	10.414	10.104	11.396
6/26/2010 10:00	0.762	4.407	3.340	3.617	2.465	2.774	2.529	0.299	0.000	3.510	0.053	0.032	0.021	0.021	0.021	0.032
6/26/2010 11:00	0	1.302	1.120	1.152	0.832	1.014	0.843	0.235	0.000	1.248	0.011	0.011	0.011	0.000	0.000	0.000
6/26/2010 12:00	0	0.736	0.683	0.704	0.459	0.523	0.491	0.203	0.000	0.726	0.011	0.000	0.000	0.000	0.000	0.000
6/26/2010 13:00	0	0.501	0.448	0.459	0.288	0.341	0.309	0.192	0.000	0.501	0.000	0.000	0.000	0.000	0.000	0.011
6/26/2010 14:00	0	0.363	0.320	0.320	0.192	0.245	0.213	0.192	0.000	0.363	0.000	0.000	0.000	0.000	0.011	0.000
6/26/2010 15:00	0	0.277	0.235	0.235	0.139	0.171	0.128	0.203	0.000	0.277	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 16:00	0	0.203	0.171	0.171	0.085	0.128	0.075	0.203	0.000	0.192	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 17:00	0	0.149	0.128	0.128	0.053	0.064	0.032	0.203	0.000	0.149	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 18:00	0	0.107	0.085	0.085	0.021	0.043	0.011	0.192	0.000	0.085	0.000	0.000	0.000	0.000	0.000	0.000
6/26/2010 19:00	0	0.064	0.053	0.043	0.000	0.021	0.000	0.181	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	20.574	19.515	17.616	18.299	12.911	13.690	13.498	2.358	0.000	14.511	18.929	18.822	19.099	17.936	17.125	19.398

Data from rain event on 6/26/2010.

Table 20.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/27/2010 6:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 7:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 8:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 9:00	1.27	0.011	0.011	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.331	0.352	0.534	0.256	0.267	0.256
6/27/2010 10:00	0.762	0.117	0.043	0.075	0.021	0.107	0.032	0.021	0.011	0.000	1.547	1.472	1.963	1.472	1.472	1.462
6/27/2010 11:00	0	0.683	0.587	0.630	0.032	0.160	0.053	0.352	0.427	0.341	1.878	1.814	2.145	1.803	1.761	1.942
6/27/2010 12:00	0	0.864	0.864	0.928	0.373	0.405	0.352	0.555	0.566	0.598	1.142	1.056	1.174	1.067	1.014	1.142
6/27/2010 13:00	0	0.587	0.619	0.662	0.341	0.331	0.331	0.427	0.437	0.469	0.107	0.075	0.053	0.064	0.075	0.075
6/27/2010 14:00	0	0.373	0.395	0.405	0.256	0.235	0.277	0.277	0.299	0.309	0.011	0.011	0.000	0.011	0.000	0.011
6/27/2010 15:00	0	0.245	0.267	0.288	0.203	0.213	0.235	0.224	0.224	0.224	0.000	0.011	0.000	0.000	0.011	0.000
6/27/2010 16:00	0	0.181	0.203	0.203	0.160	0.171	0.181	0.181	0.181	0.181	0.011	0.000	0.011	0.000	0.000	0.000
6/27/2010 17:00	0.254	0.160	0.149	0.139	0.107	0.128	0.139	0.139	0.139	0.139	0.000	0.000	0.011	0.000	0.000	0.011
6/27/2010 18:00	0	0.107	0.117	0.117	0.085	0.107	0.107	0.107	0.117	0.107	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 19:00	0	0.107	0.085	0.085	0.064	0.085	0.075	0.085	0.085	0.085	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 20:00	0	0.085	0.064	0.064	0.053	0.064	0.043	0.064	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 21:00	0	0.064	0.053	0.043	0.032	0.043	0.021	0.043	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 22:00	0	0.043	0.032	0.021	0.021	0.011	0.000	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
6/27/2010 23:00	0	0.043	0.011	0.011	0.011	0.021	0.000	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 0:00	0	0.021	0.021	0.011	0.011	0.011	0.000	0.011	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 1:00	0	0.032	0.000	0.011	0.011	0.011	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 2:00	0	0.032	0.011	0.000	0.021	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 3:00	0	0.021	0.000	0.000	0.011	0.011	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 4:00	0	0.021	0.011	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 5:00	0	0.021	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 6:00	0	0.021	0.000	0.000	0.000	0.011	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 7:00	0.254	0.011	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/28/2010 8:00	0	0.021	0.011	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.011	0.032	0.021	0.011	0.000	0.000
6/28/2010 9:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.331	0.331	0.373	0.235	0.224	0.256
6/28/2010 10:00	1.016	0.043	0.021	0.053	0.011	0.000	0.000	0.011	0.032	0.021	0.032	0.021	0.032	0.043	0.032	0.043
6/28/2010 11:00	0	0.043	0.032	0.032	0.000	0.000	0.000	0.032	0.032	0.021	0.011	0.011	0.000	0.011	0.011	0.011
6/28/2010 12:00	0	0.043	0.043	0.021	0.000	0.011	0.011	0.021	0.021	0.021	0.662	0.704	0.662	0.587	0.512	0.566
6/28/2010 13:00	0	0.192	0.149	0.181	0.000	0.000	0.000	0.117	0.139	0.096	0.171	0.107	0.139	0.149	0.160	0.149
6/28/2010 14:00	0	0.096	0.096	0.075	0.000	0.000	0.000	0.064	0.064	0.075	0.000	0.000	0.000	0.000	0.000	0.000

Table 20 (cont'd)

6/28/2010 15:00	0	0.043	0.053	0.043	0.021	0.011	0.021	0.032	0.043	0.043	0.021	0.011	0.021	0.000	0.011	0.000
6/28/2010 16:00	0	0.032	0.032	0.021	0.000	0.011	0.011	0.021	0.021	0.021	0.000	0.011	0.011	0.000	0.000	0.011
Totals (mm)	6.604	4.385	3.980	4.129	1.867	2.187	1.910	2.902	3.052	2.966	6.263	6.018	7.149	5.708	5.548	5.933

Data from rain event on 6/27/2010.

Table 21.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/5/2010 6:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/5/2010 7:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.203	0.256	0.256	0.128	0.107	0.149
7/5/2010 8:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.341	0.331	0.384	0.373	0.331	0.384
7/5/2010 9:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
7/5/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.224	0.224	0.235	0.192	0.181	0.192
7/5/2010 11:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.011	0.011	0.021
7/5/2010 12:00	0	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000
Totals (mm)	0.762	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.790	0.832	0.875	0.704	0.640	0.747

Data from rain event on 7/5/2010.

Table 22.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/8/2010 8:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/8/2010 9:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/8/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.096	0.085	0.011	0.000	0.000
7/8/2010 11:00	0	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1.014	0.950	0.992	0.875	0.832	0.960
7/8/2010 12:00	0	0.011	0.011	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.277	0.245	0.256	0.267	0.235	0.277
7/8/2010 13:00	0	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.117	0.117	0.096	0.085	0.107
7/8/2010 14:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.011	0.000	0.021	0.000
7/8/2010 15:00	0	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
Totals (mm)	1.27	0.02134	0.03201	0.02134	0	0	0.0213	0.0107	0	0	1.4618	1.4191	1.46179	1.25906	1.1737	1.34442

Data from rain event on 7/8/2010.

Table 23.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/12/2010 4:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/12/2010 5:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/12/2010 6:00	0.254	0.032	0.043	0.000	0.000	0.000	0.011	0.011	0.000	0.000	2.550	2.539	2.561	2.465	2.369	2.401
7/12/2010 7:00	0.254	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.011	0.032	0.021	0.021	0.011	0.032	0.032
7/12/2010 8:00	0.508	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.011
7/12/2010 9:00	0.762	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.011
7/12/2010 10:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
7/12/2010 11:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
Totals (mm)	3.048	0.032	0.043	0.000	0.021	0.011	0.021	0.011	0.000	0.011	2.603	2.571	2.593	2.475	2.422	2.454

Data from rain event on 7/12/2010.

Table 24.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/14/2010 23:00	0.508	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15/2010 0:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/15/2010 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.203	0.224	0.235	0.117	0.053	0.117
7/15/2010 2:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.544	0.501	0.544	0.469	0.491	0.534
7/15/2010 3:00	0	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.117	0.128	0.139	0.096	0.085	0.107
7/15/2010 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.011	0.011
7/15/2010 5:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.171	0.171	0.192	0.117	0.107	0.160
7/15/2010 6:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.011	0.011	0.011
7/15/2010 7:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000
7/15/2010 8:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.694	0.672	0.800	0.534	0.576	0.619
7/15/2010 9:00	0	0.000	0.011	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.587	0.544	0.598	0.566	0.534	0.587
7/15/2010 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.032	0.043	0.032	0.032	0.032
Totals (mm)	2.54	0.01067	0.02134	0	0	0	0	0.0107	0	0	2.3794	2.2941	2.57147	1.94194	1.90993	2.17668

Data from rain event on 7/14/2010.

Table 25.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/20/2010 3:00	2.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/20/2010 4:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/20/2010 5:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/20/2010 6:00	0.254	0.021	0.032	0.000	0.000	0.000	0.011	0.011	0.000	0.000	1.857	1.803	1.867	1.750	1.568	1.782
7/20/2010 7:00	0	0.630	0.448	0.491	0.085	0.064	0.160	0.192	0.128	0.213	3.030	2.977	3.052	3.009	2.881	3.180
7/20/2010 8:00	0	0.768	0.790	0.896	0.203	0.149	0.363	0.331	0.267	0.160	0.053	0.053	0.043	0.043	0.053	0.064
7/20/2010 9:00	0	0.192	0.192	0.288	0.075	0.139	0.096	0.096	0.107	0.032	0.021	0.011	0.021	0.011	0.000	0.011
7/20/2010 10:00	0	0.085	0.107	0.149	0.021	0.053	0.021	0.021	0.053	0.011	0.021	0.011	0.021	0.000	0.021	0.011
7/20/2010 11:00	0	0.043	0.075	0.096	0.021	0.032	0.011	0.021	0.032	0.032	0.000	0.021	0.011	0.000	0.000	0.011
7/20/2010 12:00	0	0.032	0.043	0.064	0.011	0.011	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.011
7/20/2010 13:00	0	0.011	0.043	0.043	0.011	0.011	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.011	0.000	0.000
7/20/2010 14:00	0	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	5.842	1.78189	1.73921	2.0273	0.4268	0.45881	0.66154	0.6829	0.6082	0.4588	4.9936	4.8762	5.0149	4.82284	4.52408	5.06825

Data from rain event on 7/20/2010.

Table 26.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/22/2010 16:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/22/2010 17:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/22/2010 18:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.160	0.171	0.032	0.043	0.032
7/22/2010 19:00	1.27	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.480	0.416	0.480	0.437	0.416	0.405
7/22/2010 20:00	2.286	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.181	0.213	0.224	0.149	0.128	0.160
7/22/2010 21:00	3.302	0.032	0.043	0.021	0.011	0.011	0.021	0.011	0.000	0.000	1.376	1.334	1.440	1.312	1.206	1.248
7/22/2010 22:00	3.556	0.341	0.085	0.085	0.053	0.075	0.053	0.064	0.021	0.000	3.094	3.094	3.158	3.052	2.838	3.073
7/22/2010 23:00	3.048	11.161	8.835	9.688	6.274	6.637	8.845	7.554	7.053	7.373	11.705	11.620	11.353	11.118	10.617	11.812
7/23/2010 0:00	3.048	20.935	19.067	20.657	17.211	18.587	20.369	20.156	20.422	16.432	15.151	15.237	14.895	14.735	13.604	15.194
7/23/2010 1:00	2.794	7.000	6.519	7.064	4.609	5.538	5.826	5.676	5.612	4.748	3.276	3.244	3.180	3.052	2.913	3.318
7/23/2010 2:00	2.54	2.166	1.803	1.953	1.568	1.622	1.782	1.633	1.622	1.387	0.032	0.032	0.032	0.021	0.032	0.043
7/23/2010 3:00	2.286	2.059	1.953	2.081	1.451	1.462	1.601	1.675	1.686	1.440	1.654	1.686	1.633	1.590	1.472	1.729
7/23/2010 4:00	2.032	0.800	0.758	0.800	0.683	0.726	0.736	0.726	0.768	0.630	0.011	0.011	0.011	0.000	0.011	0.021
7/23/2010 5:00	1.778	0.427	0.416	0.448	0.373	0.416	0.373	0.395	0.437	0.363	0.000	0.000	0.011	0.011	0.011	0.000
7/23/2010 6:00	1.524	0.288	0.224	0.299	0.235	0.267	0.245	0.192	0.267	0.224	0.000	0.000	0.000	0.000	0.000	0.011
7/23/2010 7:00	1.524	0.203	0.203	0.203	0.149	0.181	0.171	0.149	0.192	0.160	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 8:00	1.016	0.149	0.149	0.160	0.117	0.128	0.107	0.117	0.139	0.117	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 9:00	1.27	0.139	0.128	0.117	0.075	0.107	0.085	0.085	0.107	0.085	0.000	0.011	0.000	0.000	0.000	0.000
7/23/2010 10:00	0.762	0.107	0.107	0.107	0.053	0.075	0.053	0.075	0.085	0.064	0.011	0.000	0.000	0.000	0.000	0.000
7/23/2010 11:00	1.016	0.085	0.085	0.085	0.053	0.064	0.043	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 12:00	0.508	0.085	0.064	0.064	0.043	0.043	0.021	0.032	0.043	0.032	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 13:00	0.508	0.053	0.053	0.053	0.032	0.032	0.011	0.021	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.011
7/23/2010 14:00	0.254	0.043	0.053	0.043	0.011	0.032	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.011	0.000
7/23/2010 15:00	0	0.043	0.032	0.032	0.011	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 16:00	0	0.043	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/23/2010 17:00	0	0.021	0.021	0.011	0.000	0.011	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	37.846	46.1904	40.642	43.9924	33.01298	36.03259	40.35394	38.636	38.54	33.162	37.078	37.057	36.58743	35.50976	33.30107	37.05691

Data from rain event on 7/22/2010.

Table 27.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/28/2010 3:00	2.54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/28/2010 4:00	1.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/28/2010 5:00	0	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.651	0.704	0.758	0.491	0.576	0.576
7/28/2010 6:00	0	1.035	0.395	0.566	0.032	0.064	0.064	0.032	0.011	0.053	3.564	3.895	3.660	3.457	2.774	3.244
7/28/2010 7:00	0	0.363	0.437	0.416	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.011	0.011	0.011
7/28/2010 8:00	0	0.139	0.235	0.213	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
7/28/2010 9:00	0	0.075	0.149	0.128	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.011
7/28/2010 10:00	0	0.043	0.096	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/28/2010 11:00	0	0.043	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011
7/28/2010 12:00	0	0.011	0.043	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
7/28/2010 13:00	0	0.021	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/28/2010 14:00	0	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	3.81	1.74988	1.48313	1.54715	0.03201	0.06402	0.06402	0.032	0.0107	0.0854	4.236	4.6094	4.43872	3.96924	3.38239	3.85187

Data from rain event on 7/28/2010.

Table 28.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/31/2010 7:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/31/2010 8:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
7/31/2010 9:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/31/2010 10:00	0	0.021	0.032	0.011	0.000	0.000	0.000	0.011	0.000	0.000	1.462	1.451	1.579	1.440	1.323	1.334
7/31/2010 11:00	0.254	0.021	0.032	0.011	0.011	0.021	0.032	0.021	0.000	0.000	1.280	1.163	1.344	1.227	1.227	1.302
7/31/2010 12:00	0.254	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.224	0.203	0.267	0.235	0.224	0.245
7/31/2010 13:00	0	0.011	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.021	0.021	0.011	0.011	0.011	0.011
7/31/2010 14:00	0	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.075	0.096	0.107	0.043	0.053	0.064
7/31/2010 15:00	0	0.075	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.235	0.203	0.245	0.203	0.213	0.213
7/31/2010 16:00	0.254	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.011	0.021	0.011	0.011
7/31/2010 17:00	1.27	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011
7/31/2010 18:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
7/31/2010 19:00	0	0.053	0.021	0.011	0.011	0.011	0.011	0.021	0.000	0.000	0.587	0.576	0.598	0.448	0.395	0.395
7/31/2010 20:00	0	0.235	0.032	0.160	0.011	0.021	0.032	0.021	0.021	0.000	1.067	0.982	1.163	0.950	0.992	1.078
7/31/2010 21:00	0	0.309	0.021	0.309	0.000	0.000	0.011	0.000	0.000	0.000	0.043	0.032	0.032	0.032	0.053	0.043
7/31/2010 22:00	0	0.192	0.160	0.213	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
7/31/2010 23:00	0	0.107	0.128	0.128	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000
8/1/2010 0:00	0	0.064	0.075	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/1/2010 1:00	0	0.053	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
8/1/2010 2:00	0	0.021	0.043	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
8/1/2010 3:00	0	0.021	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/1/2010 4:00	0	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
8/1/2010 5:00	0	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/1/2010 6:00	0	0.021	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
8/1/2010 7:00	0	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	5.080	1.398	0.715	1.142	0.043	0.064	0.096	0.096	0.021	0.000	5.026	4.759	5.367	4.620	4.545	4.716

Data from rain event on 7/31/2010.

Table 29.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/6/2010 4:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/6/2010 5:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/6/2010 6:00	0.508	0.032	0.032	0.011	0.000	0.000	0.011	0.011	0.000	0.000	1.665	1.590	1.718	1.568	1.430	1.526
8/6/2010 7:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.021	0.032	0.032	0.032	0.043
8/6/2010 8:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.011	0.021	0.011	0.011	0.021
Totals (mm)	1.778	0.032	0.032	0.011	0.000	0.000	0.011	0.021	0.000	0.000	1.707	1.622	1.771	1.611	1.472	1.590

Data from rain event on 8/6/2010.

Table 30.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/8/2010 0:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 1:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 2:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 3:00	0	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1.131	1.142	1.216	1.078	0.992	1.056
8/8/2010 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.032	0.043	0.032	0.032	0.032
8/8/2010 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.011	0.011
8/8/2010 6:00	2.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 7:00	2.54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 8:00	2.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
8/8/2010 9:00	1.778	9.144	8.099	7.640	7.448	8.643	8.088	6.637	1.291	7.341	11.684	11.641	11.790	10.371	9.656	12.014
8/8/2010 10:00	1.27	4.663	3.980	3.756	2.742	2.924	2.913	2.881	0.907	2.710	1.921	1.910	1.985	1.857	1.590	2.113
8/8/2010 11:00	1.016	1.387	1.088	1.014	0.747	0.822	0.768	0.779	0.587	0.704	0.096	0.096	0.107	0.064	0.032	0.075
8/8/2010 12:00	1.016	0.640	0.491	0.491	0.288	0.352	0.320	0.363	0.437	0.288	0.011	0.011	0.011	0.000	0.000	0.021
8/8/2010 13:00	0.762	0.373	0.277	0.288	0.139	0.203	0.171	0.192	0.277	0.139	0.000	0.000	0.000	0.011	0.000	0.000
8/8/2010 14:00	0.508	0.224	0.181	0.192	0.064	0.139	0.085	0.085	0.171	0.075	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 15:00	0.508	0.171	0.117	0.096	0.043	0.075	0.032	0.043	0.096	0.032	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 16:00	0.508	0.107	0.053	0.053	0.021	0.043	0.011	0.011	0.043	0.021	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 17:00	0.508	0.085	0.032	0.011	0.000	0.011	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 18:00	0.254	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 19:00	0.254	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.011	0.000	0.011	0.000	0.000	0.000
8/8/2010 20:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 21:00	0	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8/2010 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/9/2010 0:00	0	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	16.510	16.891	14.340	13.562	11.492	13.220	12.388	10.990	3.980	11.310	14.917	14.842	15.173	13.412	12.313	15.322

Data from rain event on 8/8/2010.

