Virginia Stormwater BMP Clearinghouse Committee Meeting

Virginia Department of Conservation and Recreation
Virginia Water Resources Research Center
December 12, 2007
Clark Hall, University of Virginia
Charlottesville, Virginia

Minutes by Jane Walker

Virginia Stormwater BMP Clearinghouse Committee Members Present

Scott Crafton (substitute Committee Chairperson for Lee Hill), Virginia Department of Conservation and Recreation
Joseph G. Battiata, CONTECH Stormwater Solutions Inc.
W. Douglas Beisch, Jr., Williamsburg Environmental Group, Inc.
Linda K. Blum, University of Virginia, Department of Environmental Sciences
Dean R. Bork, Virginia Tech, Department of Landscape Architecture
Gary Boring, New River Highlands RC&D Council
Larry Coffman, Filterra
Gregory Johnson, Patton Harris Rust & Associates
Mary E. Johnson, Thomas Jefferson Soil and Water Conservation District
Roy Mills, Virginia Department of Transportation (VDOT), Location & Design Division
Douglas H. Moseley III, GKY & Associates, Inc.
David B. Powers, Michael Baker Jr., Inc.
David W. Rundgren, New River Valley Planning District Commission
James S. Talian, City of Lynchburg
Kevin D. Young, Virginia Tech, Dept. Of Civil and Environmental Engineering

Virginia Stormwater BMP Clearinghouse Committee Members Not Present

Rishi Baral, County of Stafford, Planning Department, E & S Plan Review
Michael Gerel, Chesapeake Bay Foundation
David J. Hirschman, Center for Watershed Protection
Cynthia S. Linkenhoker, City of Portsmouth, Dept. of Public Utilities/Public Works
Randy Sewell, Vanasse Hangen Brustlin, Inc. (VHB)
Scott J. Thomas, James City County Environmental Division
Burt Tuxford, Virginia Department of Environmental Quality

Virginia Department of Conservation and Recreation (DCR) Staff Present

Chuck Dietz
John McCutcheon

Virginia Water Resources Research Center (VWRRC) Staff Present

Stephen Schoenholtz
Jane Walker

Others Present
Brian Benham, Virginia Tech, Biological Systems Engineering
Glen Payton, Filterra
Maita Pang, Imbrium Systems, Inc.

Scott Crafton (DCR) called the meeting to order. The minutes from the September 11, 2007 meeting were distributed and reviewed. No corrections or additions were made to the minutes.

Scott Crafton commented that several Clearinghouse Committee members have found it necessary to resign from the committee during the past year:

Osman Akan, Old Dominion University
Kristina Hill, University of Virginia
Kelly Ramsey, Natural Resources Conservation Service

Scott reminded the group that this is the last official meeting for the committee members whose terms end after one year:

Rishi Baral, County of Stafford, Planning Department, E & S Plan Review
W. Douglas Beisch, Jr., Williamsburg Environmental Group, Inc.
Linda K. Blum, Department of Environmental Sciences, University of Virginia
Kristina Hill, Department of Landscape Architecture, University of Virginia
David J. Hirschman, Center for Watershed Protection
David B. Powers, Michael Baker Jr., Inc.
David W. Rundgren, New River Valley Planning District Commission
Burt Tuxford, Virginia Department of Environmental Quality

He mentioned that those members whose terms are ending would be contacted to see if he or she would like to continue to serve a three-year term from 2008-2010.

Each person introduced herself or himself. Brian Benham was introduced and welcomed as a likely representative of academia for the 2008-2010 term.

Scott Crafton asked Brian Benham to describe his work at Virginia Tech and his interests in stormwater issues. Brian explained that he is both an extension specialist with Virginia Cooperative Extension and an associate professor in the Department of Biological Systems Engineering (BSE) at Virginia Tech. Through his appointment, he is the director for the Center for TMDL and Watershed Studies, which (1) conducts basic and applied research (on and off campus), (2) provides training in the development and implementation of TMDLs (conducts TMDL workshops throughout the country), and (3) facilitates watershed stakeholder participation in the TMDL process by increasing awareness and understanding of water quality issues.

