

# CHASTAIN-SKILLMAN, INC.

ENGINEERS • ARCHITECTS • SCIENTISTS • SURVEYORS

## CONSULTANT'S UPDATE

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### THE "ALTA" SURVEY

By Ralph H. Whisler III, PLS



Frequently a prospective client will call and ask "How much will it cost to survey my land?" I suppose they expect an answer based on the location or size of their particular parcel. More often than not, I'm met with a long pause after I reply "What type of survey do you need?" One type of survey that is becoming more common is the ALTA/ACSM Land Title Survey, or "ALTA" survey.

In the fall of 1992, the governing boards of the American Land Title Association (ALTA) and the American Congress on

Surveying and Mapping (ACSM) adopted a set of "Minimum Standard Detail Requirements" that have become accepted as the first set of national standards with regard to the scope and content of a survey and the resultant map. This represents a substantial change from past practice.

Many years ago when a survey was ordered, the surveyor would make his measurements on the ground and hand the client a map of the survey and the bill. Some of these surveys were remarkably accurate while others were not so well done. Surveyors were governed only by their moral conscience and a community standard that

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### STATEWIDE STORMWATER TREATMENT RULE

By David A. Breitrack, PE



Land development in Florida is not getting any easier. A proposed Statewide Stormwater Treatment Rule by the Florida Department of Environmental Protection (FDEP) will be adding to the challenges of stormwater design and permitting. The intent of this article is to inform the land development sector of the proposed Rule, encourage interested parties to be proactive during the period of proposed Rule development, and empower those involved in land development in any capacity with the knowledge of the potential impacts of the proposed Rule.

The FDEP has taken the lead in addressing the increasing nutrient enrichment of Florida's surface waters and groundwater. To

that end, the FDEP has initiated the proposed Statewide Stormwater Treatment Rule to increase the level of nutrient removal required of stormwater treatment systems serving new development, including urban redevelopment.

The proposed Rule is currently under development and the specific design parameters and criteria are subject to change prior to their effective date, tentatively scheduled for July 2009. Therefore, highlights of the proposed Rule changes having an impact on land development will be presented in this article in general terms.

Land developers and their engineers should be aware of the upcoming proposed Rule because of the cost implications to the stormwater component of developing land

(Treatment Rule—Continued on page 2)

### EOHS NEWS

- ◆ *The State of Florida will be appointing a Public Task Force on Workplace Safety to issue recommendations regarding innovative ways for the State to effectively ensure that all State, County and Municipal workers have federal-level Occupational Safety and Health protections. The Committee will be comprised of Gubernatorial appointees from the House, Senate and Governor's Office.*
- ◆ *CSI's Paul Osley, PE, CIH, CSP is currently under consideration for a Gubernatorial appointment to the Florida Public Task Force on Workplace Safety.*
- ◆ *The US House Science Committee has approved a bill entitled The Methamphetamine Remediation Research Act (H.R. 365). It will require the EPA to develop model, voluntary, health-based cleanup guidelines based on the best currently available scientific knowledge for use by state and localities in cleaning up former meth labs.*

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in Florida. The proposed Rule will encourage the use of pre-treatment devices and impose more restrictive water quality requirements. Pre-treatment components may add cost to a stormwater system. More restrictive water quality requirements may require a larger percentage of land area to be utilized for stormwater treatment.

A Technical Advisory Committee (TAC) has been created to make recommendations to the FDEP about the proposed Rule. The TAC consists of approximately 21 members and 15 alternate members from various statewide interests including the Florida Engineering Society; Audubon Society; City, County and State Agencies; and the Home Builders Association, just to name a few. The TAC is addressing a number of issues that may result in changes to the Rule as presently proposed.

The TAC has laid out a schedule of meetings and workshops leading up to their recommendation to the FDEP prior to adoption of the Rule. Workshops have taken place on March 5, 2008, April 16, 2008, May 28, 2008 and July 9, 2008. At the time of this writing the next session will take place on September 15 and 16, 2008, which will have taken place by the time of issuance of this article. The next two sessions are scheduled on October 1, 2008 and November 12, 2008. The FDEP anticipates adopting the new Rule in May 2009 with an effective date of July 2009.