Table 31.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/11/2010 18:00	2.54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/11/2010 19:00	2.54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/11/2010 20:00	1.778	0.053	0.043	0.032	0.011	0.043	0.043	0.043	0.011	0.000	1.014	1.067	1.142	0.822	0.832	0.843
8/11/2010 21:00	1.524	10.137	2.646	8.632	5.420	5.836	6.306	5.612	0.011	6.039	9.368	9.336	9.454	7.842	8.483	9.027
8/11/2010 22:00	1.016	2.273	1.504	1.942	1.302	1.419	1.270	1.366	0.000	1.355	0.608	0.587	0.619	0.534	0.512	0.608
8/11/2010 23:00	0.762	0.907	1.142	0.822	0.512	0.683	0.534	0.566	0.011	0.544	0.011	0.000	0.011	0.011	0.011	0.011
8/12/2010 0:00	0.508	0.534	0.918	0.437	0.245	0.341	0.256	0.288	0.000	0.256	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 1:00	0.508	0.320	0.566	0.256	0.139	0.181	0.160	0.149	0.000	0.139	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 2:00	0.508	0.224	0.181	0.171	0.075	0.128	0.096	0.107	0.000	0.085	0.011	0.011	0.000	0.000	0.000	0.000
8/12/2010 3:00	0	0.160	0.117	0.107	0.053	0.085	0.053	0.064	0.011	0.053	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 4:00	0	0.139	0.085	0.096	0.043	0.053	0.043	0.053	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 5:00	0	0.107	0.053	0.064	0.021	0.043	0.032	0.032	0.000	0.011	0.000	0.000	0.000	0.000	0.011	0.000
8/12/2010 6:00	0	0.085	0.053	0.053	0.043	0.021	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 7:00	0	0.085	0.032	0.043	0.021	0.021	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 8:00	0	0.064	0.032	0.032	0.021	0.011	0.011	0.011	0.000	0.011	0.000	0.011	0.011	0.000	0.000	0.000
8/12/2010 9:00	0	0.053	0.032	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.032	0.000	0.000	0.000	0.000
8/12/2010 10:00	0	0.043	0.021	0.021	0.011	0.011	0.000	0.011	0.011	0.011	0.021	0.021	0.011	0.011	0.000	0.000
8/12/2010 11:00	0	0.043	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.021	0.011	0.011	0.011
8/12/2010 12:00	0	0.053	0.021	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000
8/12/2010 13:00	0	0.043	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
8/12/2010 14:00	0	0.043	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 15:00	0	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 16:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2010 17:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
Totals (mm)	11.684	15.4395	7.47967	12.78266	7.94915	8.87744	8.84543	8.3226	0.0747	8.5573	11.075	11.086	11.27819	9.24022	9.85908	10.49928

Data from rain event on 8/11/2010.

Table 32.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/14/2010 4:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 5:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 6:00	1.524	0.053	0.021	0.021	0.032	0.032	0.043	0.043	0.021	0.000	2.091	2.273	2.070	2.038	1.793	1.974
8/14/2010 7:00	1.27	0.203	0.064	0.021	0.011	0.011	0.011	0.000	0.011	0.000	0.139	0.085	0.107	0.267	0.128	0.139
8/14/2010 8:00	1.016	2.860	0.224	1.099	0.064	0.117	0.416	0.267	0.011	0.256	5.143	5.068	5.175	4.972	4.631	5.068
8/14/2010 9:00	0.762	1.462	0.427	2.177	1.238	1.238	1.312	1.248	0.011	1.142	0.021	0.021	0.011	0.021	0.011	0.021
8/14/2010 10:00	0.508	0.598	0.320	0.694	0.534	0.672	0.534	0.544	0.011	0.544	0.011	0.000	0.011	0.000	0.000	0.011
8/14/2010 11:00	0.254	0.373	0.256	0.384	0.288	0.395	0.288	0.309	0.011	0.309	0.000	0.011	0.000	0.000	0.011	0.000
8/14/2010 12:00	0	0.267	0.235	0.267	0.181	0.256	0.192	0.203	0.011	0.203	0.011	0.000	0.011	0.000	0.000	0.011
8/14/2010 13:00	0	0.192	0.224	0.181	0.128	0.171	0.128	0.128	0.032	0.149	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 14:00	0	0.160	0.203	0.128	0.075	0.117	0.085	0.085	0.032	0.075	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 15:00	0	0.128	0.192	0.064	0.043	0.064	0.053	0.021	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 16:00	0	0.085	0.160	0.011	0.021	0.021	0.021	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 17:00	0	0.053	0.128	0.000	0.011	0.000	0.000	0.000	0.032	0.011	0.000	0.011	0.000	0.011	0.000	0.000
8/14/2010 18:00	0	0.043	0.117	0.000	0.000	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.011
8/14/2010 19:00	0	0.021	0.096	0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 20:00	0	0.011	0.085	0.000	0.000	0.000	0.000	0.000	0.043	0.000	0.011	0.000	0.000	0.000	0.000	0.000
8/14/2010 21:00	0	0.011	0.085	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 22:00	0	0.000	0.064	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14/2010 23:00	0	0.000	0.064	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/15/2010 0:00	0	0.000	0.064	0.000	0.000	0.000	0.000	0.011	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	8.382	6.519	3.030	5.047	2.625	3.094	3.084	2.860	0.619	2.710	7.426	7.469	7.384	7.309	6.573	7.234

Data from rain event on 8/14/2010.

Table 33.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/19/2010 9:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/19/2010 10:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.160	0.160	0.160	0.085	0.064	0.096
8/19/2010 11:00	0.254	0.021	0.043	0.000	0.000	0.000	0.011	0.011	0.000	0.000	1.686	1.825	1.782	1.782	1.568	1.686
8/19/2010 12:00	0.254	0.011	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.491	0.448	0.469	0.480	0.459	0.534
8/19/2010 13:00	0.254	0.000	0.011	0.000	0.000	0.011	0.011	0.011	0.011	0.000	0.128	0.117	0.128	0.117	0.085	0.117
8/19/2010 14:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
8/19/2010 15:00	0.254	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/19/2010 16:00	0	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
Totals (mm)	2.286	0.043	0.064	0.011	0.011	0.021	0.032	0.021	0.011	0.000	2.475	2.561	2.539	2.465	2.187	2.433

Data from rain event on 8/19/2010.

Table 34.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/6/2010 13:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/6/2010 14:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/6/2010 15:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/6/2010 16:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.171	0.213	0.235	0.085	0.117	0.107
9/6/2010 17:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.011	0.011	0.000	0.011	0.000
9/6/2010 18:00	1.27	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.149	0.171	0.192	0.075	0.053	0.075
9/6/2010 19:00	0	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.523	0.491	0.512	0.427	0.395	0.437
9/6/2010 20:00	0	0.043	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.149	0.160	0.032	0.021	0.053
9/6/2010 21:00	0	0.171	0.064	0.139	0.000	0.000	0.000	0.000	0.000	0.000	1.152	1.088	1.163	1.046	0.960	1.142
9/6/2010 22:00	0.508	0.203	0.192	0.213	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.011	0.011	0.000	0.011
9/6/2010 23:00	0	0.139	0.139	0.128	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
9/7/2010 0:00	0	0.085	0.085	0.096	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000
9/7/2010 1:00	0	0.117	0.117	0.117	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.331	0.352	0.224	0.213	0.245
9/7/2010 2:00	0	0.107	0.107	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.021	0.011	0.011	0.000
9/7/2010 3:00	0	0.075	0.085	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
9/7/2010 4:00	0	0.053	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
9/7/2010 5:00	0	0.053	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/7/2010 6:00	0	0.032	0.032	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	3.048	1.142	0.960	1.067	0.000	0.000	0.000	0.000	0.000	0.000	2.539	2.486	2.657	1.910	1.793	2.081

Data from rain event on 9/6/2010.

Table 35.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/7/2010 22:00	1.52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/7/2010 23:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 0:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.032	0.043	0.000	0.000	0.000
9/8/2010 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.032	0.053	0.000	0.000	0.021
9/8/2010 2:00	0	0.437	0.299	0.352	0.053	0.075	0.032	0.053	0.021	0.203	3.009	3.030	3.105	3.276	2.603	3.105
9/8/2010 3:00	0	0.501	0.630	0.587	0.000	0.000	0.021	0.000	0.096	0.043	0.021	0.011	0.011	0.011	0.011	0.011
9/8/2010 4:00	0	0.299	0.395	0.373	0.000	0.000	0.171	0.064	0.192	0.149	0.075	0.085	0.096	0.032	0.032	0.043
9/8/2010 5:00	0	0.192	0.256	0.245	0.021	0.117	0.149	0.107	0.149	0.128	0.011	0.000	0.000	0.000	0.000	0.011
9/8/2010 6:00	0	0.128	0.181	0.160	0.075	0.075	0.128	0.085	0.117	0.096	0.000	0.000	0.011	0.011	0.011	0.000
9/8/2010 7:00	0	0.096	0.139	0.139	0.075	0.075	0.107	0.064	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 8:00	0	0.075	0.096	0.096	0.053	0.064	0.096	0.043	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 9:00	0	0.053	0.064	0.064	0.043	0.053	0.064	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 10:00	0	0.032	0.064	0.053	0.043	0.043	0.064	0.021	0.043	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 11:00	0	0.032	0.043	0.043	0.032	0.043	0.053	0.021	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 12:00	0	0.032	0.032	0.043	0.021	0.032	0.032	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 13:00	0	0.021	0.032	0.021	0.011	0.032	0.043	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 14:00	0	0.011	0.021	0.011	0.011	0.021	0.011	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 15:00	0	0.021	0.021	0.021	0.021	0.011	0.021	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 16:00	0	0.011	0.011	0.011	0.000	0.011	0.021	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 17:00	0	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.032	0.032	0.000	0.000	0.000
9/8/2010 18:00	0	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.021	0.011	0.021	0.000	0.000	0.000
9/8/2010 19:00	0	0.011	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/8/2010 20:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	4.314	1.985	2.315	2.251	0.491	0.672	1.035	0.534	0.896	0.918	3.169	3.233	3.372	3.329	2.657	3.190

Data from rain event on 9/7/2010.

Table 36.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/11/2010 12:00	1.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/11/2010 13:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/11/2010 14:00	4.318	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
9/11/2010 15:00	2.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.067	1.056	1.184	0.982	0.939	0.907
9/11/2010 16:00	0	0.064	0.064	0.032	0.021	0.021	0.011	0.021	0.000	0.011	2.529	2.454	2.635	2.561	2.486	2.625
9/11/2010 17:00	0	1.536	1.355	1.462	0.064	0.085	0.021	0.043	0.021	0.032	4.151	4.065	4.247	4.268	4.001	4.407
9/11/2010 18:00	0	2.411	3.041	3.020	1.494	1.472	1.803	1.889	2.198	2.027	2.145	2.177	2.177	2.198	2.017	2.251
9/11/2010 19:00	0	1.152	1.408	1.430	1.398	1.483	1.376	1.302	1.376	1.312	0.053	0.043	0.043	0.021	0.032	0.043
9/11/2010 20:00	0	0.683	0.683	0.672	0.662	0.747	0.651	0.576	0.630	0.608	0.000	0.000	0.000	0.011	0.000	0.011
9/11/2010 21:00	0	0.469	0.405	0.427	0.384	0.480	0.427	0.352	0.384	0.363	0.000	0.000	0.000	0.000	0.011	0.000
9/11/2010 22:00	0	0.352	0.277	0.288	0.245	0.331	0.299	0.235	0.267	0.245	0.000	0.000	0.011	0.000	0.000	0.000
9/11/2010 23:00	0	0.267	0.192	0.213	0.192	0.245	0.203	0.171	0.192	0.181	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 0:00	0	0.235	0.128	0.160	0.139	0.181	0.160	0.117	0.149	0.139	0.011	0.000	0.000	0.000	0.000	0.000
9/12/2010 1:00	0	0.181	0.117	0.117	0.107	0.149	0.128	0.107	0.117	0.107	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 2:00	0	0.160	0.107	0.117	0.096	0.117	0.107	0.075	0.085	0.085	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 3:00	0.762	0.128	0.075	0.085	0.064	0.096	0.085	0.064	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 4:00	0	0.117	0.075	0.075	0.064	0.085	0.075	0.053	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.011
9/12/2010 5:00	0	0.096	0.064	0.064	0.043	0.075	0.053	0.043	0.053	0.053	0.000	0.021	0.021	0.000	0.000	0.000
9/12/2010 6:00	0	0.203	0.160	0.149	0.085	0.085	0.085	0.085	0.096	0.085	0.694	0.662	0.715	0.576	0.469	0.555
9/12/2010 7:00	0	0.160	0.149	0.160	0.096	0.096	0.107	0.096	0.107	0.096	0.011	0.011	0.011	0.011	0.000	0.011
9/12/2010 8:00	0	0.139	0.128	0.117	0.064	0.085	0.085	0.075	0.075	0.075	0.021	0.011	0.011	0.000	0.000	0.011
9/12/2010 9:00	0	0.128	0.107	0.107	0.064	0.085	0.085	0.053	0.075	0.075	0.000	0.011	0.011	0.011	0.000	0.011
9/12/2010 10:00	0	0.107	0.085	0.085	0.064	0.075	0.064	0.053	0.064	0.064	0.011	0.011	0.011	0.000	0.011	0.011
9/12/2010 11:00	0	0.096	0.085	0.075	0.043	0.064	0.064	0.053	0.053	0.053	0.032	0.032	0.032	0.021	0.000	0.021
9/12/2010 12:00	0	0.085	0.075	0.085	0.053	0.053	0.053	0.043	0.053	0.043	0.021	0.021	0.032	0.011	0.000	0.032
9/12/2010 13:00	0	0.085	0.075	0.075	0.043	0.053	0.053	0.032	0.043	0.043	0.011	0.011	0.011	0.011	0.000	0.011
9/12/2010 14:00	0	0.085	0.064	0.064	0.043	0.053	0.053	0.032	0.032	0.043	0.000	0.000	0.000	0.000	0.011	0.000
9/12/2010 15:00	0	0.053	0.053	0.053	0.021	0.043	0.043	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 16:00	0	0.064	0.043	0.053	0.011	0.032	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 17:00	0	0.032	0.032	0.021	0.011	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 18:00	0	0.021	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/12/2010 19:00	0	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	11.176	9.134	9.070	9.230	5.580	6.306	6.135	5.591	6.231	5.911	10.755	10.595	11.150	10.681	9.976	10.915

Data from rain event on 9/11/2010.

Table 37.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/15/2010 18:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2010 19:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2010 20:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2010 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.416	0.395	0.469	0.320	0.309	0.213
9/15/2010 22:00	0	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.640	0.651	0.704	0.598	0.640	0.608
9/15/2010 23:00	0	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.107	0.096	0.096	0.075	0.096	0.085
9/16/2010 0:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000
9/16/2010 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000
9/16/2010 2:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/16/2010 3:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.085	0.096	0.000	0.011	0.000
9/16/2010 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.011
9/16/2010 5:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000
9/16/2010 6:00	3.3	0.011	0.011	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.203	0.181	0.224	0.139	0.128	0.107
9/16/2010 7:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.011	0.000	0.021	0.011
9/16/2010 8:00	8.64	0.011	0.000	0.011	0.011	0.000	0.000	0.000	0.011	0.000	0.171	0.149	0.181	0.128	0.117	0.107
9/16/2010 9:00	4.57	0.021	0.021	0.032	0.032	0.032	0.011	0.011	0.000	0.011	0.672	0.608	0.704	0.630	0.619	0.598
9/16/2010 10:00	0.254	0.011	0.011	0.011	0.000	0.000	0.000	0.011	0.011	0.000	0.235	0.235	0.224	0.181	0.213	0.203
9/16/2010 11:00	0	2.017	1.590	1.985	0.277	0.384	0.171	0.299	0.213	0.608	6.925	6.850	7.021	5.847	6.263	6.882
9/16/2010 12:00	0.508	6.626	7.832	8.035	6.317	5.879	6.455	6.253	6.391	6.861	4.652	4.524	4.407	4.695	4.364	4.812
9/16/2010 13:00	0	3.393	2.796	3.180	2.742	2.956	2.710	2.582	2.785	2.668	0.245	0.213	0.224	0.192	0.224	0.256
9/16/2010 14:00	0	1.323	0.971	1.110	0.907	1.056	1.003	0.950	1.003	0.939	0.021	0.000	0.011	0.000	0.000	0.000
9/16/2010 15:00	0	0.928	0.768	0.843	0.598	0.704	0.598	0.694	0.694	0.672	1.088	1.035	1.067	0.960	0.886	1.003
9/16/2010 16:00	0	0.822	0.704	0.768	0.598	0.640	0.619	0.608	0.651	0.619	0.032	0.032	0.032	0.021	0.032	0.032
9/16/2010 17:00	0	0.566	0.459	0.501	0.416	0.512	0.469	0.416	0.427	0.405	0.011	0.011	0.000	0.000	0.000	0.000
9/16/2010 18:00	0	0.416	0.309	0.352	0.309	0.352	0.331	0.277	0.320	0.277	0.000	0.000	0.000	0.000	0.011	0.000
9/16/2010 19:00	0	0.299	0.213	0.245	0.203	0.256	0.224	0.181	0.224	0.192	0.000	0.000	0.000	0.011	0.000	0.000
9/16/2010 20:00	0	0.235	0.149	0.171	0.149	0.192	0.160	0.128	0.160	0.139	0.000	0.000	0.000	0.000	0.000	0.000
9/16/2010 21:00	0	0.181	0.096	0.107	0.107	0.139	0.117	0.085	0.096	0.085	0.000	0.000	0.000	0.000	0.000	0.000
9/16/2010 22:00	0	0.139	0.075	0.085	0.075	0.107	0.085	0.064	0.085	0.064	0.000	0.000	0.000	0.000	0.000	0.000
9/16/2010 23:00	0	0.117	0.053	0.075	0.053	0.096	0.064	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 0:00	0	0.085	0.043	0.053	0.043	0.064	0.053	0.032	0.043	0.032	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 1:00	0	0.085	0.032	0.043	0.043	0.064	0.043	0.021	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 2:00	0	0.064	0.032	0.032	0.032	0.053	0.043	0.011	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 3:00	0	0.053	0.021	0.021	0.032	0.043	0.032	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 4:00	0	0.053	0.021	0.032	0.021	0.032	0.021	0.011	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 5:00	0	0.043	0.021	0.021	0.032	0.032	0.021	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000

Table 37 (cont'd)

9/17/2010 6:00	0	0.043	0.011	0.021	0.021	0.032	0.021	0.000	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 7:00	0	0.043	0.011	0.021	0.021	0.021	0.021	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 8:00	0	0.032	0.021	0.011	0.021	0.021	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 9:00	0	0.032	0.011	0.021	0.021	0.021	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 10:00	0	0.021	0.011	0.011	0.011	0.021	0.011	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 11:00	0	0.032	0.000	0.011	0.011	0.011	0.011	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/17/2010 12:00	0	0.021	0.011	0.011	0.021	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	19.304	17.744	16.325	17.819	13.124	13.754	13.327	12.761	13.316	13.807	15.557	15.098	15.493	13.796	13.946	14.927

Data from rain event on 9/15/2010.