BSE is keenly involved in stormwater monitoring and is preparing to hire a new full-time extension faculty member focused completely on stormwater management. This tenure track, permanent position will be located in northern Virginia at Virginia Tech's Occoquan Watershed Monitoring Laboratory. One committee member offered that the Department of Civil and Environmental Engineering (CEE) is also planning to hire someone in stormwater, who will be placed at the same lab.

Scott Crafton commented that several members of the Research Protocol Subcommittee suggested that Virginia develop a partnership similar to that of the New Jersey Corporation for Advanced Technology (NJCAT). The committee members could envision that the newly hired BSE faculty member could provide oversight for third-party BMP research and screen new BMPs that have not yet been tested. Another potential partnership for research in Virginia could be working through committee member Roy Mills (VDOT) and the Virginia Transportation Research Council, which is associated with VDOT and the University of Virginia. Virginia may be able to develop a research consortium around the issues associated with stormwater.

BMP Selection Tool:

Kevin Young (Virginia Tech) provided an overview of a selection tool for BMPs that was developed for VDOT. The developed tool simultaneously considers site characteristics, regulatory requirements, and other factors that would impact BMP selection. The tool suggests the highest ranking BMPs for a site based on input criteria that the user provides and ranks in importance. The algorithm relatively compares how well various BMPs support the selected criteria. Matrices are used to show the BMP comparisons based on meeting the highest-rated priority criteria. The tool is currently being modified for use at commercial and residential sites as part of a grant with EPA.

The members of the Clearinghouse Committee had many comments and questions in reference to the BMP selection tool:

- A member stated his belief that instead of people putting in ponds everywhere, they will be putting in whatever BMP the tool suggests (whether or not the BMP makes sense for the site). Kevin Young added that part of the reason for developing the tool was to provide users with options besides ponds. Kevin stressed that the tool should only be used as a first step in identifying BMPs to consider and should not be used as an end to the BMP selection process.
- Another member commented that because users can set the goals they want to achieve and rank the criteria, the program offers a great deal of useful information in setting parameters for BMP selection. The results will depend on the user's goals and how the user prioritizes the criteria.
- One member questioned in which geographic region the tool was designed for use, adding that the Chesapeake Bay Program crosses jurisdictional lines with Virginia's requirements differing from Pennsylvania's and Maryland's, etc. Kevin Young responded that the modified selection tool currently being developed is for application in EPA Region III (Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia).
- One member asked how the matrix data are populated. Kevin Young replied that data in the matrix for 80% suspended solids removal are based on the International Stormwater BMP Database and data used by the Center for Watershed Protection (not from stormwater manuals). Likewise, data pertaining to total phosphorus (TP) removal and total nitrogen (TN) removal are based on the same databases.
- One member noted that the tool doesn't have the ability to evaluate individual hydraulic response characteristics for the study watershed.
- Kevin Young explained that the tool only includes hydraulic soils in the extremes because the other soil types do not preclude BMP installations.

- Someone noted that users could get different results based on the site size. Kevin Young offered that users may need to divide the site into subwatersheds. A member added that it may be difficult to know how much dividing is needed and wished that the tool could indicate when the user may want to reanalyze the site after subdividing it.
- One member wanted a way to easily see how well BMPs work for individual selection criteria. That way, BMPs that rank poorly in just one area could be identified and examined more carefully.
- Another member commented that the VDOT version only selects BMPs, whereas he would like more information. Kevin offered that he has the ability to show the "behind the scenes" matrices so that users could have more of a choice.
- Several voiced interest in giving the user the option to see the matrices so that users could be educated. One member cautioned, however, that the matrices may confuse people.
- The numbers generated in the current VDOT matrices go to three decimal places, which are likely too specific and may thus become misleading. Someone suggested that instead of including numbers in the matrices, which are meaningless to users, colors could be used. For example, "green" could indicate a good BMP choice to meet the specified criteria; "yellow" could indicate possible BMPs to consider with caution; and "red" would suggest BMPs to avoid.
- One committee member offered that because the state regulations will be based on discharge limitations and thus will rely on performance data, using this type of tool makes sense.
- Kevin Young added that as state regulations change, the selection tool will need to change. Scott Crafton (DCR) offered that while he could not make any commitments, he thought DCR may be able to help fund the tool to keep it up to date if it proves to be useful.
- Scott Crafton reminded the committee that the purpose of the tool would be to serve as a "first-cut tool." The value of the tool lies in the ability of the user to rank the criteria. The tool provides a short list from which to select a BMP.