As a firm that designs stormwater systems, CSI will be tracking the progress of the TAC's recommendations and readying ourselves for the rollout of the new Rule. Should you have questions, you may contact any of our offices.

### **Stormwater Quality Applicant's Handbook**

The FDEP has prepared a draft Stormwater Quality Applicant's Handbook, dated March 5, 2008. The Handbook summarizes design requirements for stormwater quality treatment systems in Florida under the new Rule. This article references the March 2008 version of the Rule. It should be noted that the Handbook will be subject to change based on recommendations of the TAC, prior to its effective date, tentatively scheduled for July 2009.

So, what will be different under the new Rule? Presently each of the five Water Management Districts, except for Northwest Florida, set their own criteria for water quality standards. Under the new Rule, the water quality standards and design criteria will be consistently applied throughout the state, leveling the playing field. Second, the emphasis will be on nutrient loading in stormwater runoff, specifically targeting removal rates of phosphorus and nitrates. Stormwater systems designed under the new Rule will need to demonstrate that required removal efficiencies of these pollutants from the stormwater stream prior to discharge into surface waters and/or groundwater will be met.

The consideration of nutrient removal is not new to stormwater design and permitting in Florida. One example is the implementation of the Lake Apopka Basin Rule by the St. Johns River Water Management District in 2002. The Rule imposed more stringent requirements on stormwater treatment design of stormwater systems for new developments located within the Lake Apopka Basin watershed than other areas of the District. However, as previously stated, the new Statewide Stormwater Treatment Rule will generate a level playing field with a consistent standard throughout the state related to nutrient loading.

Best Management Practice (BMP) treatment trains may be required in many cases to achieve the required removal efficiencies. A treatment train is a number of BMPs placed in series that serve to improve pollutant removal. For example, the first "car" in the BMP series receives the highest pollutant load. The second receives a cleaner stream, and so on. This progression results in improved stormwater discharge quality. Although treatment trains have been encouraged under the current regulations, the proposed Handbook provides a mechanism to calculate the treatment credit associated with successive BMPs installed in series that was not recognized in the current regulations. The Handbook will establish a methodology to calculate the appropriate load reduction for such trains.

Stormwater recycling and reuse may become more commonplace to reduce stormwater discharge volumes and pollutant loads, especially when using wet de-

tection systems. Tables will be provided in the Handbook that allow for calculating the amount of treatment credit to be allowed for water storage and irrigation rates.

Low Impact Design (LID) concepts are under development. Credits will be established to increase the focus on nonstructural, pollution prevention BMPs as the first "car" in the treatment train. Examples of LID concepts include:

- Green roof/cistern/irrigation systems
- Pervious concrete
- Florida Friendly Landscaping/Green Industry BMP Program
- Promotion of natural vegetation on-site to reduce compaction of urban soils/loss of infiltration capacity.

### **New Design Criteria**

The March 2008 edition of the Handbook includes design criteria and the methodology for sizing stormwater quality components that meet nutrient removal rates required by the new Rule. Under the new Rule, post-development nutrient loading shall not exceed the pre-development nutrient loading. Runoff from undeveloped areas contains ambient levels of nitrates and phosphorus. Developed land areas typically generate higher concentrations of these nutrients. Therefore, stormwater treatment devices will be required to have sufficient nutrient removal capabilities to achieve pre- vs. post-development equality. The Handbook also provides tables for calculating pre-development and post-development nutrient loads.

The industry is already responding to new rule development by announcing software upgrades to take the treatment requirements into consideration in the design of stormwater treatment components.

### **Stormwater Treatment Components**

#### *Dry Ponds*

Dry retention ponds (zero surface discharge) will remain the favored means of runoff volume attenuation and stormwater treatment in closed basins where the groundwater table and soil permeability will support such a system. Dry detention ponds that allow discharge are not recognized in the Handbook as a viable means of providing adequate treatment when

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*(Treatment Rule—Continued from page 2)*

also used for volume attenuation. The use of dry detention (pond or swale) for use as a BMP prior to discharge into a wet detention pond will be encouraged to provide pretreatment benefit.