Table 38.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/18/2010 8:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 9:00	2.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 10:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 11:00	0	0.032	0.032	0.021	0.021	0.021	0.000	0.021	0.011	0.000	0.779	0.758	0.832	0.736	0.651	0.694
9/18/2010 12:00	0	0.512	0.320	0.448	0.096	0.139	0.053	0.171	0.075	0.064	2.892	2.646	2.742	2.774	2.614	2.796
9/18/2010 13:00	0	0.662	0.651	0.619	0.128	0.053	0.139	0.331	0.320	0.277	0.277	0.224	0.235	0.203	0.171	0.213
9/18/2010 14:00	0	0.469	0.459	0.459	0.203	0.267	0.224	0.256	0.235	0.267	0.043	0.043	0.043	0.032	0.032	0.032
9/18/2010 15:00	0	0.309	0.309	0.320	0.181	0.149	0.203	0.171	0.181	0.181	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 16:00	0	0.192	0.192	0.192	0.139	0.117	0.160	0.128	0.139	0.128	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 17:00	0	0.128	0.128	0.128	0.096	0.096	0.107	0.075	0.085	0.075	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 18:00	0	0.075	0.075	0.075	0.053	0.064	0.064	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 19:00	0	0.053	0.053	0.043	0.032	0.043	0.053	0.011	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 20:00	0	0.032	0.032	0.032	0.021	0.032	0.021	0.000	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 21:00	0	0.021	0.011	0.011	0.011	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 22:00	0	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/18/2010 23:00	0	0.011	0.011	0.000	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/19/2010 0:00	0	0.021	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	3.302	2.529	2.283	2.358	1.014	1.014	1.067	1.216	1.142	1.088	3.991	3.670	3.852	3.745	3.468	3.735

Data from rain event on 9/18/2010.

Table 39.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/23/2010 4:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/23/2010 5:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/23/2010 6:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/23/2010 7:00	3.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.267	0.277	0.331	0.213	0.171	0.181
9/23/2010 8:00	5.588	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.608	0.576	0.640	0.608	0.566	0.544
9/23/2010 9:00	5.33	0.064	0.064	0.032	0.043	0.043	0.000	0.021	0.021	0.011	2.668	2.635	2.774	2.700	2.646	2.806
9/23/2010 10:00	17.53	0.587	0.437	0.523	0.043	0.053	0.021	0.032	0.011	0.011	2.305	2.315	2.326	2.337	2.187	2.422
9/23/2010 11:00	21.59	3.329	4.087	4.044	1.398	1.248	1.697	1.665	1.771	1.825	5.495	5.570	5.495	5.346	4.930	5.698
9/23/2010 12:00	4.318	3.308	3.799	3.873	3.702	3.767	3.606	3.788	3.820	3.799	4.802	5.047	4.684	4.866	4.449	5.164
9/23/2010 13:00	0.254	13.071	14.522	13.508	13.423	14.234	13.754	14.372	14.276	14.415	16.325	16.688	16.272	14.853	14.853	16.336
9/23/2010 14:00	0.508	26.995	26.184	25.853	24.584	26.440	24.957	25.704	26.142	25.789	20.156	20.145	20.070	20.038	16.688	20.518
9/23/2010 15:00	0	10.585	9.016	9.358	7.992	8.451	7.757	7.949	8.003	7.928	4.311	4.385	4.161	4.193	2.134	4.663
9/23/2010 16:00	1.78	3.329	2.721	2.977	2.571	2.796	2.507	2.454	2.465	2.465	0.341	0.331	0.341	0.267	0.117	0.363
9/23/2010 17:00	0.51	1.665	1.291	1.419	1.195	1.355	1.152	1.152	1.163	1.206	0.491	0.469	0.469	0.405	0.224	0.491
9/23/2010 18:00	0	1.035	0.800	0.875	0.790	0.843	0.726	0.747	0.779	0.758	0.011	0.011	0.021	0.011	0.000	0.011
9/23/2010 19:00	0	0.779	0.619	0.651	0.555	0.544	0.512	0.555	0.566	0.555	0.534	0.534	0.576	0.448	0.128	0.512
9/23/2010 20:00	0	0.704	0.587	0.630	0.491	0.512	0.491	0.534	0.555	0.534	0.277	0.277	0.309	0.235	0.053	0.299
9/23/2010 21:00	0	0.576	0.448	0.480	0.416	0.416	0.427	0.416	0.448	0.437	0.032	0.021	0.021	0.011	0.000	0.032
9/23/2010 22:00	0	0.437	0.352	0.373	0.299	0.341	0.331	0.320	0.331	0.331	0.000	0.011	0.000	0.000	0.011	0.011
9/23/2010 23:00	0	0.363	0.267	0.288	0.245	0.256	0.245	0.245	0.256	0.256	0.011	0.000	0.011	0.000	0.000	0.000
9/24/2010 0:00	0	0.288	0.213	0.235	0.171	0.213	0.203	0.181	0.192	0.181	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 1:00	0	0.224	0.160	0.181	0.139	0.181	0.160	0.139	0.149	0.139	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 2:00	0.25	0.181	0.139	0.149	0.107	0.139	0.128	0.096	0.117	0.117	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 3:00	0.76	0.149	0.117	0.117	0.085	0.128	0.096	0.085	0.085	0.096	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 4:00	0.25	0.117	0.085	0.096	0.064	0.096	0.096	0.053	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 5:00	0	0.107	0.064	0.064	0.053	0.075	0.064	0.043	0.043	0.053	0.021	0.032	0.053	0.000	0.000	0.000
9/24/2010 6:00	0	0.139	0.107	0.128	0.043	0.075	0.064	0.053	0.064	0.053	0.320	0.331	0.395	0.267	0.245	0.299
9/24/2010 7:00	0	0.128	0.139	0.139	0.064	0.064	0.075	0.064	0.075	0.075	0.075	0.075	0.085	0.043	0.043	0.064
9/24/2010 8:00	0.254	0.117	0.117	0.117	0.043	0.075	0.053	0.053	0.053	0.064	0.032	0.032	0.032	0.032	0.032	0.043
9/24/2010 9:00	0	0.096	0.096	0.107	0.043	0.043	0.064	0.032	0.053	0.053	0.011	0.021	0.032	0.000	0.000	0.011
9/24/2010 10:00	0.762	0.075	0.085	0.075	0.043	0.043	0.053	0.032	0.032	0.032	0.000	0.011	0.011	0.000	0.000	0.000
9/24/2010 11:00	0	0.096	0.096	0.096	0.021	0.053	0.043	0.021	0.043	0.043	0.085	0.096	0.139	0.032	0.043	0.085
9/24/2010 12:00	0	0.075	0.107	0.107	0.032	0.043	0.053	0.032	0.032	0.032	0.053	0.053	0.075	0.043	0.043	0.043
9/24/2010 13:00	0	0.107	0.117	0.117	0.032	0.043	0.043	0.043	0.043	0.053	0.587	0.576	0.662	0.576	0.512	0.587
9/24/2010 14:00	0	0.181	0.224	0.213	0.075	0.075	0.085	0.085	0.107	0.096	0.032	0.032	0.021	0.021	0.021	0.021

Table 39 (cont'd)

9/24/2010 15:00	0	0.107	0.149	0.139	0.053	0.064	0.075	0.053	0.064	0.064	0.000	0.000	0.011	0.000	0.000	0.000
9/24/2010 16:00	0	0.064	0.096	0.096	0.032	0.032	0.064	0.021	0.032	0.032	0.011	0.000	0.000	0.000	0.000	0.011
9/24/2010 17:00	0	0.043	0.075	0.075	0.021	0.032	0.043	0.000	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000
9/24/2010 18:00	0	0.032	0.053	0.032	0.021	0.011	0.032	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 19:00	0	0.021	0.032	0.032	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 20:00	0	0.011	0.021	0.021	0.021	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 21:00	0	0.021	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 22:00	0	0.000	0.011	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/24/2010 23:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/25/2010 0:00	0	0.000	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	66.290	69.227	67.541	67.242	58.941	62.825	59.731	61.054	61.875	61.577	59.869	60.563	60.019	57.543	50.096	61.214

Data from rain event on 9/23/2010.

Table 40.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/1/2010 21:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/1/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/1/2010 23:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/2/2010 0:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.213	0.256	0.299	0.149	0.139	0.139
10/2/2010 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.181	0.149	0.181	0.149	0.160	0.181
10/2/2010 2:00	0	0.021	0.021	0.032	0.021	0.021	0.011	0.011	0.021	0.000	0.662	0.619	0.640	0.608	0.587	0.587
10/2/2010 3:00	0	0.032	0.032	0.043	0.032	0.043	0.011	0.021	0.011	0.021	0.843	0.811	0.790	0.832	0.790	0.790
10/2/2010 4:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.011
10/2/2010 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.000
10/2/2010 6:00	0	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
Totals (mm)	1.524	0.053	0.053	0.075	0.064	0.064	0.021	0.032	0.043	0.021	1.921	1.846	1.921	1.750	1.697	1.707

Data from rain event on 10/1/2010.

Table 41.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/21/2010 4:00	1.778	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/21/2010 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/21/2010 6:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.128	0.128	0.021	0.000	0.000
10/21/2010 7:00	0.254	0.064	0.064	0.053	0.064	0.043	0.011	0.043	0.021	0.032	1.878	1.761	1.835	1.857	1.558	1.654
10/21/2010 8:00	0	0.011	0.000	0.011	0.011	0.011	0.011	0.011	0.011	0.000	0.181	0.181	0.149	0.171	0.149	0.181
10/21/2010 9:00	0	0.032	0.032	0.032	0.032	0.032	0.011	0.021	0.011	0.011	0.843	0.800	0.822	0.832	0.662	0.843
10/21/2010 10:00	0	0.011	0.011	0.011	0.011	0.011	0.000	0.011	0.011	0.011	0.224	0.224	0.213	0.203	0.149	0.224
10/21/2010 11:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.043	0.043	0.032	0.021	0.043
10/21/2010 12:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.075	0.053	0.043	0.032	0.053
10/21/2010 13:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000
10/21/2010 14:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/21/2010 15:00	0	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.363	0.363	0.416	0.267	0.235	0.277
10/21/2010 16:00	0	0.000	0.011	0.011	0.011	0.000	0.000	0.011	0.000	0.000	0.149	0.128	0.128	0.107	0.117	0.096
10/21/2010 17:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.011
10/21/2010 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.021	0.000	0.000	0.000
10/21/2010 19:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.011	0.011
10/21/2010 20:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.021	0.000	0.000	0.000
10/21/2010 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.032	0.064	0.000	0.000	0.000
10/21/2010 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.011	0.000	0.000	0.000
10/21/2010 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
10/22/2010 0:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	3.048	0.139	0.128	0.117	0.128	0.096	0.032	0.096	0.053	0.053	3.905	3.820	3.927	3.532	2.934	3.393

Data from rain event on 10/21/2010.

Table 42.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/23/2010 14:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/23/2010 15:00	3.048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/23/2010 16:00	2.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/23/2010 17:00	3.556	0.021	0.032	0.011	0.011	0.011	0.000	0.000	0.000	0.000	1.440	1.419	1.590	1.419	1.323	1.291
10/23/2010 18:00	1.016	0.085	0.085	0.085	0.032	0.053	0.021	0.043	0.011	0.053	2.764	2.732	2.828	2.700	2.593	2.742
10/23/2010 19:00	1.27	0.566	1.216	1.206	0.053	0.053	0.021	0.053	0.021	0.149	2.038	2.081	2.081	1.963	1.899	1.995
10/23/2010 20:00	1.016	1.697	2.518	2.401	0.320	0.128	0.341	0.587	0.480	0.448	3.382	3.521	3.329	3.233	3.052	3.404
10/23/2010 21:00	0	1.494	1.995	2.262	1.280	1.323	1.558	1.120	1.099	1.014	1.174	1.227	1.206	1.088	1.056	1.131
10/23/2010 22:00	0	1.195	1.408	1.590	1.174	1.344	1.174	0.854	0.939	0.907	1.174	1.184	1.216	1.099	1.067	1.163
10/23/2010 23:00	0.254	1.291	1.515	1.654	1.323	1.419	1.323	1.152	1.163	1.163	1.216	1.238	1.248	1.184	1.131	1.248
10/24/2010 0:00	0.254	0.886	0.960	1.120	0.939	1.056	0.918	0.683	0.790	0.726	0.064	0.064	0.053	0.032	0.043	0.053
10/24/2010 1:00	0	0.598	0.587	0.672	0.544	0.619	0.534	0.395	0.459	0.416	0.032	0.032	0.032	0.011	0.021	0.032
10/24/2010 2:00	0	0.448	0.416	0.480	0.352	0.427	0.352	0.267	0.309	0.299	0.235	0.235	0.267	0.181	0.181	0.213
10/24/2010 3:00	0	0.373	0.352	0.395	0.267	0.320	0.288	0.203	0.235	0.235	0.181	0.149	0.181	0.139	0.149	0.160
10/24/2010 4:00	0	0.299	0.277	0.331	0.224	0.245	0.245	0.171	0.192	0.203	0.032	0.043	0.021	0.021	0.032	0.032
10/24/2010 5:00	0.254	0.245	0.235	0.267	0.181	0.213	0.203	0.139	0.149	0.149	0.011	0.011	0.011	0.011	0.000	0.021
10/24/2010 6:00	0.254	0.213	0.181	0.213	0.139	0.171	0.160	0.117	0.128	0.128	0.011	0.011	0.011	0.000	0.000	0.000
10/24/2010 7:00	0.254	0.171	0.160	0.181	0.117	0.128	0.128	0.085	0.107	0.107	0.000	0.011	0.000	0.000	0.000	0.011
10/24/2010 8:00	0	0.160	0.139	0.160	0.096	0.117	0.107	0.075	0.085	0.085	0.181	0.171	0.224	0.139	0.160	0.181
10/24/2010 9:00	0.254	0.171	0.171	0.171	0.107	0.117	0.107	0.085	0.096	0.096	0.256	0.267	0.277	0.224	0.235	0.256
10/24/2010 10:00	0	0.181	0.192	0.192	0.107	0.117	0.107	0.107	0.117	0.117	0.288	0.277	0.309	0.245	0.256	0.267
10/24/2010 11:00	0	0.181	0.192	0.192	0.117	0.128	0.139	0.117	0.128	0.117	0.075	0.043	0.043	0.032	0.053	0.064
10/24/2010 12:00	0	0.181	0.181	0.203	0.117	0.139	0.139	0.107	0.117	0.128	0.203	0.213	0.245	0.171	0.192	0.192
10/24/2010 13:00	0	0.171	0.192	0.181	0.117	0.128	0.128	0.107	0.128	0.117	0.085	0.075	0.096	0.053	0.075	0.075
10/24/2010 14:00	0	0.149	0.160	0.171	0.107	0.117	0.107	0.096	0.107	0.107	0.043	0.043	0.032	0.021	0.032	0.032
10/24/2010 15:00	0	0.139	0.139	0.160	0.096	0.107	0.117	0.085	0.085	0.085	0.011	0.011	0.000	0.011	0.011	0.011
10/24/2010 16:00	1.016	0.117	0.117	0.128	0.085	0.107	0.096	0.064	0.085	0.085	0.000	0.011	0.011	0.000	0.000	0.000
10/24/2010 17:00	0	0.117	0.107	0.117	0.075	0.096	0.075	0.064	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2010 18:00	0.508	0.107	0.096	0.107	0.064	0.085	0.085	0.043	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2010 19:00	1.778	0.160	0.171	0.160	0.085	0.085	0.075	0.075	0.085	0.075	0.886	0.896	0.971	0.672	0.768	0.736
10/24/2010 20:00	0	0.192	0.203	0.203	0.107	0.117	0.117	0.096	0.107	0.117	0.075	0.053	0.075	0.032	0.064	0.064
10/24/2010 21:00	0	0.171	0.203	0.192	0.107	0.117	0.117	0.096	0.096	0.107	0.491	0.491	0.566	0.416	0.469	0.480
10/24/2010 22:00	0	0.512	0.704	0.587	0.320	0.288	0.331	0.320	0.309	0.363	1.782	1.782	1.761	1.686	1.611	1.814
10/24/2010 23:00	0	0.566	0.779	0.790	0.459	0.576	0.523	0.448	0.480	0.501	0.011	0.032	0.032	0.021	0.011	0.032
10/25/2010 0:00	0	0.384	0.469	0.501	0.373	0.491	0.416	0.341	0.341	0.373	0.021	0.011	0.011	0.000	0.011	0.011
10/25/2010 1:00	0.254	0.309	0.320	0.341	0.277	0.363	0.299	0.245	0.256	0.267	0.011	0.011	0.011	0.011	0.000	0.011

Table 42 (cont'd)

10/25/2010 2:00	0	0.245	0.245	0.256	0.213	0.267	0.224	0.181	0.192	0.203	0.011	0.011	0.021	0.000	0.000	0.011
10/25/2010 3:00	0	0.192	0.181	0.203	0.160	0.203	0.171	0.149	0.149	0.160	0.011	0.021	0.021	0.000	0.000	0.011
10/25/2010 4:00	0	0.192	0.181	0.192	0.149	0.160	0.149	0.128	0.128	0.139	0.224	0.192	0.224	0.160	0.117	0.181
10/25/2010 5:00	0	0.160	0.149	0.171	0.128	0.149	0.139	0.107	0.117	0.139	0.021	0.021	0.011	0.011	0.000	0.021
10/25/2010 6:00	0	0.128	0.128	0.139	0.117	0.117	0.117	0.096	0.096	0.107	0.000	0.011	0.011	0.000	0.000	0.011
10/25/2010 7:00	0	0.139	0.107	0.128	0.085	0.128	0.107	0.085	0.085	0.096	0.000	0.011	0.011	0.000	0.011	0.011
10/25/2010 8:00	0	0.117	0.096	0.117	0.096	0.096	0.085	0.064	0.085	0.085	0.011	0.000	0.000	0.000	0.000	0.000
10/25/2010 9:00	0	0.096	0.096	0.096	0.064	0.096	0.085	0.064	0.064	0.075	0.000	0.011	0.000	0.000	0.000	0.000
10/25/2010 10:00	0	0.107	0.075	0.096	0.064	0.064	0.075	0.053	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.011
10/25/2010 11:00	0	0.096	0.075	0.075	0.064	0.075	0.053	0.053	0.043	0.064	0.000	0.000	0.011	0.011	0.000	0.000
10/25/2010 12:00	0	0.085	0.075	0.085	0.064	0.064	0.064	0.032	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 13:00	0	0.075	0.053	0.064	0.043	0.053	0.053	0.043	0.032	0.043	0.011	0.000	0.000	0.000	0.000	0.000
10/25/2010 14:00	0	0.064	0.053	0.064	0.032	0.064	0.043	0.021	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 15:00	0	0.064	0.053	0.053	0.043	0.043	0.053	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 16:00	0	0.053	0.043	0.053	0.032	0.053	0.043	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 17:00	0	0.053	0.032	0.043	0.032	0.043	0.043	0.021	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 18:00	0	0.053	0.032	0.032	0.032	0.043	0.032	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 19:00	0	0.032	0.032	0.032	0.021	0.043	0.032	0.011	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 20:00	0	0.043	0.021	0.032	0.032	0.043	0.032	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 21:00	0	0.032	0.021	0.021	0.011	0.021	0.021	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 22:00	0	0.021	0.011	0.011	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/25/2010 23:00	0	0.021	0.011	0.021	0.011	0.021	0.021	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/26/2010 0:00	0	0.021	0.011	0.000	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	18.542	15.642	18.256	19.409	11.310	12.697	12.036	9.603	10.115	10.265	18.459	18.619	19.046	16.997	16.624	17.979

Data from rain event on 10/23/2010.