Review of BMP Standards Subcommittee Meeting:

Scott Crafton (DCR) summarized the BMP Standards Subcommittee meeting held on October 16, 2007. He explained that the Center for Watershed Protection (CWP) developed a list of proposed BMP design checklist criteria categories: Sizing and Dimensions; Location; Materials; Hydrology and Hydraulics; Pre-treatment; and Vegetation. The subcommittee offered that maintenance as it applies to BMP design (the information needed to engineer proper maintenance into the design) should be added as a category. A category entitled "Other" was also proposed to cover any special factors specific to a BMP.

David Hirschman with the CWP developed draft design checklists for bioretention #1 and bioretention #2. Scott Crafton explained that the #1-level BMPs are designed to achieve the median pollutant removal rate for the target pollutant(s), from within the range of pollutant removals recorded from all the research projects captured in the National Water Quality Database. The #2-level BMPs are designed to achieve the 75th percentile removals from that database.

Using the bioretention templates developed by David Hirschman as a guide and information from the CWP's recently published "Urban BMP Retrofit Manual," Scott Crafton began developing templates for the remaining conventional BMPs. Most have missing information, including a key component: sizing criteria. As part of a new Chesapeake Stormwater Network Project, Tom Schueler agreed to revise and complete the design checklists for the conventional BMPs and develop them for Bay-wide application. Dave Hirschman and Scott Crafton have begun developing design checklists templates for low-impact-development (LID) practices for which volume reduction credits will be allowed.

Scott Crafton explained that DCR withdrew its Notice of Intended Regulatory Action (NOIRA) concerning stormwater management regulations in September 2007 and is in the process of resubmitting a new NOIRA. In addition to addressing water quality, the new NOIRA will also address the water quantity side of stormwater management. By reducing the volume of runoff water, the amount of pollutants from runoff will also be reduced. DCR is reconsidering its stormwater treatment volumes, channel protection criteria, etc. as they relate to water quantity. For example, Virginia's current channel protection regulations require containment of a two-year storm to be released at pre-development rates. Neighboring states require retaining or treating the first one-inch of precipitation and releasing it over a 24-hour time period. Such differences make the task of developing Bay-wide design checklists more difficult because water quantity issues impact BMP sizing.

Virginia's Stormwater Handbook Technical Advisory Committee (TAC) held its first meeting this fall and is aiming to solidify BMP criteria at its next meeting. Scott Crafton will likely invite members of the BMP Standards Subcommittee to the TAC meeting so he can present the information to both groups at the same time and get feedback from more people. The next step will be to have a series of design charrettes that allow participants to work through and discuss detailed case studies for designing BMPs. DCR and the Virginia Chapter of the American Society of Civil Engineers (ASCE) will sponsor four charrettes in spring 2008. The charrettes will educate participants, allow for testing of the criteria, and provide feedback to DCR.

Review of Research Protocol Subcommittee Meetings:

During previous Clearinghouse Committee meetings, it was decided that because Virginia has endorsed the Technology Acceptance Reciprocity Partnership (TARP) protocols, the state's research methodologies should be based on the TARP protocols. TARP, however, focuses on protocols related to total suspended solids (TSS), whereas Virginia needs to develop protocols for TP and TN to support its stormwater management regulations. Thus, Virginia needs to customize TARP to focus on TP and TN.

The Research Protocol Subcommittee met two times this fall: October 17, 2007 and December 4, 2007. During these meetings, the subcommittee reviewed the TARP criteria to see where to tweak the criteria to meet Virginia's needs. The subcommittee also examined the Technology Assessment Protocol—Ecology (TAPE) protocols developed for the state of Washington to see if any of their protocols would be useful and appropriate for use by Virginia.

Scott Crafton distributed a comparison table that the subcommittee used in its discussions. The table compares the protocols used by TARP and TAPE. Suggestions made at the subcommittee meetings are summarized in blue (Appendix 1).