#### *Bio-filtration Systems*

Bio-filtration systems consist of a dry basin underlain with perforated drainage pipe that collects and conveys stormwater following percolation from the basin through suitable soil. This type of system provides an alternative for site conditions where retention is not feasible because of low soil permeability rates, and where the site is not in a closed basin (i.e. a downstream receiving water is available for discharge). The underdrain discharge allows pond volume to recover in soils with low soil permeability rates. In effect, a bio-filtration system is a dry detention system that provides a higher level of treatment than a standard dry detention pond by using soil percolation prior to discharge via underdrain pipes.

#### *Exfiltration Trench Systems*

An exfiltration trench is a subsurface system consisting of a conduit such as perforated pipe surrounded by natural or artificial aggregate that temporarily stores and infiltrates stormwater runoff. The FDEP continues to recognize the use of alternatives to pipe and aggregate trenches, such as manufactured arch-shaped modular open-bottom chambers. There is little change in the design parameters of exfiltration systems in the new Rule, and their use continues to be encouraged due to their treatment and groundwater recharge capabilities. However, the operation of these systems remains a concern to the FDEP. Sediment accumulation and clogging by fines can reduce the life of an exfiltration system.

#### *Wet Ponds*

Wet detention systems are permanently wet ponds that are designed to slowly release collected stormwater runoff through an outlet structure. Wet detention systems have been widely used for decades throughout Florida and remain strongly recommended by the FDEP on sites where conditions favor their use (i.e. shallow groundwater). Presently, the design criteria for wet ponds vary widely between Water Management Districts. The new Rule will make uniform design

criteria of maximum depth, mean depth, length to width ratio, littoral zone, and recovery time.

Other components discussed in the Handbook include the use of Wetlands Stormwater Management Systems, Vegetated Natural Buffers, and Stormwater Reuse Systems.

Stormwater credit categories have been developed to encourage preservation and design techniques that reduce the impact of developing sites (LID). Stormwater credit categories include the following LID techniques: natural area conservation, site reforestation, disconnection of impervious area, pervious pavement, and Florida Friendly Landscaping.

#### **Redevelopment Sites**

We saved the most controversial topic for last. A major issue that the TAC is addressing includes the definition of pre-development condition. Under the Rule as currently proposed, the pre-development condition will be defined as undeveloped native landscape, not the current land use of the developed condition. The nutrient loading under the pre-development condition will be compared with nutrient loading of the post-development condition in assessing removal efficiencies. This is a significant departure from the current requirements. Applying a definition of native landscape for the pre-development condition of developed sites will generally increase the amount of water quality treatment necessary to achieve the required removal efficiencies. This may make redevelopment of urban sites cost prohibitive to most owners and developers. Of course, reducing incentives to redevelop urbanized areas is not in the best interest of protecting natural environments throughout the state. Therefore, this is one of the priority issues for the TAC to address with the new Rule.

#### **Summary**

The proposed Statewide Stormwater Treatment Rule will have a noticeable impact on the design of stormwater systems and the cost of developing land in Florida. The new Rule will apply the same design standards throughout the state in lieu of each Water Management District setting unique stormwater treatment standards. The design standards will

be based on nutrient loading; specifically phosphorus and nitrates. Dry detention ponds will not be recognized as a viable means of stormwater treatment. The TAC has advised that the new Rule should be more flexible with the definition of pre-development condition with respect to redevelopment of existing urbanized sites.

#### **References**

[http://www.dep.state.fl.us/water/wetlands/erp/rules/sw\\_swt\\_rule\\_dvlpmt.htm](http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_dvlpmt.htm)

*"Draft" Stormwater Quality Applicant's Handbook*, prepared by the Florida Department of Environmental Protection, draft dated March 5, 2008

*"Draft" White Paper – Proposed Statewide Stormwater Rule*, March 3 Revision

*Statewide Stormwater Treatment Rule Development*, an issues presentation by Devo Seereeram, Ph.D., P.E., dated April 16, 2008

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**PLEASE JOIN US AS WE  
WELCOME OUR NEW  
ASSOCIATES**

#### **In Lakeland**

**Jay Chastain** has joined the company as Project Liaison. Jay will be based at our Lakeland Headquarters, but will be spending most of his time out of the office with clients. This will include providing support to all CSI office locations.