Table 43.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/26/2010 10:00	0.254	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/26/2010 11:00	0.508	0.011	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/26/2010 12:00	1.27	0.021	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/26/2010 13:00	0.508	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.160	0.171	0.235	0.096	0.117	0.075
10/26/2010 14:00	3.048	0.043	0.011	0.043	0.011	0.011	0.000	0.000	0.000	0.000	0.501	0.512	0.512	0.459	0.480	0.416
10/26/2010 15:00	0	0.213	0.181	0.192	0.043	0.053	0.043	0.011	0.043	0.032	0.971	0.950	1.035	0.864	0.960	0.971
10/26/2010 16:00	0.254	0.245	0.267	0.277	0.107	0.139	0.117	0.096	0.128	0.128	0.480	0.480	0.523	0.437	0.427	0.491
10/26/2010 17:00	0	0.747	0.886	0.886	0.363	0.288	0.320	0.320	0.288	0.341	2.177	2.230	2.209	2.177	1.985	2.326
10/26/2010 18:00	0	1.046	1.152	1.259	0.768	0.715	1.014	0.704	0.726	0.822	0.032	0.032	0.011	0.000	0.011	0.011
10/26/2010 19:00	0	0.534	0.576	0.630	0.566	0.651	0.726	0.523	0.501	0.534	0.160	0.149	0.181	0.064	0.075	0.064
10/26/2010 20:00	0	0.320	0.352	0.395	0.363	0.469	0.448	0.320	0.363	0.352	0.000	0.011	0.011	0.000	0.000	0.000
10/26/2010 21:00	0	0.213	0.203	0.235	0.267	0.331	0.299	0.203	0.245	0.224	0.000	0.011	0.000	0.000	0.000	0.000
10/26/2010 22:00	0	0.149	0.139	0.149	0.203	0.245	0.213	0.139	0.160	0.149	0.000	0.000	0.000	0.000	0.000	0.000
10/26/2010 23:00	0	0.107	0.107	0.107	0.128	0.181	0.149	0.096	0.117	0.107	0.000	0.000	0.000	0.000	0.000	0.011
10/27/2010 0:00	0	0.064	0.064	0.085	0.096	0.149	0.117	0.053	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 1:00	0	0.064	0.053	0.043	0.085	0.096	0.085	0.043	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 2:00	0	0.032	0.032	0.043	0.053	0.085	0.064	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 3:00	0	0.032	0.021	0.032	0.043	0.075	0.053	0.011	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 4:00	0	0.021	0.011	0.011	0.032	0.053	0.043	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 5:00	0	0.021	0.011	0.021	0.021	0.053	0.032	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 6:00	0	0.021	0.000	0.000	0.021	0.043	0.032	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 7:00	0	0.011	0.011	0.011	0.011	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 8:00	0	0.011	0.000	0.000	0.021	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 9:00	0	0.000	0.000	0.000	0.011	0.021	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 10:00	0	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 11:00	0	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/27/2010 12:00	0	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	5.842	3.948	4.087	4.439	3.244	3.767	3.852	2.571	2.796	2.913	4.481	4.545	4.716	4.097	4.055	4.364

Data from rain event on 10/26/2010.

Table 44.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/10/2011 3:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.085	0.075	0.000	0.000	0.000
5/10/2011 4:00	0	0.032	0.043	0.011	0.032	0.021	0.000	0.011	0.000	0.000	2.262	2.198	2.358	2.294	2.017	2.038
5/10/2011 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.181	0.160	0.203	0.181	0.203	0.181
5/10/2011 6:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.011
5/10/2011 7:00	0.254	0.011	0.021	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.469	0.448	0.469	0.384	0.341	0.341
5/10/2011 8:00	0.508	0.107	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.256	0.245	0.267	0.245	0.245	0.235
5/10/2011 9:00	0	0.299	0.011	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.469	0.459	0.501	0.459	0.459	0.448
5/10/2011 10:00	0	0.139	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.011
5/10/2011 11:00	0	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/10/2011 12:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	4.064	0.662	0.075	0.021	0.053	0.043	0.000	0.011	0.000	0.011	3.702	3.596	3.884	3.564	3.276	3.265

Data from rain event on 5/10/2011.

Table 45.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/11/2011 9:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 10:00	16	0.053	0.043	0.075	0.032	0.043	0.011	0.032	0.043	0.021	0.992	0.928	1.110	1.152	1.003	0.928
5/11/2011 11:00	2.794	9.358	8.664	0.437	4.652	4.343	5.196	5.869	6.306	7.629	13.935	13.540	13.743	12.985	12.473	12.921
5/11/2011 12:00	0	5.388	4.866	1.067	4.535	5.143	4.321	5.111	5.463	5.186	2.518	2.614	2.539	2.230	2.177	2.497
5/11/2011 13:00	0	1.963	1.857	1.323	1.697	2.049	1.665	2.006	2.102	1.942	0.085	0.107	0.096	0.085	0.085	0.107
5/11/2011 14:00	0	0.918	0.886	1.280	0.779	1.003	0.747	1.014	1.078	0.939	0.000	0.000	0.000	0.000	0.000	0.011
5/11/2011 15:00	0	0.555	0.512	1.099	0.459	0.587	0.427	0.651	0.672	0.608	0.000	0.000	0.011	0.000	0.000	0.000
5/11/2011 16:00	0	0.373	0.363	0.758	0.309	0.405	0.277	0.459	0.459	0.427	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 17:00	0	0.288	0.267	0.566	0.224	0.299	0.192	0.352	0.341	0.320	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 18:00	0	0.213	0.203	0.427	0.160	0.213	0.149	0.277	0.256	0.245	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 19:00	0	0.160	0.149	0.256	0.107	0.181	0.107	0.203	0.213	0.181	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 20:00	0	0.128	0.107	0.149	0.075	0.128	0.064	0.171	0.171	0.149	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 21:00	0	0.085	0.096	0.085	0.064	0.107	0.043	0.117	0.117	0.107	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 22:00	0.254	0.064	0.075	0.064	0.043	0.085	0.032	0.107	0.096	0.096	0.000	0.000	0.000	0.000	0.000	0.000
5/11/2011 23:00	0	0.075	0.085	0.053	0.043	0.075	0.043	0.096	0.096	0.096	0.181	0.181	0.192	0.075	0.085	0.075
5/12/2011 0:00	0	0.053	0.064	0.053	0.032	0.064	0.021	0.096	0.075	0.075	0.021	0.021	0.021	0.011	0.021	0.032
5/12/2011 1:00	0.508	0.064	0.064	0.043	0.032	0.053	0.021	0.075	0.075	0.075	0.117	0.096	0.139	0.107	0.096	0.096
5/12/2011 2:00	0.254	0.085	0.117	0.043	0.053	0.064	0.032	0.096	0.085	0.085	0.427	0.405	0.437	0.395	0.395	0.363
5/12/2011 3:00	0	0.117	0.149	0.053	0.075	0.096	0.053	0.117	0.117	0.117	0.213	0.213	0.203	0.192	0.181	0.181
5/12/2011 4:00	0	0.117	0.128	0.043	0.064	0.096	0.064	0.107	0.107	0.096	0.053	0.053	0.075	0.053	0.043	0.064
5/12/2011 5:00	0	0.107	0.096	0.043	0.053	0.075	0.053	0.096	0.085	0.096	0.032	0.032	0.021	0.021	0.011	0.021
5/12/2011 6:00	0	0.096	0.085	0.032	0.032	0.064	0.032	0.085	0.075	0.085	0.011	0.011	0.011	0.011	0.000	0.011
5/12/2011 7:00	0	0.075	0.064	0.043	0.053	0.053	0.032	0.085	0.075	0.064	0.011	0.000	0.000	0.011	0.000	0.011
5/12/2011 8:00	0	0.075	0.075	0.043	0.021	0.053	0.032	0.075	0.064	0.075	0.000	0.011	0.000	0.000	0.011	0.000
5/12/2011 9:00	0	0.075	0.075	0.043	0.043	0.043	0.043	0.064	0.064	0.064	0.011	0.000	0.000	0.000	0.000	0.000
5/12/2011 10:00	0	0.064	0.064	0.053	0.021	0.053	0.021	0.064	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 11:00	0	0.053	0.075	0.053	0.021	0.053	0.021	0.075	0.075	0.053	0.000	0.000	0.011	0.000	0.000	0.000
5/12/2011 12:00	0	0.064	0.053	0.075	0.000	0.032	0.021	0.053	0.075	0.064	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 13:00	0	0.053	0.043	0.480	0.000	0.011	0.000	0.064	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 14:00	0	0.043	0.032	0.117	0.000	0.011	0.000	0.053	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 15:00	0	0.021	0.011	0.000	0.000	0.000	0.000	0.043	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 16:00	0	0.011	0.011	0.000	0.011	0.000	0.011	0.032	0.032	0.021	0.000	0.011	0.000	0.000	0.000	0.000
5/12/2011 17:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
5/12/2011 18:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	20.826	20.817	19.377	8.856	13.690	15.482	13.732	17.766	18.673	19.174	18.608	18.224	18.608	17.328	16.581	17.317

Data from rain event on 5/11/2011.

Table 46.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/19/2011 7:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/19/2011 8:00	0.508	0.032	0.021	0.032	0.043	0.032	0.000	0.021	0.011	0.011	0.896	0.886	0.896	0.758	0.758	0.800
5/19/2011 9:00	0	0.021	0.021	0.021	0.000	0.021	0.011	0.021	0.000	0.000	0.566	0.566	0.544	0.501	0.523	0.544
5/19/2011 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.011	0.011	0.000	0.011	0.011
Totals (mm)	1.270	0.053	0.043	0.053	0.043	0.053	0.011	0.043	0.011	0.011	1.483	1.462	1.451	1.259	1.291	1.355

Data from rain event on 5/19/2011.

Table 47.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/21/2011 21:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.117	0.117	0.160	0.043	0.000	0.011
5/21/2011 22:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.171	0.171	0.171	0.149	0.117	0.160
5/21/2011 23:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.256	0.224	0.267	0.235	0.192	0.245
5/22/2011 0:00	0.254	0.011	0.021	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.864	0.832	0.886	0.768	0.694	0.790
5/22/2011 1:00	0	0.011	0.011	0.011	0.000	0.011	0.000	0.011	0.000	0.000	0.320	0.331	0.331	0.288	0.256	0.320
5/22/2011 2:00	0	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.011	0.032	0.011	0.000	0.011	0.011
5/22/2011 3:00	0.254	0.000	0.011	0.000	0.000	0.011	0.000	0.011	0.000	0.011	0.160	0.149	0.171	0.149	0.128	0.160
5/22/2011 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.021	0.021	0.021	0.011	0.021
5/22/2011 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.011	0.000	0.000	0.000
5/22/2011 6:00	2.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.011
5/22/2011 7:00	0	0.021	0.021	0.011	0.011	0.000	0.011	0.000	0.000	0.000	1.739	1.686	1.782	1.558	1.558	1.675
5/22/2011 8:00	0.254	0.011	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.021	0.011	0.021	0.011	0.000	0.021
5/22/2011 9:00	0	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.011
5/22/2011 10:00	0	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000
5/22/2011 11:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
5/22/2011 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	4.318	0.128	0.064	0.032	0.053	0.043	0.011	0.021	0.000	0.032	3.702	3.628	3.831	3.233	2.977	3.436

Data from rain event on 5/21/2011.

Table 48.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/25/2011 16:00	1.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.096	0.117	0.000	0.000	0.000
5/25/2011 17:00	1.016	0.043	0.043	0.000	0.032	0.032	0.000	0.021	0.000	0.021	1.472	0.992	1.515	1.366	1.291	1.195
5/25/2011 18:00	1.27	0.053	0.032	0.011	0.043	0.043	0.011	0.032	0.021	0.011	0.992	1.142	0.982	0.886	0.854	0.822
5/25/2011 19:00	1.016	0.128	0.128	0.000	0.043	0.053	0.032	0.096	0.181	0.160	1.270	1.056	1.216	1.174	1.067	1.152
5/25/2011 20:00	0	0.544	0.469	0.000	0.053	0.064	0.032	0.352	0.395	0.437	1.334	1.035	1.216	1.120	1.067	1.131
5/25/2011 21:00	2.032	0.405	0.437	0.000	0.011	0.064	0.000	0.256	0.288	0.288	0.117	0.779	0.107	0.064	0.064	0.096
5/25/2011 22:00	2.54	0.544	0.598	0.000	0.075	0.267	0.053	0.352	0.331	0.416	2.070	0.790	2.145	1.782	1.771	1.953
5/25/2011 23:00	0.762	1.814	1.729	0.096	0.598	0.822	0.544	0.960	0.928	1.195	3.244	1.387	3.372	2.796	2.657	3.116
5/26/2011 0:00	0	1.995	1.814	0.128	1.195	0.939	1.867	1.120	1.142	1.451	1.078	1.195	1.067	0.843	0.854	1.088
5/26/2011 1:00	0	1.451	1.248	0.096	1.099	1.120	1.366	1.046	1.195	1.312	0.192	1.014	0.181	0.117	0.128	0.192
5/26/2011 2:00	0	0.896	0.779	0.299	0.726	0.896	0.779	0.800	0.928	0.918	0.011	0.768	0.011	0.011	0.011	0.011
5/26/2011 3:00	0	0.598	0.534	1.750	0.512	0.651	0.501	0.598	0.694	0.630	0.011	0.534	0.011	0.000	0.000	0.011
5/26/2011 4:00	0	0.416	0.395	1.398	0.363	0.491	0.341	0.469	0.512	0.469	0.000	0.117	0.000	0.000	0.000	0.000
5/26/2011 5:00	0	0.299	0.288	0.160	0.267	0.373	0.245	0.363	0.384	0.341	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 6:00	0	0.213	0.224	0.352	0.213	0.288	0.192	0.288	0.309	0.277	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 7:00	0	0.181	0.181	0.224	0.171	0.245	0.139	0.235	0.235	0.224	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 8:00	0	0.149	0.149	0.149	0.139	0.192	0.117	0.213	0.192	0.181	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 9:00	0	0.117	0.128	0.139	0.107	0.160	0.107	0.181	0.160	0.160	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 10:00	0	0.107	0.107	0.107	0.096	0.139	0.075	0.149	0.149	0.117	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 11:00	0	0.075	0.096	0.085	0.075	0.117	0.064	0.128	0.128	0.117	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 12:00	0	0.064	0.064	0.053	0.053	0.085	0.043	0.107	0.117	0.096	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 13:00	0	0.043	0.043	0.043	0.021	0.075	0.043	0.085	0.085	0.085	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 14:00	0	0.032	0.032	0.011	0.000	0.043	0.021	0.053	0.075	0.064	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 15:00	0	0.021	0.011	0.011	0.000	0.032	0.011	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 16:00	0	0.011	0.011	0.000	0.000	0.021	0.011	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 17:00	0	0.011	0.000	0.000	0.000	0.011	0.000	0.011	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
5/26/2011 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	10.160	10.211	9.539	5.111	5.890	7.224	6.594	8.003	8.579	9.091	11.854	10.905	11.940	10.158	9.763	10.766

Data from rain event on 5/25/2011.

Table 49.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
5/31/2011 18:00	7.112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5/31/2011 19:00	0.508	0.011	0.000	0.000	0.011	0.043	0.000	0.021	0.000	0.021	3.254	3.201	3.596	3.158	0.053	3.468
5/31/2011 20:00	0	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.341	0.918	0.373	0.277	0.128	0.341
5/31/2011 21:00	0	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.021	0.000
5/31/2011 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011
5/31/2011 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.011
Totals (mm)	7.620	0.245	0.000	0.000	0.011	0.043	0.000	0.021	0.011	0.021	3.606	4.129	3.969	3.436	0.203	3.831

Data from rain event on 5/31/2011.

Table 50.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/8/2011 8:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/8/2011 9:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.149	0.160	0.181	0.043	0.000	0.053
6/8/2011 10:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.043	0.032	0.000	0.000	0.000
6/8/2011 11:00	2.794	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000
6/8/2011 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.017	0.715	2.145	1.857	0.075	2.059
6/8/2011 13:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.608	0.021	0.011	0.011	0.021
6/8/2011 14:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.341	0.000	0.000	0.000	0.000
6/8/2011 15:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.096	0.235	0.117	0.011	0.000	0.011
6/8/2011 16:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.160	0.160	0.171	0.117	0.000	0.117
6/8/2011 17:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.000	0.000	0.000	0.000
6/8/2011 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000	0.000	0.011
6/8/2011 19:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000
6/8/2011 20:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.000
6/8/2011 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.011	0.000
6/8/2011 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000
6/8/2011 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000
6/9/2011 0:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000
Totals (mm)	3.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.465	2.785	2.678	2.038	0.096	2.273

Data from rain event on 6/8/2011.