The subcommittee proposes that Virginia establish three levels of certification:

Pilot Level Designation (PLD): Manufacturer has limited data or no data about actual product performance but Virginia's stormwater BMP reviewer(s) believes the product has merit and should be tested. Manufacturers with a product receiving a pilot level designation are not to market the product but instead are to work with a third party to set up an initial testing program.

Conditional Use Designation (CUD): New products with some efficiency monitoring data could be marketed and installed on a limited basis if approved for conditional use. The manufacturer would have a set time (e.g., two years) to install the product and obtain additional monitoring data for evaluation of the product efficiency. During the two-year testing period, a manufacturer will probably be allowed to market its product freely although some subcommittee members expressed concerns about the risk of a product's proliferation and subsequent findings that it does not function as the manufacturer claimed. Testing would be required at representative locations but not at all installations. During the monitoring period, the manufacturer would need to provide interim (e.g., quarterly) reports. If disturbing trends appear or if reporting deadlines are missed, DCR would have the authority to halt or limit further sales until monitoring is completed and results indicate expected removal efficiencies are being met. Extensions of the research time period to account for insufficient rainstorms to monitor, late monitoring start-ups, etc. could also be granted by DCR. At the end of the testing period, the manufacturer would need to stop selling and installing the product until the monitoring data are reviewed, and the product is either approved or not approved for general use.

General Use Designation (GUD): At the end of the monitoring process, the manufacturer will make a presentation of the data to the Clearinghouse Committee. Any internal reviewer(s) should also report his/her opinions of the data. If the data confirmed or established solid performance information, the Clearinghouse Committee would recommend that DCR certify/approve the product for unlimited use within appropriate applications in Virginia.

The subcommittee proposed its plan as a way to establish a balance between providing incentives for product development while simultaneously limiting proliferation of products until an appropriate level of confidence has been established. The subcommittee proposed that no product should be certified at any level unless the manufacturer can demonstrate that it has sufficient research funding to prove performance claims. Thus, BMP manufacturers would need to submit a product plan to ensure the technical feasibility of the product and a business plan to demonstrate the financial ability to have the product tested.

Several commented that North Carolina requires manufacturers to retrofit their sites with adequate treatment technologies when new products are found to be ineffective. They asked if Virginia is considering a similar rule. Scott Crafton replied that DCR is considering it but has

not made a decision. One member commented that Virginia wants to encourage innovations. Another member added that North Carolina is not encouraging the use of manufactured products because of the poor performance of many products installed in the state in the past. This member voiced concern that if Virginia follows North Carolina's example, manufacturers will not want to come to Virginia. Another member offered that he likes encouraging innovation but also wants accountability.

Scott Crafton stated that the goal of using established research protocols is to have a better understanding of performance efficiencies early in the process so that hundreds of manufactured BMPs are not installed across the Commonwealth only to later learn that they don't work.

One member offered that Virginia has an opportunity to use the private sector (manufacturers) as a resource to fund stormwater research.

Another member stressed the need for a set of rules for non-manufactured products. The research protocols should apply to manufactured and non-manufactured BMPs. Some regions of the state do not use the currently developed manufactured BMPs. Integrated site engineering innovations need to be considered or innovations in that area will be stifled. Another member offered that the testing protocol should be the same for manufactured and non-manufactured BMPs. The funding for the testing, however, will be different. Proprietors should fund the manufactured BMPs, and grants should be used to test the non-manufactured BMPs.

Scott Crafton offered that two of the strengths of the TAPE protocols are the specificity of its requirements for vendors and its requirement for third-party involvement. The subcommittee proposed that Virginia follow the TAPE protocols in these areas. The subcommittee indicated that having an internal review of the work of third-party entities and the generated monitoring data seems prudent. An internal review could potentially be provided by the same individual/entity (DCR staff, VWRRC staff, etc.) that provides the initial review of a manufacturer's concept/claims. Scott Crafton offered that perhaps Virginia Tech's Occoquan Watershed Monitoring Laboratories in Northern Virginia would be interested and willing to take on such a review role (manufacturers would pay the lab for the services, and the lab would employ the needed scientists/engineers).

Although Virginia should focus on removing TP and TN to meet Virginia's stormwater regulations, the developed process should also allow for testing and certification of practices that treat other pollutants that may be needed to meet TMDLs, etc. Virginia will require field testing for all practices. Data from lab studies will be accepted and considered (but not at the exclusion of field studies). The Virginia methodology document will allow the Clearinghouse Committee and DCR to request additional information from the vendor on a case-by-case basis.