Our Accounting department welcomes **Stacy Benner** who will fill the role of Assistant Accountant, processing Accounts Payable. Stacy has experience in many aspects of accounting, has completed her Associates degree and is working toward her Bachelor's degree at Southeastern University.

## *Project Spotlight*

*Beginning 90 years ago, a drainage system between two lakes in Frostproof, Florida was constructed in an existing stream bed and subsequently modified numerous times over the years. The existing system was a series of open channels and 48-inch pipes. High water levels and pipe failure following the hurricane season of 2004 prompted major reconstruction of the system. To resolve the problematic flow through the heart of the City between Lakes Clinch and Reedy, Chastain-Skillman designed a system constructed of 2,600 feet of 72-inch pipe, replaced a bridge with a box culvert, installed new walls lining both sides of a 900-foot canal, and installed a control structure to control inter-lake water flow. The project was designed in 2006 and constructed in 2007. A challenging aspect of the project was that various types of structures had actually been built on top of sections of the old system. Working together with Polk County and the City, Chastain-Skillman coordinated the use of funds from a Legislative Grant, a SWFWMD Grant, and Polk County.*



New box culvert under Lake Avenue replacing old bridge



New rip rap placement on existing 48-inch culverts under railroad tracks



New discharge canal to Lake Reedy through existing mobile home park

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could only become higher through competition. Unfortunately, the lone local surveyor was left to set his own standards. Later in time, after realizing the disparity between surveys from county to county, most states decided to adopt their own set of "Minimum Technical Standards" for surveying. Each surveyor licensed by his or her state was then bound by a set of guidelines, providing a direct benefit to the public at large and the profession as a whole. On the surface this would seem like a good plan – except when a client in Ohio happened to order a survey from a surveyor in Texas. I would bet the client got something very different than he expected. For better or worse, each state has its own set of standards. Many states (including Alabama and Mississippi) have standards that are very similar to Florida's, however, no two are the same and they can vary greatly even between bordering states.

Interestingly, it was the court case *Bell v. Jones (District of Columbia Court of Appeals, 1987, 523A.2d 982)* that seemed to establish a national standard of care. In this case, Robert A. Bell (an architect) filed suit against Raymond M. Jones (an engineer and land surveyor). Bell relied on Jones' survey to create architectural plans for eight townhouses, and contended that Jones' survey erroneously represented the location of property lines and corner angles. Jones, however, argued that he interpreted Bell's request to be for a survey only to be used for a real estate closing. Jones continued that, had he known of Bell's intention to use his survey for site design, Jones would have quoted a much higher price and Bell should have realized this when he received the quote. Jones further argued that Bell, being an architect, should have known to order a topographic survey and should have informed Jones of his intentions. After a non-jury trial, the court found that Jones was negligent, but also found that Bell was contributorily negligent and, hence, could not recover damages. Both parties appealed the decision, but a portion of the Judge's final ruling stated that "the public at large can hold doctors and architects to a standard of performance which requires them to employ a degree of skill and care ordinarily used by their colleagues" and that he "saw no reason to treat surveyors differently from architects and physicians." Accordingly, he further held that "the standard of care by which the professional acts of surveyors are measured

is a national standard, not a local or regional one." Although the court never handed down a set of standards or guidelines, the "ALTA" survey has come to be accepted by the courts as a national standard. Generally the ALTA survey is for the benefit of the title insurance companies that use the survey to add or delete exceptions to coverage, and it provides the basis for coverage that may be requested by the buyer or lender.

When ordering an ALTA survey, the onus is placed on the client to provide the surveyor with (among other things) all record documents pertaining to the legal description of the subject parcel or parent tract, easements, covenants and encumbrances. Also, the client must provide the surveyor with a copy of "Table A," which is a list of optional survey requirements ranging from contours to parking stripes to evidence of site use as a solid waste dump, sump or sanitary landfill. The surveyor will review the documents provided by the client and arrive at a fee based on these requirements. After the surveyor and client negotiate an agreement based on the specifications, the survey is prepared and delivered (with the bill of course!). As you will notice, this arrangement is beneficial to both the client and surveyor because, regardless of the proximity of the two, each knows what is expected from the other, and the possibility of miscommunication is greatly reduced, thereby avoiding the potential for costly legal proceedings.