Table 51.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/11/2011 5:00	11.18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
6/11/2011 6:00	6.858	4.055	3.574	0.160	2.732	3.180	2.742	1.729	1.216	1.697	10.137	0.021	10.040	9.987	0.000	10.297
6/11/2011 7:00	2.794	8.355	7.928	0.064	6.679	6.978	6.882	6.615	6.626	6.903	6.903	0.021	7.010	6.594	0.032	7.266
6/11/2011 8:00	0	3.884	3.841	0.064	3.329	3.468	3.489	3.617	3.468	3.628	3.212	0.021	3.372	2.849	0.203	3.126
6/11/2011 9:00	0	0.683	0.822	0.021	0.768	0.886	0.886	0.918	0.950	0.886	0.021	0.011	0.011	0.000	0.011	0.021
6/11/2011 10:00	0	0.224	0.309	0.011	0.299	0.341	0.352	0.395	0.416	0.363	0.011	0.021	0.011	0.000	0.000	0.011
6/11/2011 11:00	0	0.085	0.171	0.011	0.160	0.192	0.192	0.224	0.245	0.203	0.011	0.021	0.000	0.000	0.011	0.000
6/11/2011 12:00	0	0.043	0.096	0.011	0.096	0.128	0.117	0.128	0.160	0.128	0.000	0.021	0.000	0.021	0.000	0.000
6/11/2011 13:00	0	0.000	0.053	0.000	0.053	0.075	0.075	0.085	0.107	0.075	0.000	0.011	0.000	0.000	0.000	0.000
6/11/2011 14:00	0	0.000	0.032	0.000	0.021	0.043	0.032	0.043	0.064	0.053	0.000	0.021	0.000	0.000	0.000	0.000
6/11/2011 15:00	0	0.000	0.011	0.000	0.011	0.021	0.011	0.021	0.032	0.021	0.000	0.021	0.000	0.000	0.000	0.000
6/11/2011 16:00	0	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000
6/11/2011 17:00	0	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000
6/11/2011 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.021	0.000	0.000	0.000	0.000
Totals (mm)	20.832	17.328	16.848	0.341	14.148	15.333	14.778	13.775	13.316	13.988	20.294	0.245	20.444	19.451	0.256	20.721

Data from rain event on 6/11/2011.

Table 52.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/15/2011 23:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
6/16/2011 0:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.822	0.011	0.907	0.704	0.000	0.608
6/16/2011 1:00	0.508	0.021	0.021	0.000	0.011	0.021	0.000	0.011	0.000	0.000	0.822	0.043	0.864	0.747	0.000	0.768
6/16/2011 2:00	1.524	0.011	0.021	0.000	0.021	0.000	0.000	0.011	0.000	0.011	0.501	0.043	0.523	0.459	0.000	0.469
6/16/2011 3:00	0	0.053	0.053	0.000	0.032	0.043	0.000	0.032	0.011	0.021	1.323	0.032	1.376	1.216	0.000	1.227
6/16/2011 4:00	0	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.053	0.032	0.032	0.021	0.000	0.032
6/16/2011 5:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.032	0.053	0.021	0.000	0.032
6/16/2011 6:00	1.27	0.011	0.021	0.000	0.011	0.011	0.011	0.000	0.000	0.000	0.598	0.032	0.576	0.534	0.000	0.523
6/16/2011 7:00	1.016	0.043	0.043	0.000	0.043	0.032	0.011	0.032	0.011	0.021	1.323	0.021	1.334	1.227	0.011	1.312
6/16/2011 8:00	0.254	0.096	0.032	0.000	0.032	0.032	0.011	0.021	0.011	0.011	1.003	0.021	1.046	0.907	0.011	0.950
6/16/2011 9:00	0.762	0.384	0.011	0.000	0.011	0.011	0.000	0.011	0.000	0.011	0.341	0.011	0.331	0.288	0.000	0.331
6/16/2011 10:00	0	0.480	0.181	0.000	0.021	0.021	0.011	0.021	0.011	0.011	0.640	0.021	0.662	0.566	0.021	0.598
6/16/2011 11:00	0	0.224	0.309	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.021	0.021	0.011	0.000	0.011
6/16/2011 12:00	0	0.085	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
6/16/2011 13:00	0	0.011	0.096	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
6/16/2011 14:00	0	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
Totals (mm)	7.620	1.419	1.014	0.000	0.192	0.171	0.043	0.139	0.043	0.085	7.490	0.363	7.725	6.701	0.043	6.861

Data from rain event on 6/15/2011.

Table 53.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/19/2011 11:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20/2011 0:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20/2011 1:00	3.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.672	0.672	0.704	0.544	0.000	0.459
6/20/2011 2:00	0	0.075	0.107	0.075	0.053	0.075	0.075	0.053	0.021	0.064	3.393	3.233	3.425	3.158	0.011	3.212
6/20/2011 3:00	0	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.053	0.064	0.021	0.000	0.053
6/20/2011 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.043	0.043	0.021	0.000	0.032
Totals (mm)	4.064	0.085	0.107	0.075	0.053	0.075	0.075	0.053	0.021	0.064	4.151	4.001	4.236	3.745	0.011	3.756

Data from rain event on 6/19/2011.

Table 54.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/20/2011 15:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20/2011 16:00	0	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.491	0.459	0.523	0.405	0.000	0.352
6/20/2011 17:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
6/20/2011 18:00	0	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20/2011 19:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20/2011 20:00	0	0.011	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.843	0.811	0.918	0.736	0.000	0.704
6/20/2011 21:00	0	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.096	0.064	0.053	0.053	0.000	0.064
6/20/2011 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
6/20/2011 23:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000
6/21/2011 0:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.043	0.053	0.000	0.000	0.021
6/21/2011 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.075	0.075	0.064	0.000	0.064
6/21/2011 2:00	0.254	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.203	0.192	0.224	0.192	0.000	0.203
6/21/2011 3:00	0	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.053	0.053	0.053	0.043	0.000	0.032
6/21/2011 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.011	0.021
Totals (mm)	2.286	0.011	0.043	0.032	0.011	0.021	0.011	0.000	0.000	0.000	1.825	1.729	1.910	1.504	0.021	1.462

Data from rain event on 6/20/2011.

Table 55.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
6/21/2011 10:00	3.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.128	0.160	0.139	0.043	0.000	0.053
6/21/2011 11:00	0	0.928	0.480	0.405	0.053	0.064	0.064	0.043	0.021	0.000	3.073	2.753	2.924	2.753	0.021	2.849
6/21/2011 12:00	0	0.566	0.608	0.555	0.000	0.000	0.000	0.000	0.011	0.000	0.021	0.011	0.011	0.000	0.000	0.011
6/21/2011 13:00	0	0.203	0.267	0.256	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.011
6/21/2011 14:00	0	0.075	0.128	0.128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/21/2011 15:00	0	0.021	0.053	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/21/2011 16:00	0.254	0.011	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/21/2011 17:00	1.016	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.235	0.277	0.299	0.149	0.011	0.128
6/21/2011 18:00	0	0.256	0.203	0.203	0.032	0.032	0.032	0.032	0.032	0.000	0.822	0.683	0.715	0.726	0.000	0.704
6/21/2011 19:00	0	0.117	0.149	0.160	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
6/21/2011 20:00	0	0.053	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
6/21/2011 21:00	5.08	0.032	0.053	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.149	0.171	0.203	0.053	0.011	0.043
6/21/2011 22:00	2.032	1.558	1.483	1.238	0.043	0.075	0.096	0.053	0.011	0.032	4.695	4.385	4.524	4.311	0.011	4.791
6/21/2011 23:00	0	3.233	3.777	3.841	2.358	2.283	2.988	2.262	2.475	2.390	2.081	1.899	1.963	1.803	0.064	2.155
6/22/2011 0:00	0	0.939	0.971	0.971	0.982	1.216	1.024	1.014	1.088	1.003	0.032	0.021	0.011	0.011	0.011	0.021
6/22/2011 1:00	0	0.416	0.448	0.416	0.437	0.566	0.480	0.459	0.512	0.469	0.011	0.011	0.011	0.000	0.000	0.011
6/22/2011 2:00	1.524	0.245	0.245	0.235	0.267	0.352	0.288	0.288	0.309	0.299	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2011 3:00	1.27	0.672	0.608	0.555	0.309	0.363	0.373	0.341	0.309	0.320	1.536	1.483	1.547	1.430	0.000	1.472
6/22/2011 4:00	0.254	1.035	1.078	1.035	0.640	0.726	0.694	0.726	0.576	0.683	1.142	1.035	1.099	1.046	0.000	1.067
6/22/2011 5:00	0.762	0.907	1.003	0.971	0.832	0.939	0.822	0.896	0.800	0.854	0.437	0.405	0.405	0.363	0.000	0.395
6/22/2011 6:00	0	0.672	0.715	0.683	0.651	0.758	0.651	0.630	0.619	0.619	0.662	0.630	0.651	0.587	0.000	0.640
6/22/2011 7:00	0	0.651	0.704	0.672	0.608	0.736	0.619	0.619	0.587	0.608	0.203	0.181	0.192	0.181	0.011	0.224
6/22/2011 8:00	0	0.363	0.395	0.395	0.448	0.555	0.437	0.437	0.437	0.437	0.021	0.021	0.011	0.000	0.000	0.011
6/22/2011 9:00	0	0.235	0.267	0.256	0.320	0.373	0.309	0.309	0.309	0.299	0.021	0.000	0.011	0.011	0.000	0.011
6/22/2011 10:00	0	0.171	0.181	0.181	0.213	0.267	0.224	0.213	0.224	0.235	0.000	0.011	0.000	0.000	0.011	0.011
6/22/2011 11:00	0	0.128	0.139	0.128	0.181	0.213	0.171	0.171	0.192	0.181	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2011 12:00	0	0.085	0.085	0.096	0.117	0.160	0.139	0.117	0.149	0.149	0.011	0.000	0.000	0.000	0.000	0.000
6/22/2011 13:00	9.14	0.032	0.053	0.053	0.085	0.117	0.085	0.085	0.117	0.096	0.000	0.000	0.000	0.000	0.000	0.000
6/22/2011 14:00	3.556	0.736	0.576	0.491	0.320	0.299	0.267	0.171	0.160	0.373	3.222	3.542	3.265	3.062	0.000	0.939
6/22/2011 15:00	0	8.003	8.547	8.632	8.547	8.973	9.048	9.134	9.432	8.973	4.951	4.812	4.908	4.663	0.000	4.898
6/22/2011 16:00	0.254	1.387	1.366	1.387	1.440	1.697	1.430	1.451	1.718	1.355	0.021	0.011	0.021	0.011	0.000	0.021
6/22/2011 17:00	0	0.608	0.576	0.566	0.630	0.811	0.630	0.630	0.779	0.598	0.160	0.171	0.171	0.053	0.000	0.043
6/22/2011 18:00	8.64	0.331	0.341	0.320	0.352	0.469	0.363	0.363	0.459	0.384	0.011	0.011	0.011	0.000	0.000	0.000
6/22/2011 19:00	1.016	5.271	5.826	5.922	4.983	4.972	5.367	5.260	3.969	5.196	7.682	7.277	7.821	6.925	0.000	7.736
6/22/2011 20:00	0.508	2.454	2.358	2.390	2.358	2.571	2.305	2.390	4.183	2.273	0.928	0.896	0.960	0.736	0.000	0.939
6/22/2011 21:00	0.254	1.280	1.248	1.216	1.184	1.387	1.184	1.195	1.558	1.131	0.587	0.544	0.608	0.427	0.000	0.555

Table 55 (cont'd)

6/22/2011 22:00	0	0.822	0.811	0.811	0.790	0.950	0.790	0.779	0.950	0.768	0.277	0.245	0.235	0.203	0.011	0.256
6/22/2011 23:00	0.254	0.491	0.480	0.448	0.491	0.619	0.501	0.501	0.598	0.512	0.021	0.021	0.021	0.000	0.000	0.021
6/23/2011 0:00	2.032	0.352	0.320	0.320	0.341	0.416	0.341	0.341	0.405	0.341	0.075	0.085	0.107	0.043	0.011	0.064
6/23/2011 1:00	0	1.088	1.056	1.046	0.683	0.758	0.768	0.736	0.800	0.736	2.113	2.059	2.123	1.857	0.064	2.113
6/23/2011 2:00	2.54	0.672	0.736	0.747	0.736	0.822	0.704	0.694	0.800	0.662	0.192	0.181	0.192	0.149	0.032	0.203
6/23/2011 3:00	2.286	1.056	1.035	1.014	0.736	0.822	0.800	0.758	0.800	0.758	2.187	2.187	2.283	1.910	0.053	2.283
6/23/2011 4:00	2.286	2.689	3.105	3.180	2.870	2.913	2.977	2.849	2.187	2.785	2.465	2.369	2.486	2.123	0.171	2.614
6/23/2011 5:00	4.318	1.665	1.579	1.601	1.483	1.686	1.526	1.515	2.294	1.451	2.081	2.006	2.113	1.771	0.064	2.177
6/23/2011 6:00	0.508	3.927	4.289	4.257	3.638	3.670	3.831	3.670	2.187	3.564	4.439	4.247	4.449	3.767	0.309	4.620
6/23/2011 7:00	0.254	2.646	2.529	2.678	2.924	3.169	2.838	2.913	2.593	2.806	0.480	0.448	0.480	0.341	0.192	0.501
6/23/2011 8:00	0.762	1.056	0.939	0.896	0.971	1.216	0.960	0.971	2.166	0.960	0.309	0.288	0.341	0.235	0.021	0.309
6/23/2011 9:00	1.27	0.790	0.726	0.694	0.630	0.790	0.672	0.640	1.547	0.662	0.480	0.469	0.491	0.363	0.032	0.491
6/23/2011 10:00	0	1.174	1.163	1.152	0.896	1.035	0.971	0.918	1.078	0.907	1.504	1.430	1.494	1.216	0.085	1.568
6/23/2011 11:00	0	0.662	0.747	0.715	0.790	0.960	0.800	0.747	0.982	0.768	0.032	0.032	0.011	0.011	0.000	0.021
6/23/2011 12:00	0	0.427	0.427	0.405	0.480	0.566	0.501	0.480	0.576	0.523	0.011	0.000	0.000	0.000	0.011	0.000
6/23/2011 13:00	0	0.288	0.267	0.277	0.320	0.427	0.341	0.341	0.395	0.352	0.000	0.000	0.000	0.000	0.000	0.011
6/23/2011 14:00	0	0.171	0.203	0.181	0.213	0.277	0.224	0.224	0.277	0.245	0.000	0.011	0.011	0.000	0.000	0.000
6/23/2011 15:00	0.254	0.107	0.107	0.096	0.117	0.192	0.139	0.149	0.192	0.181	0.000	0.000	0.000	0.000	0.000	0.000
6/23/2011 16:00	0	0.085	0.096	0.085	0.107	0.139	0.096	0.107	0.149	0.128	0.149	0.149	0.160	0.021	0.000	0.021
6/23/2011 17:00	0	0.032	0.043	0.021	0.032	0.107	0.075	0.085	0.107	0.107	0.011	0.011	0.000	0.000	0.000	0.000
6/23/2011 18:00	0	0.011	0.021	0.000	0.032	0.075	0.053	0.043	0.075	0.064	0.000	0.000	0.000	0.000	0.000	0.000
6/23/2011 19:00	0	0.011	0.000	0.000	0.000	0.053	0.032	0.021	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
6/23/2011 20:00	0	0.000	0.000	0.000	0.000	0.032	0.021	0.021	0.032	0.032	0.000	0.000	0.000	0.000	0.011	0.000
6/23/2011 21:00	0	0.000	0.000	0.000	0.011	0.032	0.021	0.011	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
6/23/2011 22:00	0	0.000	0.000	0.000	0.000	0.021	0.011	0.011	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
6/23/2011 23:00	0	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
6/24/2011 0:00	0	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	55.880	53.905	55.719	55.228	47.695	52.763	50.096	48.826	52.358	48.388	49.690	47.652	49.477	43.363	1.216	47.012

Data from rain event on 6/22/2011.

Table 56.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
7/18/2011 0:00	3.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/18/2011 1:00	9.91	0.256	0.245	0.320	0.160	0.309	0.117	0.096	0.064	0.203	2.892	3.052	2.828	2.582	0.000	2.603
7/18/2011 2:00	0.254	8.387	9.635	9.795	7.394	8.291	8.088	6.135	0.928	7.117	9.411	9.848	8.931	9.208	0.000	9.336
7/18/2011 3:00	0	1.408	1.206	1.398	1.003	1.163	1.142	1.014	0.331	0.896	0.320	0.235	0.267	0.267	0.000	0.309
7/18/2011 4:00	0	0.534	0.469	0.534	0.331	0.427	0.405	0.331	0.181	0.320	0.011	0.011	0.011	0.011	0.000	0.021
7/18/2011 5:00	0	0.299	0.224	0.277	0.139	0.149	0.181	0.149	0.117	0.117	0.021	0.011	0.011	0.000	0.000	0.011
7/18/2011 6:00	0	0.181	0.139	0.192	0.064	0.075	0.096	0.075	0.064	0.053	0.011	0.011	0.021	0.000	0.000	0.011
7/18/2011 7:00	0	0.117	0.096	0.117	0.021	0.053	0.053	0.032	0.032	0.011	0.011	0.021	0.011	0.011	0.000	0.011
7/18/2011 8:00	0	0.085	0.075	0.085	0.021	0.011	0.032	0.021	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.011
7/18/2011 9:00	0	0.053	0.053	0.064	0.000	0.011	0.011	0.000	0.011	0.011	0.000	0.011	0.000	0.000	0.000	0.000
7/18/2011 10:00	0	0.053	0.043	0.032	0.000	0.021	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/18/2011 11:00	0	0.011	0.032	0.011	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/18/2011 12:00	0.508	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/18/2011 13:00	0	0.032	0.043	0.043	0.011	0.011	0.011	0.000	0.011	0.000	0.469	0.427	0.512	0.384	0.000	0.341
7/18/2011 14:00	0	0.032	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
7/18/2011 15:00	0	0.000	0.011	0.011	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	14.228	11.460	12.303	12.879	9.144	10.531	10.147	7.853	1.803	8.739	13.156	13.636	12.591	12.463	0.000	12.655

Data from rain event on 7/18/2011.