The next step for the subcommittee is to translate its discussions into a useful testing methodology document. A member offered that Virginia's proposed testing methodology should include the TARP protocols as an appendix. The data collected should be able to meet both Virginia's and TARP's criteria. Scott Crafton offered that the developed document would be circulated within the subcommittee first and then provided to the full committee for input. His

plan is to finalize the document at the March Clearinghouse Committee meeting. Scott encouraged any member with additional thoughts on the subject to contact him.

Review of the Web Site Subcommittee Meeting:

Scott Crafton distributed and reviewed a set of sample web pages he developed following the August 1, 2007 and November 19, 2007 meetings of the Web Site Subcommittee (Appendix 2). Comments regarding the draft pages included:

- Under the section "BMP Design Checklists and Standards," there is a subsection entitled "Specific Basin /Impoundment Elements." This subsection refers to components of impoundment structures listed separately in the current Virginia Stormwater Handbook so that users can apply this information to all impoundment BMPs without having to replicate the same information over and over within each different impoundment BMP. It was suggested that the elements be renumbered so that users won't mistake them for a continuation of the Basin/Impoundment BMP listing. Instead of numbering them from "h - l," list them as "h-1, h-2..., h-5."
- For the detailed standards and specifications, include all the information on this section listed in the handbook as a PDF and include bookmark links in the left side pane. The bookmarks will allow users to quickly go to the specific areas of interest.
- Manufactured BMPs approved for conditional use should include a schedule, such as the date of CUD approval, extensions granted, etc. so that people can tell how far along the product is in its testing period.
- The Stormwater BMP Clearinghouse should not link to the manufacturer's website. Manufacturers will need to provide information about the product and will be responsible for providing updates to the information when necessary.
- For stormwater BMP costs, it was suggested that Virginia follow New Jersey's example by describing expenses as "high, medium, or low" instead of listing dollar amounts. Expenses are variable due to differences in land costs, etc., and manufacturers will likely not want to provide this information because of the variability in construction costs. Furthermore, including dollar amounts in the Clearinghouse could invite liabilities.
- An alternative is to list cost considerations, with specific line-by-line needs.
- A link to the CWP's Bond Calculator in the cost section (as well as in the reference section) would be a useful addition to the Clearinghouse.
- On the Maintenance Page: (1) Link to the maintenance chapter in the handbook for traditional BMPs; (2) Include the maintenance elements for approved proprietary products.

Scott Crafton summarized that DCR wants to start small with the web site and have it grow and become more robust with time. Scott offered that the Water Center would initially manage the site. DCR may eventually need to hire someone to maintain the Clearinghouse (as well as another DCR web site proposed for stormwater permit applications). Scott Crafton proposed that DCR and VWRRC sit down with a web designer and have the designer make draft pages for the Web Site Subcommittee to review and critique.

Scott outlined the web development and regulatory process as he currently envisions it. Four stormwater BMP design charrettes are expected for spring 2008. The one-day programs, co-

sponsored by ASCE and DCR, are to be held in Richmond, Lexington, northern Virginia and Hampton Roads. Based on input from these meetings, the Regulatory TAC should be able to make changes to the proposed regulations and have them ready for public comment in mid-to-late summer. With this in mind, Scott aims to have the Clearinghouse web site up and running by mid-spring.

Next Meetings

The 2008 Virginia Stormwater BMP Clearinghouse Committee Meetings were scheduled for the second Thursday of March, June, September, and December:

March 13, 2008;
June 12, 2008;
September 11, 2008; and
December 11, 2008.

Most committee members voiced support for having the meetings in Charlottesville instead of Richmond.

With no further business, the meeting was adjourned.