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## RECENT PROJECTS AND CONTRACTS OF INTEREST

CSI has provided civil engineering site design, surveying, and construction observation services at **Florida Southern College** in Lakeland for several recent projects. These include:

- New multi-floor dormitory on the lake, completed in the Summer of 2008
- A second dormitory on which construction will begin in the Fall of 2008
- The McKay Archive Building
- Two new parking lots

Additionally, as of September 2008, CSI is wrapping up site design efforts for the new Nursing Building and the new Humanities Building. Design efforts are also currently underway for the new Technology Building.

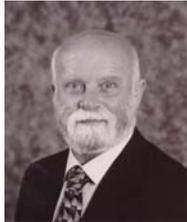
Now under construction at **Lakeside Village** in Lakeland, is the new Alexan Apartment complex development, which will consist of at least 12 multi-floor structures.

Yet another phase of the **Oakbridge development** is under construction. The photo below shows one of the stormwater structures designed by CSI's structural department at The Sanctuary at Grasslands.



# HYDRAULIC ANALYSIS: THE EFFECT OF WIND ON WATER

By Thomas J. Moran, PE



Wind passing across the surface of a small pond or lake can produce an alteration in the water levels. This effect is known as **setup**, which is used to describe how high the water level will rise on the upwind side of the water body.

There are five factors that are used to estimate the setup in a water body:

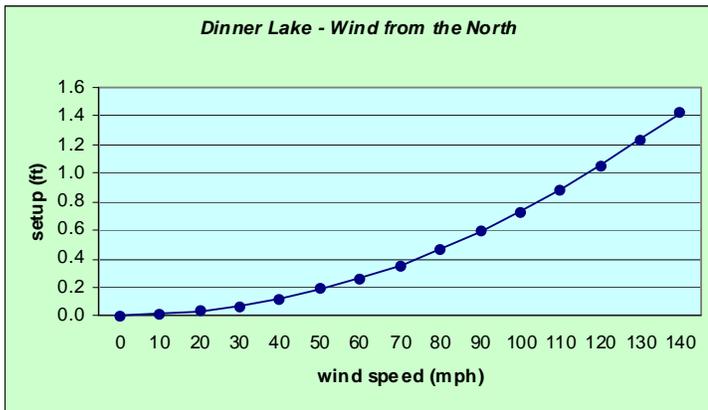
- fetch – the distance (measured in feet) across the water that the wind travels;
- depth – the average depth (measured in feet) of the water body;
- gravity = 32.2 feet per second squared;
- wind speed (measured in feet per second); and
- the “K” factor =  $2.025 \times 10^{-6}$ .

Setup is then calculated as follows:

$$\text{Setup} = (K \times (\text{wind speed})^2 \times \text{fetch}) / (\text{gravity} \times \text{depth})$$

For example, Dinner Lake, located in Highlands County, Florida, has an average depth of 9.8 feet, and the maximum width is 1 mile. Presuming the wind travels across the widest portion of the lake, the following table illustrates the setup as a function of wind speed.

Wind Speed (mph)	Setup (ft)
0	0.0
20	0.0
40	0.1
60	0.3
70	0.4
80	0.5
90	0.6
100	0.7
110	0.9
120	1.0
130	1.2
140	1.4



As you can see; a category 1 hurricane (with winds of approximately 80 MPH) will produce a setup of approximately 0.5 feet.

Another effect caused by the interaction of water and wind is **runup**. This term describes how far, in a vertical direction, a wave will travel up a slope. The determination of runup involves a fairly complex mathematical equation.

The significant wave height ( $H_s$ ) for an 80 MPH storm across Dinner Lake (1 mile) is 3.6 feet. The wind must blow for 15 minutes to achieve this height.

The wave height (H) that will be exceeded in height by only 2% of the waves is  $1.40 \times H_s$  which equals  $1.40 \times 3.6 = 5.04$  feet.