Table 57.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/2/2011 11:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
8/2/2011 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.224	0.267	0.277	0.096	0.000	0.085
8/2/2011 13:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.043	0.053	0.043	0.000	0.053
8/2/2011 14:00	16.51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000
8/2/2011 15:00	0	8.451	8.408	8.344	7.480	0.000	7.672	5.250	6.263	6.519	12.793	13.359	13.113	12.804	0.000	13.135
8/2/2011 16:00	0	2.209	1.665	2.209	1.515	0.000	1.803	2.145	2.006	1.729	0.032	0.021	0.011	0.011	0.000	0.032
8/2/2011 17:00	0	0.598	0.491	0.640	0.320	0.000	0.416	0.566	0.501	0.469	0.011	0.011	0.011	0.011	0.000	0.000
8/2/2011 18:00	0	0.277	0.213	0.331	0.128	0.000	0.181	0.309	0.256	0.235	0.000	0.000	0.000	0.000	0.000	0.000
8/2/2011 19:00	0	0.160	0.128	0.192	0.043	0.000	0.064	0.171	0.149	0.117	0.000	0.000	0.011	0.000	0.000	0.000
8/2/2011 20:00	0	0.096	0.064	0.128	0.011	0.011	0.043	0.117	0.096	0.075	0.011	0.011	0.011	0.000	0.000	0.000
8/2/2011 21:00	0.508	0.053	0.032	0.085	0.000	0.171	0.011	0.075	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
8/2/2011 22:00	0.254	0.203	0.203	0.192	0.021	0.139	0.011	0.096	0.053	0.064	0.758	0.726	0.736	0.587	0.000	0.566
8/2/2011 23:00	0	0.128	0.107	0.139	0.000	0.043	0.021	0.085	0.053	0.053	0.096	0.107	0.107	0.075	0.000	0.096
8/3/2011 0:00	0	0.096	0.064	0.107	0.000	0.011	0.011	0.064	0.043	0.032	0.021	0.000	0.011	0.011	0.000	0.021
8/3/2011 1:00	0	0.053	0.053	0.064	0.000	0.011	0.011	0.043	0.021	0.021	0.011	0.011	0.011	0.011	0.000	0.011
8/3/2011 2:00	0.508	0.043	0.032	0.053	0.000	0.000	0.011	0.032	0.011	0.021	0.011	0.011	0.000	0.000	0.000	0.011
8/3/2011 3:00	0	0.192	0.171	0.171	0.011	0.011	0.021	0.096	0.043	0.043	0.587	0.576	0.587	0.544	0.000	0.523
8/3/2011 4:00	0	0.096	0.096	0.117	0.000	0.000	0.043	0.075	0.053	0.053	0.021	0.000	0.011	0.011	0.000	0.011
8/3/2011 5:00	0	0.075	0.043	0.075	0.011	0.000	0.021	0.043	0.032	0.021	0.011	0.011	0.000	0.000	0.000	0.011
8/3/2011 6:00	0	0.043	0.043	0.053	0.000	0.000	0.021	0.021	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000
8/3/2011 7:00	0	0.032	0.021	0.032	0.000	0.000	0.011	0.021	0.011	0.011	0.011	0.000	0.011	0.000	0.000	0.000
8/3/2011 8:00	0	0.032	0.021	0.032	0.000	0.000	0.011	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
8/3/2011 9:00	0	0.011	0.011	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/3/2011 10:00	0	0.011	0.000	0.021	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
Totals (mm)	18.034	12.857	11.865	13.007	9.539	0.395	10.393	9.240	9.667	9.539	14.682	15.173	14.970	14.202	0.000	14.554

Data from rain event on 8/2/2011.

Table 58.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/12/2011 13:00	13.46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 14:00	0	3.116	3.468	3.340	2.102	0.000	1.846	1.408	1.035	1.430	11.268	11.204	11.332	10.745	0.000	11.107
8/12/2011 15:00	0	3.873	3.340	4.215	3.126	0.000	3.009	4.898	4.588	4.055	0.064	0.043	0.053	0.043	0.000	0.064
8/12/2011 16:00	0	1.035	0.736	0.928	0.694	0.000	0.694	1.035	0.950	0.843	0.011	0.000	0.000	0.011	0.000	0.000
8/12/2011 17:00	0	0.491	0.299	0.437	0.299	0.000	0.299	0.534	0.480	0.416	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 18:00	0	0.245	0.139	0.235	0.149	0.000	0.149	0.341	0.267	0.245	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 19:00	0	0.128	0.064	0.128	0.064	0.000	0.075	0.213	0.181	0.149	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 20:00	0	0.096	0.032	0.075	0.043	0.000	0.053	0.160	0.107	0.107	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 21:00	0	0.064	0.032	0.053	0.021	0.000	0.032	0.107	0.085	0.075	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 22:00	0	0.043	0.011	0.032	0.011	0.000	0.032	0.085	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
8/12/2011 23:00	0	0.032	0.021	0.032	0.000	0.000	0.021	0.064	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
8/13/2011 0:00	0	0.032	0.011	0.011	0.000	0.011	0.021	0.064	0.043	0.032	0.000	0.000	0.000	0.000	0.000	0.011
Totals (mm)	13.460	9.155	8.152	9.486	6.509	0.011	6.231	8.909	7.842	7.448	11.342	11.246	11.385	10.798	0.000	11.182

Data from rain event on 8/12/2011.

Table 59.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
8/23/2011 17:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/23/2011 18:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.309	0.331	0.181	0.000	0.171
8/23/2011 19:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.800	0.768	0.832	0.747	0.000	0.779
8/23/2011 20:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.309	0.299	0.320	0.267	0.000	0.277
8/23/2011 21:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.011	0.000	0.021
8/23/2011 22:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.011
8/23/2011 23:00	1.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000	0.000	0.000
8/24/2011 0:00	7.62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.864	0.864	0.960	0.758	0.000	0.854
8/24/2011 1:00	3.048	1.067	1.323	0.790	0.032	0.000	0.043	0.000	0.000	0.064	6.455	6.274	6.711	6.338	0.000	7.096
8/24/2011 2:00	0.254	1.878	1.761	1.921	0.160	0.000	0.256	0.000	0.000	0.107	3.009	2.924	3.030	2.689	0.000	3.041
8/24/2011 3:00	0	1.867	1.558	2.155	1.462	0.000	1.408	0.640	0.128	0.160	0.117	0.075	0.085	0.053	0.000	0.107
8/24/2011 4:00	0	0.715	0.437	0.864	0.566	0.000	0.587	0.768	0.566	0.395	0.011	0.011	0.011	0.000	0.000	0.011
8/24/2011 5:00	0	0.395	0.213	0.491	0.288	0.000	0.341	0.501	0.427	0.352	0.000	0.000	0.000	0.000	0.000	0.011
8/24/2011 6:00	0	0.245	0.117	0.309	0.181	0.000	0.203	0.363	0.299	0.256	0.011	0.011	0.000	0.000	0.000	0.011
8/24/2011 7:00	0	0.181	0.096	0.213	0.117	0.000	0.139	0.267	0.235	0.192	0.000	0.000	0.011	0.011	0.000	0.000
8/24/2011 8:00	0	0.139	0.064	0.171	0.075	0.000	0.107	0.224	0.160	0.149	0.000	0.000	0.000	0.000	0.000	0.000
8/24/2011 9:00	0	0.107	0.053	0.117	0.064	0.000	0.075	0.181	0.139	0.128	0.000	0.000	0.000	0.000	0.000	0.011
8/24/2011 10:00	0	0.096	0.032	0.107	0.043	0.000	0.064	0.149	0.117	0.096	0.000	0.000	0.000	0.000	0.000	0.011
8/24/2011 11:00	0	0.075	0.032	0.096	0.043	0.000	0.043	0.139	0.107	0.085	0.011	0.000	0.000	0.000	0.000	0.000
8/24/2011 12:00	0	0.053	0.011	0.075	0.011	0.000	0.032	0.107	0.064	0.064	0.000	0.000	0.000	0.000	0.000	0.000
8/24/2011 13:00	0	0.043	0.011	0.043	0.011	0.000	0.032	0.107	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
8/24/2011 14:00	0	0.021	0.000	0.043	0.011	0.000	0.011	0.075	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	13.716	6.882	5.708	7.394	3.062	0.000	3.340	3.521	2.358	2.155	11.940	11.556	12.303	11.054	0.000	12.409

Data from rain event on 8/23/2011.

Table 60.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/2/2011 23:00	3.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 0:00	0.254	0.000	0.000	0.000	0.117	0.043	0.075	0.000	0.000	0.000	3.116	3.116	3.158	3.020	0.000	3.116
9/3/2011 1:00	0	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.011	0.075	0.053	0.064	0.053	0.000	0.085
9/3/2011 2:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.011	0.000	0.021
9/3/2011 3:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.011
9/3/2011 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
9/3/2011 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
9/3/2011 6:00	0.508	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 7:00	0.762	0.011	0.011	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.608	0.630	0.640	0.512	0.000	0.480
9/3/2011 8:00	0	0.021	0.011	0.075	0.011	0.021	0.000	0.000	0.000	0.011	0.758	0.694	0.790	0.704	0.000	0.779
9/3/2011 9:00	3.048	0.085	0.000	0.160	0.000	0.021	0.000	0.000	0.000	0.000	0.032	0.021	0.021	0.011	0.000	0.032
9/3/2011 10:00	0.254	1.259	0.875	1.014	0.053	0.128	0.139	0.032	0.000	0.160	3.340	3.340	3.308	3.030	0.000	3.340
9/3/2011 11:00	0	0.971	0.779	0.864	0.000	0.000	0.021	0.011	0.000	0.032	0.235	0.213	0.256	0.203	0.000	0.277
9/3/2011 12:00	0	0.373	0.245	0.427	0.000	0.000	0.000	0.011	0.000	0.000	0.021	0.011	0.021	0.011	0.000	0.021
9/3/2011 13:00	0	0.213	0.096	0.256	0.000	0.032	0.000	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011
9/3/2011 14:00	0	0.128	0.043	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
9/3/2011 15:00	0	0.096	0.021	0.139	0.000	0.032	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 16:00	0	0.064	0.011	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 17:00	0	0.032	0.000	0.043	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 18:00	0	0.021	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 19:00	0	0.011	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 20:00	0	0.011	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	8.382	3.297	2.091	3.318	0.203	0.405	0.245	0.075	0.000	0.213	8.227	8.099	8.280	7.554	0.000	8.173

Data from rain event on 9/2/2011.

Table 61.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/3/2011 22:00	14.22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3/2011 23:00	0	7.714	8.536	8.195	7.149	7.821	7.618	5.965	6.573	6.167	8.824	8.803	8.888	8.131	0.000	9.048
9/4/2011 0:00	0.254	2.241	1.867	2.305	2.091	2.486	2.145	2.678	2.198	2.113	0.235	0.203	0.235	0.181	0.000	0.235
9/4/2011 1:00	0	0.896	0.704	0.907	0.790	0.939	0.822	1.046	0.811	0.800	0.085	0.064	0.075	0.064	0.000	0.085
9/4/2011 2:00	0	0.512	0.373	0.523	0.448	0.534	0.459	0.598	0.480	0.480	0.021	0.011	0.000	0.011	0.000	0.021
9/4/2011 3:00	0	0.341	0.235	0.341	0.277	0.331	0.288	0.427	0.309	0.331	0.000	0.011	0.011	0.000	0.000	0.011
9/4/2011 4:00	0	0.235	0.160	0.256	0.181	0.235	0.203	0.299	0.213	0.224	0.000	0.000	0.011	0.000	0.000	0.000
9/4/2011 5:00	0	0.171	0.128	0.192	0.139	0.171	0.149	0.245	0.171	0.171	0.011	0.000	0.000	0.000	0.000	0.011
9/4/2011 6:00	0	0.107	0.096	0.128	0.096	0.117	0.107	0.181	0.117	0.128	0.000	0.000	0.000	0.011	0.000	0.000
9/4/2011 7:00	0	0.075	0.053	0.107	0.075	0.096	0.075	0.149	0.096	0.096	0.000	0.011	0.000	0.000	0.000	0.000
9/4/2011 8:00	0	0.064	0.053	0.085	0.043	0.075	0.053	0.117	0.075	0.075	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 9:00	0	0.053	0.043	0.064	0.043	0.053	0.053	0.096	0.053	0.064	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 10:00	0	0.043	0.032	0.053	0.043	0.043	0.032	0.075	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 11:00	0	0.021	0.011	0.053	0.011	0.032	0.032	0.064	0.021	0.032	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 12:00	0	0.021	0.011	0.021	0.011	0.021	0.011	0.053	0.021	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 13:00	0	0.000	0.000	0.011	0.000	0.011	0.011	0.032	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/4/2011 14:00	0	0.011	0.000	0.011	0.011	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	14.474	12.505	12.303	13.252	11.406	12.964	12.057	12.057	11.193	10.745	9.176	9.102	9.219	8.397	0.000	9.411

Data from rain event on 9/3/2011.

Table 62.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/15/2011 0:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2011 1:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.341	0.331	0.352	0.224	0.000	0.203
9/15/2011 2:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.032	0.043	0.032	0.000	0.043
9/15/2011 3:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.011
9/15/2011 4:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
9/15/2011 5:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2011 6:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15/2011 7:00	0.762	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.213	0.213	0.213	0.117	0.000	0.096
9/15/2011 8:00	0	0.011	0.000	0.011	0.011	0.032	0.000	0.000	0.000	0.000	0.768	0.768	0.758	0.694	0.000	0.726
9/15/2011 9:00	0	0.011	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.011	0.032	0.021	0.021	0.021	0.000	0.032
9/15/2011 10:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.117	0.107	0.053	0.000	0.064
9/15/2011 11:00	0	0.021	0.021	0.064	0.021	0.064	0.021	0.011	0.000	0.043	1.046	0.982	1.003	1.046	0.000	1.003
9/15/2011 12:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.011	0.000	0.000	0.011
9/15/2011 13:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.032	0.011	0.000	0.000	0.000
Totals (mm)	1.778	0.043	0.021	0.075	0.043	0.107	0.032	0.011	0.000	0.053	2.582	2.518	2.518	2.187	0.000	2.187

Data from rain event on 9/15/2011.

Table 63.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/19/2011 0:00	0.762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000
9/19/2011 1:00	1.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.694	0.704	0.779	0.587	0.000	0.566
9/19/2011 2:00	1.27	0.011	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	1.195	1.152	1.280	1.120	0.000	1.099
9/19/2011 3:00	0.762	0.021	0.021	0.011	0.011	0.043	0.011	0.000	0.000	0.000	1.462	1.398	1.536	1.440	0.000	1.440
9/19/2011 4:00	3.302	0.011	0.000	0.000	0.011	0.021	0.000	0.000	0.000	0.000	0.608	0.598	0.651	0.555	0.000	0.576
9/19/2011 5:00	0.508	0.096	0.566	0.053	0.032	0.064	0.075	0.021	0.000	0.096	3.532	3.382	3.606	3.233	0.000	3.660
9/19/2011 6:00	0.508	0.886	0.907	1.067	0.011	0.032	0.011	0.011	0.000	0.021	0.779	0.790	0.832	0.683	0.000	0.811
9/19/2011 7:00	0.762	0.662	0.416	0.768	0.000	0.000	0.011	0.011	0.000	0.011	0.448	0.459	0.480	0.395	0.000	0.459
9/19/2011 8:00	0.254	0.715	0.640	0.811	0.085	0.544	0.320	0.011	0.000	0.043	0.715	0.694	0.779	0.651	0.000	0.779
9/19/2011 9:00	0.508	0.512	0.373	0.608	0.384	0.555	0.405	0.000	0.000	0.000	0.160	0.160	0.171	0.139	0.000	0.160
9/19/2011 10:00	5.588	0.448	0.341	0.491	0.341	0.448	0.352	0.000	0.000	0.011	0.608	0.608	0.672	0.576	0.000	0.619
9/19/2011 11:00	1.27	3.372	4.215	3.478	3.084	2.273	3.372	0.918	1.259	1.601	5.975	5.975	5.943	5.655	0.000	6.327
9/19/2011 12:00	1.27	2.870	2.315	3.062	2.774	3.820	2.732	2.721	2.988	2.913	1.387	1.398	1.408	1.238	0.000	1.419
9/19/2011 13:00	0	2.251	2.209	2.369	2.177	2.668	2.273	2.241	2.134	2.219	1.568	1.515	1.547	1.430	0.000	1.633
9/19/2011 14:00	0	1.184	0.907	1.238	1.099	1.761	1.142	1.579	1.344	1.312	0.149	0.160	0.181	0.107	0.000	0.128
9/19/2011 15:00	0	0.683	0.448	0.683	0.598	0.715	0.598	0.971	0.768	0.790	0.064	0.032	0.043	0.032	0.000	0.053
9/19/2011 16:00	0	0.416	0.277	0.437	0.363	0.459	0.384	0.651	0.501	0.523	0.000	0.000	0.011	0.000	0.000	0.000
9/19/2011 17:00	0	0.277	0.181	0.309	0.245	0.309	0.267	0.469	0.341	0.352	0.000	0.011	0.000	0.011	0.000	0.000
9/19/2011 18:00	0	0.181	0.096	0.203	0.171	0.224	0.181	0.341	0.235	0.256	0.021	0.000	0.000	0.000	0.000	0.000
9/19/2011 19:00	0	0.139	0.064	0.149	0.117	0.160	0.139	0.267	0.181	0.203	0.000	0.000	0.000	0.000	0.000	0.000
9/19/2011 20:00	0.254	0.096	0.043	0.117	0.085	0.117	0.096	0.203	0.139	0.139	0.000	0.000	0.000	0.000	0.000	0.011
9/19/2011 21:00	0	0.064	0.043	0.085	0.064	0.085	0.064	0.171	0.117	0.128	0.000	0.000	0.000	0.000	0.000	0.000
9/19/2011 22:00	0	0.053	0.011	0.064	0.053	0.075	0.053	0.139	0.096	0.096	0.000	0.000	0.000	0.000	0.000	0.000
9/19/2011 23:00	0	0.032	0.021	0.053	0.032	0.053	0.053	0.117	0.075	0.075	0.000	0.000	0.011	0.000	0.000	0.000
9/20/2011 0:00	0	0.032	0.021	0.053	0.032	0.043	0.032	0.096	0.064	0.075	0.000	0.000	0.000	0.000	0.000	0.000
9/20/2011 1:00	0	0.032	0.021	0.043	0.032	0.043	0.032	0.085	0.053	0.064	0.000	0.011	0.021	0.000	0.000	0.000
9/20/2011 2:00	0	0.021	0.011	0.032	0.011	0.032	0.032	0.085	0.053	0.053	0.000	0.032	0.032	0.000	0.000	0.000
9/20/2011 3:00	0	0.032	0.021	0.032	0.011	0.021	0.021	0.064	0.043	0.053	0.021	0.032	0.032	0.000	0.000	0.000
9/20/2011 4:00	0	0.021	0.011	0.032	0.021	0.021	0.032	0.064	0.032	0.043	0.032	0.032	0.032	0.011	0.000	0.011
9/20/2011 5:00	0	0.021	0.011	0.032	0.011	0.021	0.000	0.053	0.043	0.043	0.021	0.032	0.032	0.021	0.000	0.021
9/20/2011 6:00	0	0.021	0.011	0.032	0.011	0.021	0.021	0.043	0.021	0.032	0.043	0.032	0.032	0.021	0.000	0.021
Totals (mm)	18.034	15.162	14.202	16.314	11.865	14.650	12.708	11.332	10.489	11.150	19.483	19.206	20.134	17.904	0.000	19.793

Data from rain event on 9/19/2011.

Table 64.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
9/21/2011 8:00	1.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/21/2011 9:00	0.762	0.011	0.000	0.053	0.000	0.011	0.000	0.011	0.000	0.000	0.960	0.918	1.003	0.843	0.000	0.875
9/21/2011 10:00	0.254	0.277	0.267	0.288	0.043	0.021	0.032	0.128	0.053	0.117	0.832	0.800	0.864	0.758	0.011	0.854
9/21/2011 11:00	0	0.245	0.224	0.245	0.139	0.235	0.128	0.160	0.139	0.139	0.128	0.117	0.149	0.107	0.000	0.128
9/21/2011 12:00	0	0.160	0.149	0.160	0.085	0.139	0.096	0.107	0.107	0.107	0.011	0.011	0.011	0.011	0.000	0.011
9/21/2011 13:00	0	0.107	0.096	0.128	0.085	0.085	0.075	0.085	0.064	0.075	0.011	0.000	0.000	0.000	0.000	0.011
9/21/2011 14:00	0	0.053	0.053	0.064	0.043	0.064	0.064	0.053	0.043	0.043	0.000	0.000	0.000	0.000	0.000	0.000
9/21/2011 15:00	0	0.021	0.021	0.043	0.021	0.032	0.032	0.043	0.032	0.021	0.000	0.000	0.000	0.000	0.000	0.000
9/21/2011 16:00	0	0.000	0.011	0.011	0.011	0.011	0.021	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/21/2011 17:00	0	0.000	0.000	0.011	0.000	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
9/21/2011 18:00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
Totals (mm)	2.286	0.875	0.822	1.003	0.427	0.608	0.459	0.640	0.459	0.523	1.953	1.846	2.027	1.718	0.011	1.878

Data from rain event on 9/21/2011.