Appendix 1 -- TABLE COMPARING TARP AND TAPE PROTOCOLS (Text in blue indicates points for Virginia-specific TARP criteria)

	TARP	TAPE
A. Endorsed by	CA, MA, MD, NJ, PA, VA	WA (requires research/evaluation to be done at Washington sites)
B. Specified Use	Structural and nonstructural stormwater BMPs for 1-directing and distributing flows, 2-reducing velocities, 3-removing contaminants (p. 4) (Virginia should also add volume reduction (so far no other states have accounted for this) and pre-treatment (probably excluding hydrodynamic devices) as specified uses (vendor must specify, as applicable, sizing, pollutant(s) of interest, and performance to be evaluated/validated)	Emerging erosion and sediment technologies – treatments: basic, enhanced, phosphorous, oil, treatment train, retrofits, and pretreatment
C. Purpose	Provide a uniform method for demonstrating, with reasonable statistical confidence, emerging stormwater technologies for specified applications and developing testing QA for certification or verification of performance claims (p. 4)	Characterize, with reasonable statistical confidence, an emerging technology's effectiveness in removing pollutants …for an intended application and compare test results with vendor's claims (p.13)
D. Goals	Use TARP to determine if product meets performance claims (Virginia should be more specific, listing at least TP and TN as specific pollutants of interest and specifying a target percent removal for a specific normal influent concentration (i.e., Virginia's EMCs) or an acceptable effluent concentration.)	Specific for treatment type, e.g., basic treatment reduces TSS by 80% when influent is 100-200 mg/L TSS; phosphorous treatment reduces TP by 50% when influent is 0.1-0.5 mg/L TP. (p.4)
E. Evaluation Determination	Meets/Does Not Meet Performance Claims (Virginia should add the following levels of certification, similar to TAPE certification levels: 1 – Pilot Level Designation (PLD) – insufficient data available to adequately evaluate claims, but reviewer believes the product has merit and should have initial performance testing conducted. The product may not be marketed or installed other than for testing during this phase. 2 – Conditional Use Designation (CUD) – Product has cleared the Pilot Level evaluation and is allowed to be marketed and installed in the field while more extensive field and lab testing occurs; testing not necessary at all installations, but at representative locations. CUD certification would apply for a specified period of time (suggestion is two years), after which no more devices	1-GULD confers a general acceptance 2-CUD are allowed for use while field and lab testing occurs; testing not necessary at all installations 3-PLD allows limited use for field testing; sponsor agrees to conduct field testing based on TAPE at all installations (p. 6-9)

	may be marketed until monitoring has been completed, the test data evaluated, and either an extension is provided by the Clearinghouse Committee or the product is certified at the GUD level. 3 – General Use Designation (GUD) – certified for unlimited use throughout the Commonwealth, based on validated performance claims. In addition, the Clearinghouse should avoid certifying ANY product at ANY level unless the vendor can demonstrated sufficient available funding (through a business plan, etc.) to ensure the technical feasibility of the product and the financial ability to have the product thoroughly tested. This will minimize the risk of allowing products to be installed for which adequate performance can never be verified. Also, consideration should be given to establishing appropriate limits on the number of installations of CUD products, to prevent the proliferation of such products until a sufficient level of confidence has been established regarding their performance.	
F. Certification or verification process	Must meet specific state requirements (See Appendix D, p. 21) Virginia should be very specific and clear about what will be expected of vendors, in a step-wise manner such as is use in the TAPE protocol. The main considerations are (1) to have an initial review of the product information, claims and supporting data by qualified DCR/Clearinghouse staff and/or associates; (2) if more testing is needed, vendor would submit a Quality Assurance Plan and Research Plan for review and approval as well; (3) during research period, periodic (quarterly?) progress reports would be submitted; (4) at the completion of research, a final report would be submitted to DCR/Clearinghouse for review; (5) if report is deemed accurate and consistent with protocol requirements, product is certified to the next level; OR if more work is needed, Clearinghouse decides on appropriate action, which may be to provide an extension of the testing period,.which may or may	1-Sponsor implement QAPP 2-Sponsor submit TEER to Ecology and TRC 3-Ecology and TRC review QAPP and TEER 4-Ecology publish pertinent info and determination at (p. 2): http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html Accept data from—TAPE, ETV, EvTEC, TARP