The wave length (L) is then  $0.159gT^2$

Where T is the wave period, in seconds, and is calculated as  $T = 0.429U^{0.44}F^{0.28} / g^{0.72}$  where

- U = wind velocity in feet per second
- g = gravitational force = 32.2 ft / s<sup>2</sup> and
- F = distance = 1 mile = 5,280 feet

Thus, in this case,  
 $T = 0.429 \times 177.3^{0.44} \times 5,280^{0.28} / 32.2^{0.72}$   
 T = 3.79 seconds

and wave length  $L = 0.159 \times 32.2 \times 3.79^2$   
 L = 73.5 feet

The bank of Dinner Lake has an average slope of one foot vertical for every six feet horizontal (1:6) and has a relatively smooth slope.

The wave height (H) divided by the wave length (L) =  $5.04 / 73.5 = 0.68$ . Using published data tables, it is estimated that the ratio of runup (R) to the wave height (H) =  $R/H = 0.66$ .

Thus, the runup is calculated as follows:  
 $R = 0.66 \times 5.04 = 3.33$  feet.

Adding the runup and setup then provides an indication of how far the water could rise on the upwind side of the lake.

In this case runup + setup = 3.83 feet indicating that, with a category 1 hurricane, the water level on the upwind side of Dinner Lake could theoretically rise 3.83 feet. This does not include any settlement of the bank caused by wind and wave action or contingencies.

If an individual intends to purchase and develop property adjacent to a lake, they should investigate the potential rise in water level before constructing any buildings. The wind and water action shown in this article can also be useful in evaluating the required freeboard on stormwater retention ponds necessary to prevent overflow. Water, misunderstood and uncontrolled, can be an extremely destructive force.

Roberson, Cassidy and Chaudhry, *Hydraulic Engineering*, 2<sup>nd</sup> ed. (John Wiley & Sons Inc., 1998) 331-38

### Water Tidbits

- A cubic foot of water weighs 62.4 pounds
- A cubic yard of water (3 ft x 3ft x 3 ft) weighs 1,685 pounds
- The water that would fill an office space that is 10 feet x 10 feet x 8 feet would weigh about 25 tons.

When you hear about a wall of water racing down a canyon at 25 miles per hour and the canyon is 50 feet wide and the water is 10 feet high; try to imagine the weight of the flood coming at you.

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In June, Chastain-Skillman was proud to be a sponsor of a special initiative that provided school supply backpacks to over 70 needy Lakeland area children in a clown/balloon filled fun day at **Barnett Family Park**. Throughout the year this program also provides school uniforms, and feeds many hungry families at Easter, Thanksgiving, and Christmas.

Art Wade attended "**The Basics of Tortoise Mitigation, Monitoring and Management Workshop**" from June 25 - June 27, 2008.

The workshop was held at the Ashton Biodiversity Research & Preservation Institute in Newberry, Florida. Sessions were held in the classroom and field exercises were also conducted for hands-on training.

Topics included the current state of regulations and upcoming changes, trapping, health evaluations, transport and handling, survey methods, burrow excavation, and recipient site evaluation.

CSI is lending its services to a **Frostproof Middle School** literature class as a resource to complete their reading assignment research tasks. Ms. Suzanne Duke's class is reading the novel *Hoot* by Carl Hiaasen. In this humorous ecological mystery, three unlikely middle-school kids lead a protest to save endangered burrowing owls that live on the property where Mother Paula's All-American Pancake House is about to be built.

Ms. Dukes has given her class an extension activity, as follows: A vandal has pulled the surveyor's stakes at the future site of Mother Paula's All American Pancake House. The policeman says you can't press charges for vandalism without monetary damage. Call a surveying company to find out an estimated cost for surveying the property lines of three acres of land. Since the land must be surveyed again, calculate the resulting monetary damage to Mother Paula's.

CSI has agreed to be a resource for the students to call to complete their extension assignment.

*This newsletter is provided solely for informational purposes and presents only highly condensed summaries relating to the topics presented. Therefore, it should not be relied upon as a complete record for purposes of regulatory compliance, nor is it intended to furnish advice adequate to any particular circumstances. For additional information on any of the topics in this newsletter, please contact the author, or Allan Duhm, (863) 646-1402, or e-mail us.*

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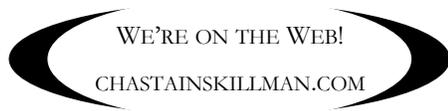
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