Table 65.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/18/2011 19:00	0.254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/18/2011 20:00	1.524	0.021	0.000	0.011	0.000	0.021	0.000	0.011	0.000	0.000	0.768	0.758	0.768	0.598	0.000	0.576
10/18/2011 21:00	0.762	0.096	0.032	0.149	0.043	0.107	0.053	0.053	0.000	0.075	1.814	1.729	1.793	1.718	0.000	1.739
10/18/2011 22:00	0	0.213	0.213	0.309	0.032	0.064	0.043	0.053	0.000	0.053	1.088	1.024	1.046	0.982	0.000	1.078
10/18/2011 23:00	0	0.277	0.256	0.288	0.053	0.000	0.107	0.096	0.064	0.043	0.043	0.021	0.032	0.011	0.000	0.021
10/19/2011 0:00	0.762	0.203	0.192	0.192	0.085	0.117	0.117	0.085	0.096	0.075	0.011	0.011	0.000	0.011	0.000	0.011
10/19/2011 1:00	0	0.288	0.267	0.309	0.117	0.128	0.171	0.117	0.075	0.117	0.982	1.003	0.992	0.896	0.000	0.960
10/19/2011 2:00	0	0.320	0.341	0.331	0.171	0.149	0.192	0.128	0.107	0.128	0.085	0.064	0.085	0.053	0.000	0.085
10/19/2011 3:00	0	0.235	0.235	0.213	0.139	0.128	0.160	0.107	0.107	0.107	0.021	0.011	0.000	0.011	0.000	0.011
10/19/2011 4:00	0	0.171	0.171	0.171	0.117	0.107	0.128	0.096	0.085	0.085	0.011	0.000	0.000	0.000	0.000	0.000
10/19/2011 5:00	0	0.139	0.128	0.139	0.107	0.085	0.117	0.085	0.075	0.085	0.000	0.000	0.011	0.000	0.000	0.000
10/19/2011 6:00	0	0.117	0.096	0.107	0.096	0.085	0.107	0.064	0.053	0.064	0.000	0.011	0.000	0.000	0.000	0.011
10/19/2011 7:00	0	0.096	0.085	0.107	0.085	0.064	0.096	0.053	0.064	0.053	0.000	0.000	0.000	0.000	0.000	0.000
10/19/2011 8:00	0	0.096	0.085	0.096	0.085	0.075	0.085	0.064	0.053	0.053	0.011	0.000	0.000	0.000	0.000	0.000
10/19/2011 9:00	0	0.075	0.075	0.075	0.064	0.075	0.107	0.053	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000
10/19/2011 10:00	0	0.064	0.064	0.075	0.075	0.064	0.075	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
10/19/2011 11:00	0	0.064	0.053	0.064	0.064	0.064	0.075	0.043	0.053	0.043	0.000	0.000	0.000	0.000	0.000	0.000
10/19/2011 12:00	0	0.053	0.043	0.053	0.053	0.053	0.064	0.043	0.043	0.032	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	3.302	2.529	2.337	2.689	1.387	1.387	1.697	1.195	0.982	1.110	4.834	4.631	4.727	4.279	0.000	4.492

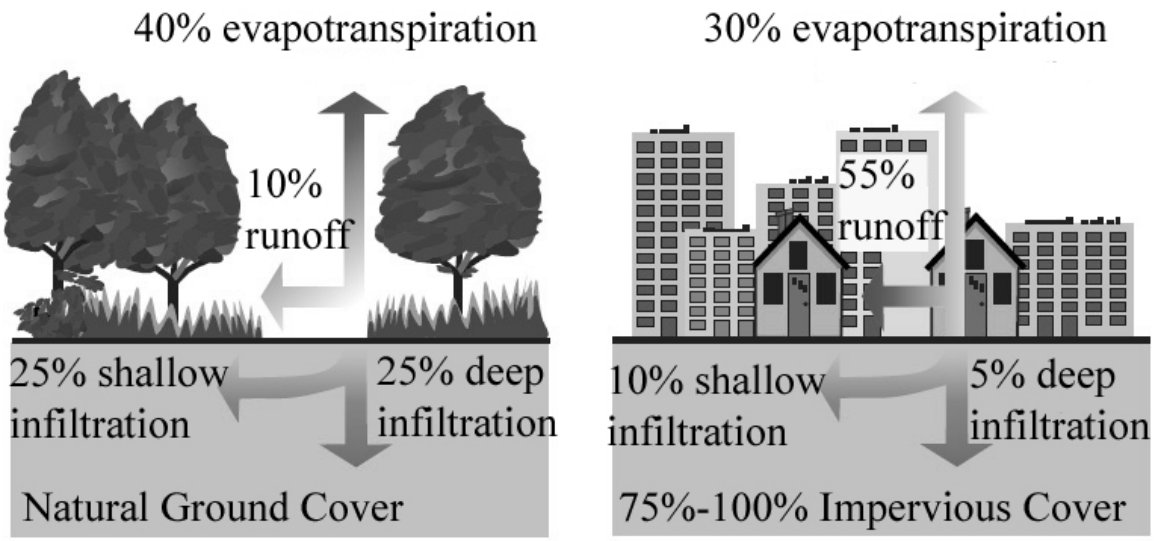
Data from rain event on 10/18/2011.

Table 66.

Date/Time	rainfall	media (1)	media (2)	media (3)	sedum (1)	sedum (2)	sedum (3)	grass (1)	grass (2)	grass (3)	steel (1)	steel (2)	steel (3)	shingle (1)	shingle (2)	shingle (3)
10/23/2011 22:00	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/23/2011 23:00	0.254	0.000	0.000	0.032	0.000	0.000	0.011	0.000	0.000	0.000	0.619	0.640	0.694	0.469	0.000	0.501
10/24/2011 0:00	0	0.096	0.107	0.117	0.064	0.021	0.021	0.021	0.021	0.000	0.235	0.235	0.267	0.213	0.000	0.245
10/24/2011 1:00	0.508	0.053	0.075	0.075	0.053	0.053	0.043	0.032	0.021	0.021	0.021	0.011	0.021	0.000	0.000	0.021
10/24/2011 2:00	0	0.053	0.064	0.064	0.032	0.043	0.043	0.032	0.032	0.021	0.331	0.341	0.373	0.309	0.000	0.341
10/24/2011 3:00	0	0.107	0.107	0.117	0.075	0.075	0.075	0.053	0.053	0.053	0.096	0.075	0.107	0.085	0.000	0.107
10/24/2011 4:00	0	0.064	0.085	0.085	0.064	0.064	0.064	0.053	0.043	0.043	0.021	0.011	0.011	0.000	0.000	0.011
10/24/2011 5:00	0	0.043	0.043	0.053	0.032	0.043	0.043	0.032	0.032	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2011 6:00	0	0.032	0.043	0.043	0.032	0.032	0.032	0.032	0.032	0.021	0.011	0.000	0.011	0.000	0.000	0.000
10/24/2011 7:00	0	0.032	0.043	0.032	0.021	0.032	0.032	0.021	0.021	0.021	0.000	0.000	0.000	0.011	0.000	0.011
10/24/2011 8:00	0	0.021	0.021	0.021	0.021	0.021	0.032	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2011 9:00	0	0.021	0.021	0.032	0.011	0.021	0.021	0.021	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2011 10:00	0	0.021	0.032	0.021	0.011	0.011	0.021	0.021	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2011 11:00	0	0.011	0.021	0.021	0.021	0.021	0.021	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
10/24/2011 12:00	0	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Totals (mm)	1.270	0.566	0.672	0.726	0.448	0.448	0.469	0.363	0.331	0.288	1.334	1.312	1.483	1.088	0.000	1.238

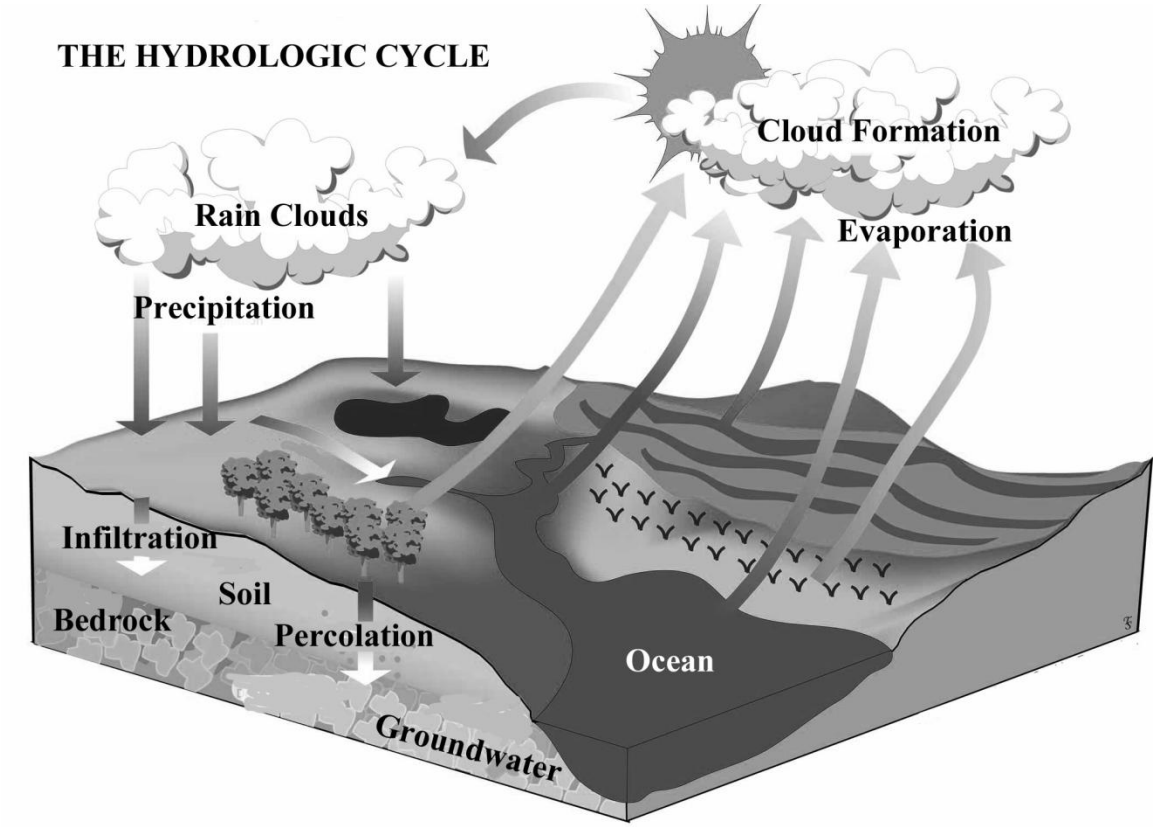
Data from rain event on 10/23/2011.

Figure 1.



Graphic representation of land use change and its effects on stormwater runoff, evapotranspiration and infiltration. Source: U.S. Environmental Protection Agency, Washington, D.C. "Protecting Water Quality from Urban Runoff." Document No. EPA 841-F-03-003

Figure 2.

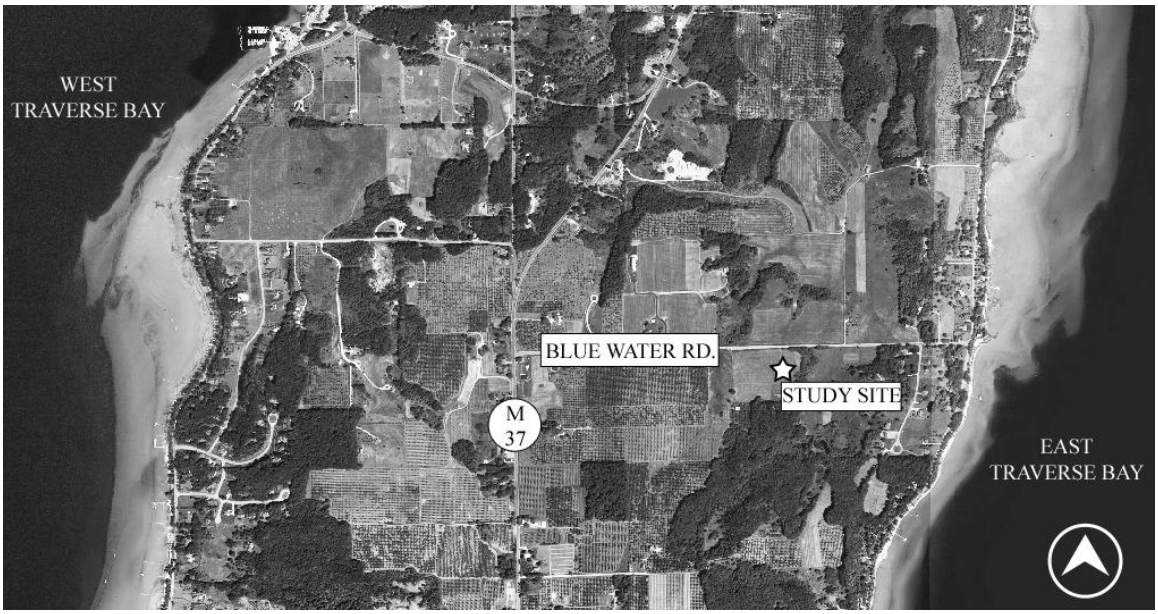


Graphic representation of the hydrologic cycle. Source: http://www.buffer.forestry.iastate.edu/Photogallery/illustrations/illustrations-1.htm

Figure 3.

Example of early birch bark waterproof membrane technique. Scandinavian cabin, West Norwegian Folk-Art Institute, Voss, Norway (Photo courtesy of Westphal 2008).

Figure 4.



Location map of study site on the Old Mission Peninsula, Michigan. (Aerial courtesy of MI Geographic Data Library)

Figure 5.

Photo of .045mm EPDM rubber membrane used for waterproofing in study plots (Photo courtesy of Cronk 2010).

Figure 6.

Green roof partitions draining to separate tipping bucket measuring devices (Photo courtesy of Cronk 2010).

Figure 7.

Plant coverage in each green roof partition. Average plant cover for sedum and native grass partitions was 90% and 95%, respectively. (Photo courtesy of Cronk 2010)

Figure 8.

Conventional roofing partitions draining into separate tipping bucket measuring devices (Photo courtesy of Cronk 2010).

Figure 9.

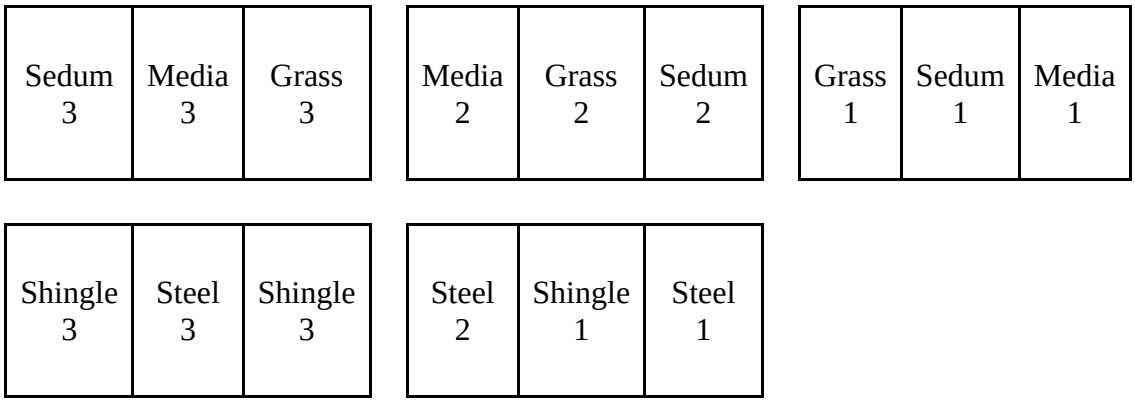
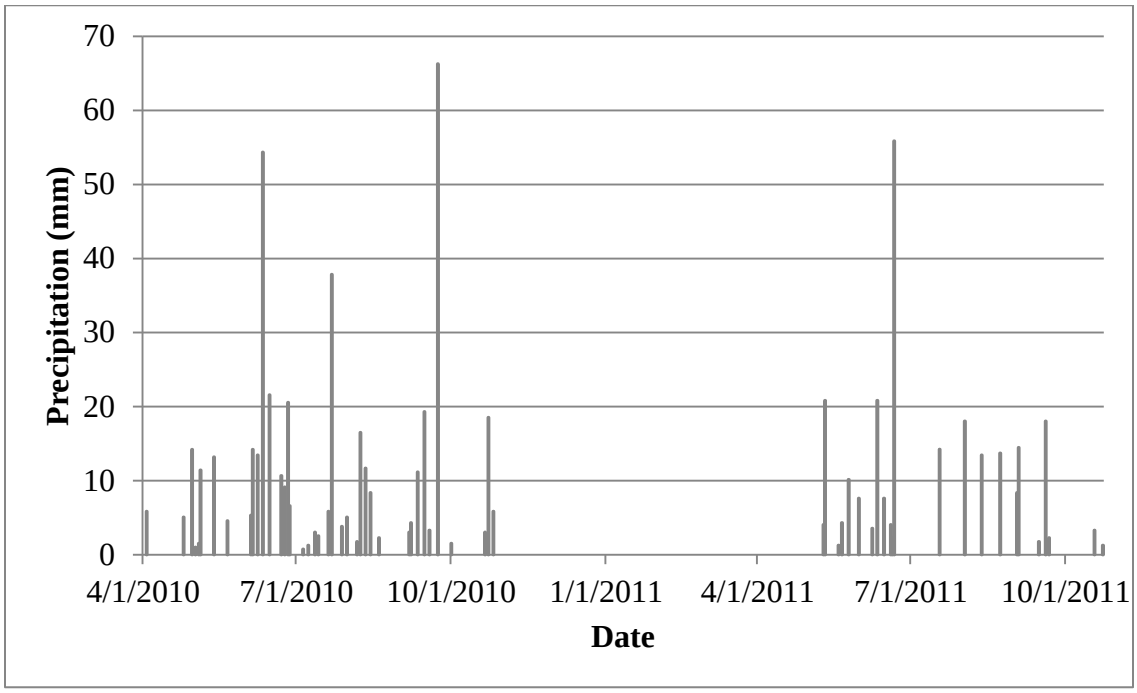


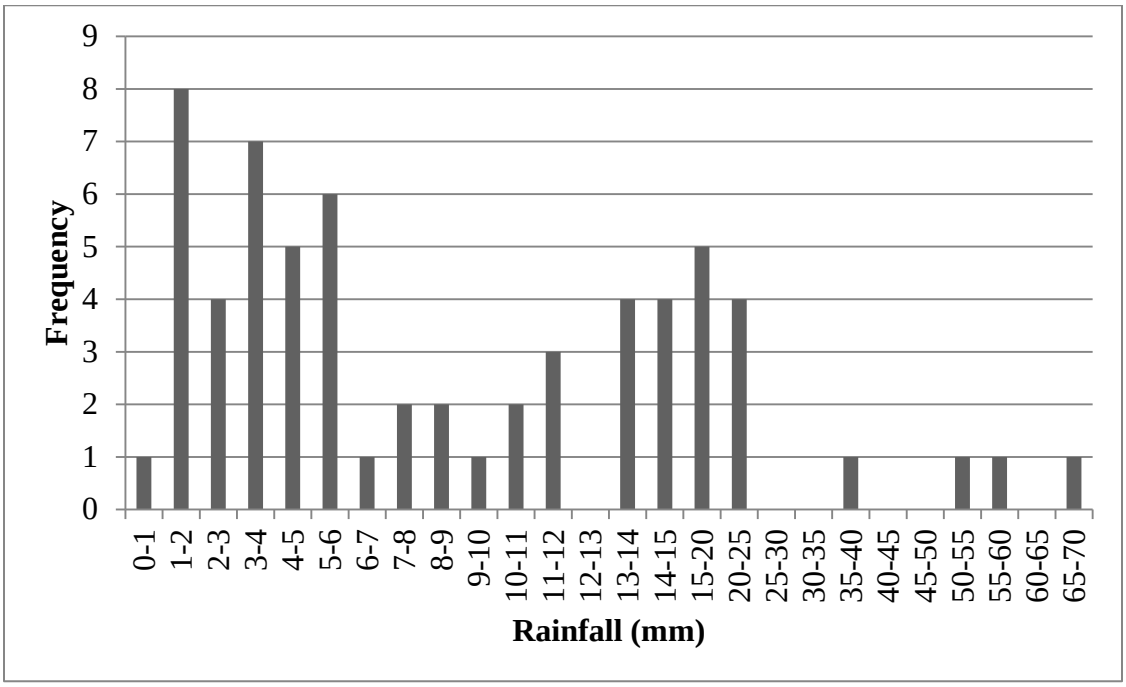
Diagram of treatments arranged in a completely stratified design with the conventional roofing treatments occupying two platforms in an alternate pattern, and each of the three green roof treatments found on three platforms in a rotated manner

Figure 10.