	allow continued marketing of product during extension.	
G. Third Party Involvement	Virginia should require vendors to obtain services from a qualified and objective third party engineer/scientist. The third party would need to oversee preparation and implementation of the initial Quality Assurance Plan for the testing project and complete/submit a Final Project Report, which would include a description of the research process, evaluation of the quarterly reports, a data analysis (and validation, if appropriate), and conclusions/recommendations. The third-party reports would be reviewed independently by DCR/Clearinghouse staff and/or associates, who would make their own recommendations to the Clearinghouse Committee..	Require: 3rd party complete data validation report, TEER summary, and make recommendations on technology use level, info for posting on website, and additional testing (if needed), etc. Recommends: 3rd party 1) oversee QAPP prep and implementation, 2) prepare data validation report, 3) prepare TEER. Verification by ETV depends on third party testing (p.3)
H. Submittal information	Technology specifications, performance claims, Test QA Plan scope, performance claim data (if available). (p. 5) Virginia will add the TAPE comment that the review committee will request additional information on case-by-case basis, as needed.	All data appropriate for technology and rationale for submitting that data. Review committee will request additional information on case-by-case basis (p.1); PLT Notice of Intent Form (Appendix C, p. 32)
I. Technology Specifications	Describe the technology, components, and all process units; lists many specifications (p. 6). Using the TAPE protocol as an example, Virginia should be as specific as possible regarding what kinds of information manufacturers need to provide, including other than performance-related information. The more useful information is provided to reviewers, the better.	Describe technology, components, installation requirements, raw material specifications, manufacturer's information, limitations or pretreatment requirements, etc. (p.14)
J. Performance Claim	Identify intended use of technology and predict capability to remove contaminant and/or control runoff quantity (p.7) Using the TAPE protocol as an example, Virginia should be as specific as possible in requirements for vendors regarding this category of information (e.g., pollutant removal, pollutant load limits to be met, basis for device sizing, etc.). At a minimum, all such criteria included in the BMP design checklists developed by DCR and the Clearinghouse should be addressed.	In QAPP, include: reduction of pollutants, applications of technology to be verified, uses of the technology, basis for sizing of device in test plan, and pollutants used to evaluate performance. (p.3)

K. Plan	Test QA Plan Scope: Sets forth the protocol's expectations regarding the content of quality assurance plans for product monitoring, to ensure procedures for collecting, handling, and analyzing samples and data meet criteria. Includes test objectives, use of standardized test methods and procedures, a data QAPP, data collection, statistical tests (p. 8) NOTE: The TARP protocol criteria are much more detailed in this category of information. Virginia should be as specific, complete and accurate as possible, especially regarding testing for removals of TP and TN.	QAPP: Must be approved before conducting field tests. Contains: Project organization (contact info of all involved in performance testing) and schedule, technology info, sampling design, MQOs (stats goals), lab procedures, field and lab QC, data management procedures, data review, interim progress reports (p 13)
K-1. Test objectives	Should be clear, concise, quantitative, and unambiguous. Test entire range of technology performance capabilities (p. 8). TARP is okay.	
K-2. Use of standardized test methods and procedures	1.) Accepted: Flow—ASTM, ASCE; Contaminants—EPA, AWWA, NSF, APHA; Alternative methods accepted with evidence to assure data quality 2.) Submit sampling plan 3.) Submit SOP (p. 8). TARP is okay.	Recommended analytical procedures listed in Appendix E: EPA, Coulter Counter or Laser diffraction for PSD, Ecology method, SM, ASTM (p. 41); Wet Sieve Protocol and mass measurement recommended by TRC Subcommittee in Appendix F (p. 43)
K-3. QAPP and/or SAP	Use EPA AQ/G-5 or ASTM 5612-94 Meet EPA QA/R-5 requirements (p. 9). TARP is okay.	
K-4. Data collection	Based on NPDES permit compliance (EPA 833-B-92-001); Necessary criteria for contaminant loading data (p. 9-14). The TARP protocol is okay for this category.	
K-4-a	Virginia should be specific regarding sizing of the test facility, but ideally simpler than the TAPE criteria. Virginia should determine a peak flow rate for the water quality volume and require data regarding the total volume treated, which allows prediction of the total pollutant load reduction. There was agreement that Virginia should allow a choice of several computation methods, as California does. If a vendor makes a claim about the device's sizing, the project plan should explain how to verify that claim.	Sizing of Test Facility: Based on performance goals at design flow rate that treats 91+% runoff volume using HSPF or Ecology Hydrology Model
K-4-b	Virginia should require information similar to this TAPE criterion.	Test Site Characterization: Field test sites should be consistent with technology's applications, geographical location, and influent characteristics; Describe how treatment technology was selected and designed for field test site. Describe field test site (p. 15)