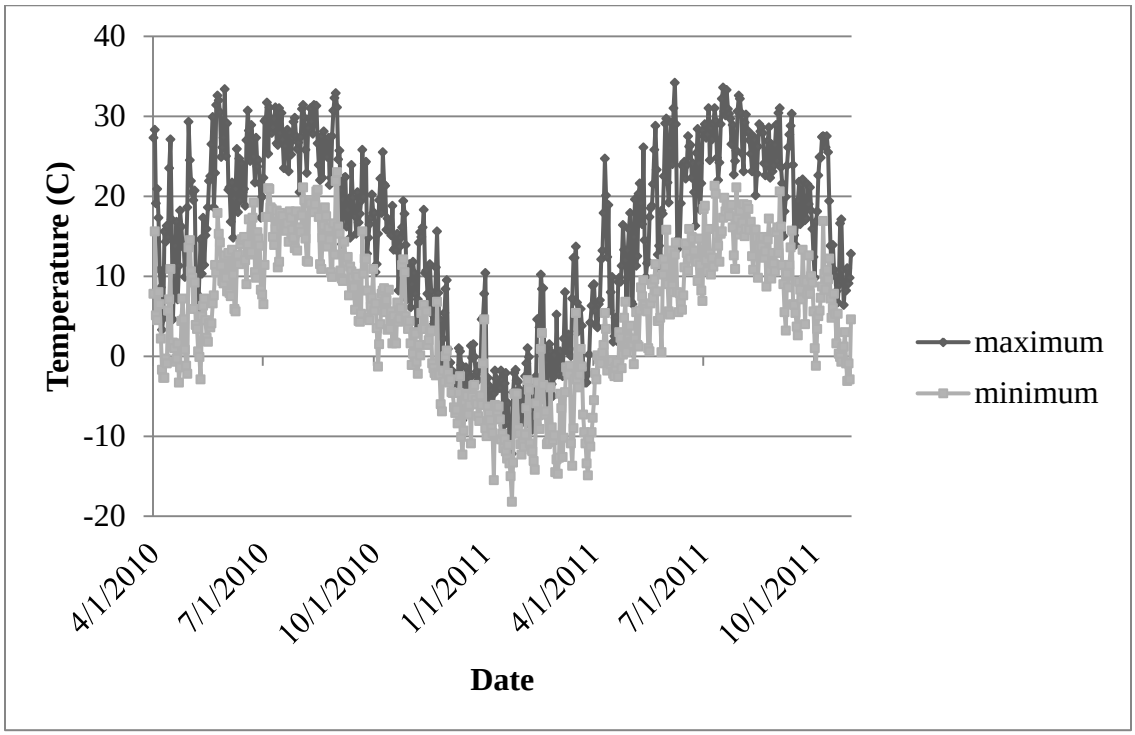
Daily precipitation (mm) during the experimental study (1 May 2010 to 31 October 2011). Data collected from a weather station located on the study site adjacent to the research plots.

Figure 11.



Frequency of rain events during the experimental study (1 May 2010 to 31 October 2011).

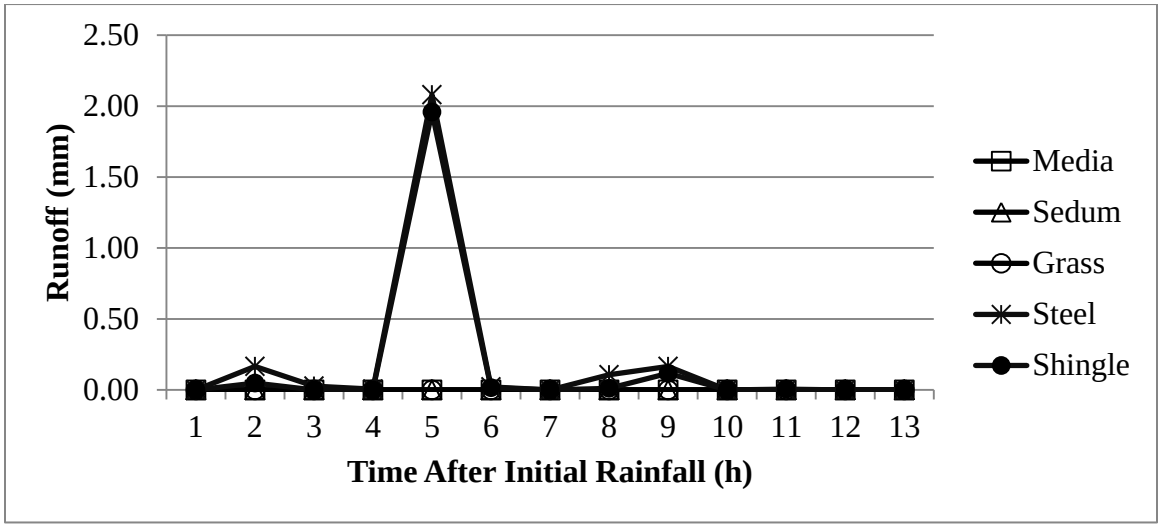
Figure 12.



Daily maximum and minimum temperatures (C) during the experimental study (1 May 2010 to 31 October 2011). Data is from the Michigan Automated Weather Network's weather station located on the Old Mission Peninsula, MI.

Figure 13.

A.


2.50
2.00
1.50
1.00
0.50
0.00
Runoff (mm)
1 2 3 4 5 6 7 8 9 10 11 12 13
Time After Initial Rainfall (h)
Media
Sedum
Grass
Steel
Shingle

B.

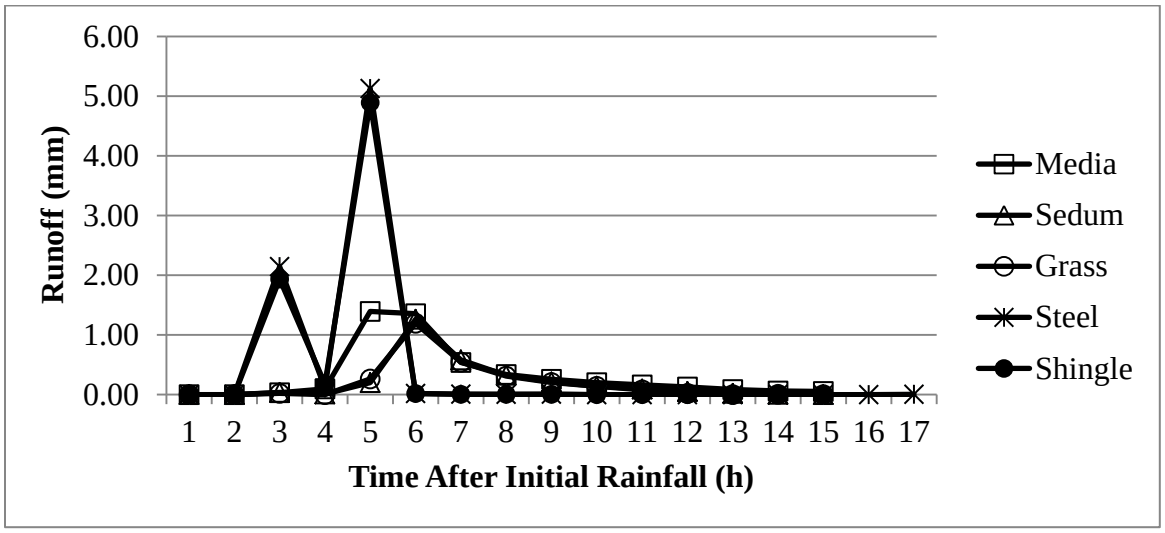
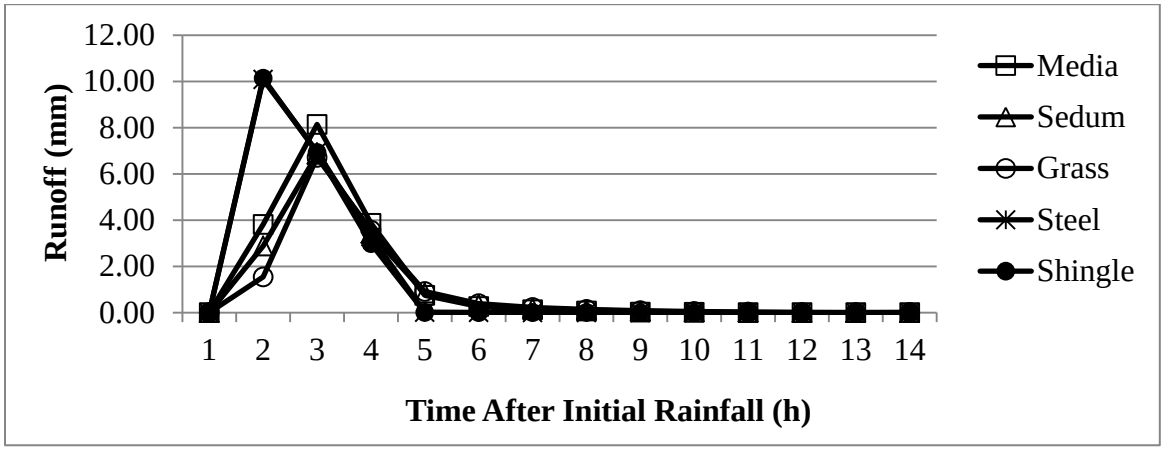

6.00
5.00
4.00
3.00
2.00
1.00
0.00
Runoff (mm)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Time After Initial Rainfall (h)
Media
Sedum
Grass
Steel
Shingle

Figure 13 (cont'd)

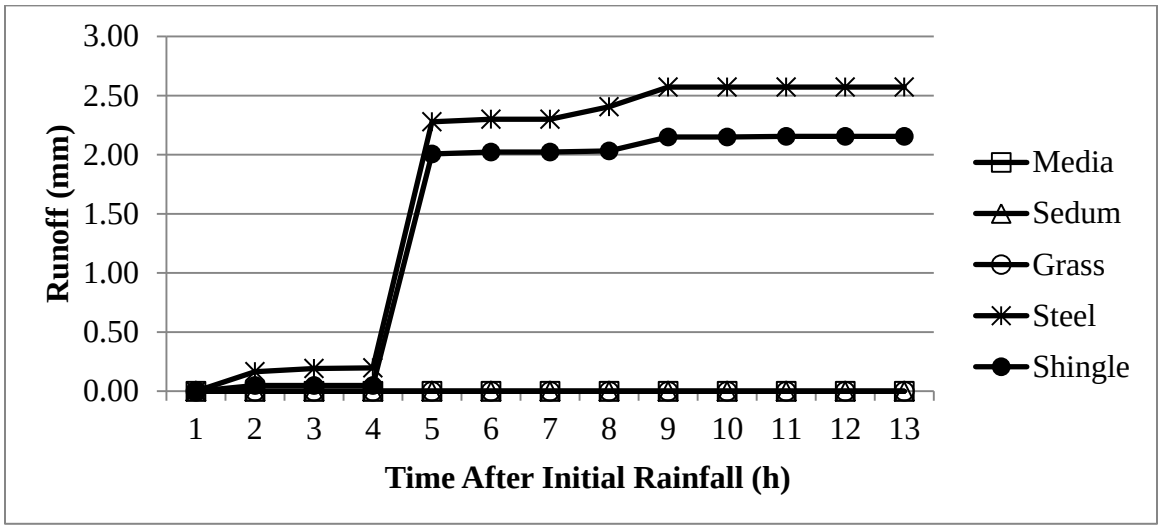
C.



Runoff hydrographs of selected representative (A) light (3.56 mm), (B) medium (8.38 mm), and (C) heavy (20.83 mm) rain events. Lines represent runoff (mm) from media-only, sedum, grass, steel and shingle roof treatments. Values are averages of measurements taken using three tipping bucket rain gauges. Note the different x and y axis scales.

Figure 14.

A.


3.00
2.50
2.00
1.50
1.00
0.50
0.00
Runoff (mm)
1 2 3 4 5 6 7 8 9 10 11 12 13
Time After Initial Rainfall (h)
Media
Sedum
Grass
Steel
Shingle

B.

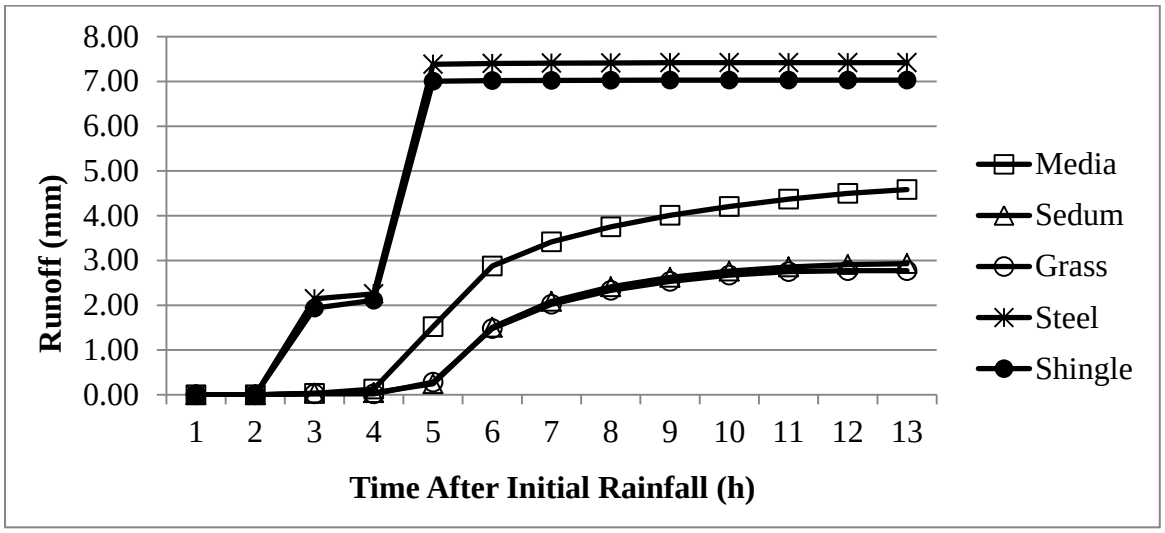

8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Runoff (mm)
1 2 3 4 5 6 7 8 9 10 11 12 13
Time After Initial Rainfall (h)
Media
Sedum
Grass
Steel
Shingle

Figure 14 (cont'd)

C.

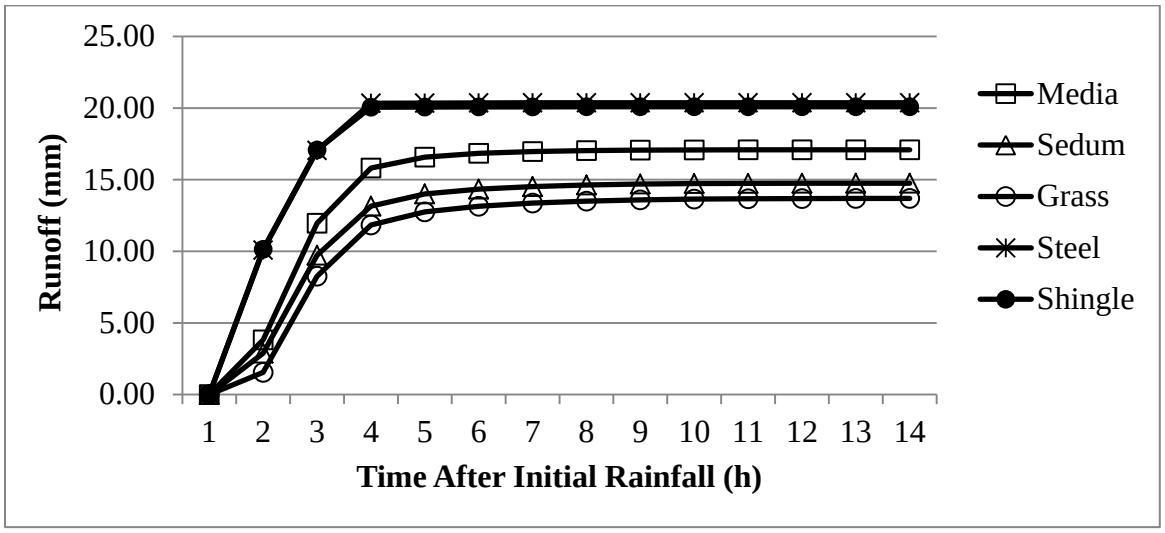


Figure 14. Cumulative runoff hydrographs of selected representative (A) light (3.56 mm), (B) medium (8.38 mm), and (C) heavy (20.83 mm) rain events. Lines represent runoff (mm) from media-only, sedum, grass, steel and shingle roof treatments. Values are averages of measurements taken using three tipping bucket rain gauges. Note the different x and y axis scales.

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