K-4-c		Procedures: Describes sampling of TSS, PSD, accumulated sediment sampling (p. 19-20)
K-4-d	Storm Event Criteria to Sample: Obtain monthly mean ppt data, for all 12 months over the period of record from nearest NWS station; current weather; Storm intensity using continuous recording rain gauges (15-min increments) (p. 10). The TARP protocol is okay for this category.	Sampling Events: Have evenly distributed over monitoring period (p.15) Rainfall Monitoring: Measure and record ≤ 15-min intervals; Indicate type of rain gauge; location of gauge. Install and calibrate equipment with manufacturer's instructions. Inspect and maintain gauge. If equipment fails, can use data from closest monitoring station. State deviation in TEER (p. 18)
K-4-e	Identify Storms to Sample: 0.1"+ of rainfall; minimum inter-event period of 6 hr; flow-weighted composite samples (when appropriate); minimum of 10 water quality samples (p. 10) There was support for the TARP approach in this category, especially the requirement for a greater number of qualifying storms with a lower rainfall threshold.	Storm Event Criteria: Minimum storm depth of 0.15", minimum dry-period of 6 hr with < 0.04" rain, minimum storm duration of 1 hr, and no minimum storm intensity (p. 16)
K-4-f	Determine a Representative Data Set: flow measurements, concentrations; Sample at least 50% of the total annual rainfall (minimum of 15" of ppt; (15-20 storms) (p. 11) The subcommittee agreed that the TARP criteria for this category better assure that the research captures a more thorough data set.	Minimum # of events: Measure 12-35 storms or discrete flow rate sampling events per application (depends on statistical evaluation) (p. 16)
K-4-g	Sampling Locations: Inlet and outlet of BMP; include scaled plan view of demo site; describe site drainage area. For systems that bypass runoff, the effluent is located after effluent joins bypass. (p. 11) The TARP protocol is okay for this category.	Sampling Locations: Inlet and outlet of system; provide site map. For systems that bypass runoff, measure bypass flows and loads. Samples should be collected in well-mixed areas b/c settable or floating solids (associated pollutants) may become stratified across flow column if not mixed (p. 17)
K-4-h	The TARP protocol is okay for this category.	Sampling Equipment: Describe sampler make and model, installation, operation, and maintenance (p. 17)
K-4-i	Sampling Methods: Use automatic flow samplers with continuous flow measurements (unless infeasible or alternate method better). Use grab samples only for certain constituents (time-weighted composite samples not acceptable) (p. 12) The TARP protocol is okay for this category.	Sampling Methods: Use automatic samplers unless grab samples required (e.g., NWTPH-Dx); use Teflon tubing for organic contaminants; certify that equipment and location likely to achieve desired sample representativeness. Tells how to use and when to use automatic flow-weighted composite sampling, discrete flow composite sampling, combined method (p. 15-17)
K-4-j	Flow Measurement Methods: Primary and secondary flow measurement devices are required (p. 12). The TARP protocol is okay for this category.	Flow Monitoring: Measure into and out of treatment device; Record on a continuous basis during the sampling event; appropriate method depends on test site and conveyance system. Measure bypass flow. Describe flow measurement equipment. Log <15-min intervals (p. 16)

K-4-k	Sample Data QA/QC: Describe equipment decontamination, sample preservation, holding time, volume, QC samples, QA on sampling equipment, packaging and shipping, identification and labeling, chain-of custody (p. 12) TARP is okay.	Field QA/QC: Describes equipment decontamination, QC samples, sample preservation and handling, equipment calibration, recordkeeping (p. 20-22)
K-4-l	Selection of Parameters: Minimally: TSS and SSC. Consider other parameters (p. 12). All pollutants with performance claims must be tested (p.20). In VA, P is keystone pollutant (p. 29) Virginia should specify investigation of TP and TN removals or achievement of associated regulatory load limits. The Virginia process should also certify practices that have validated performance effectiveness aimed at other pollutants, which may be needed for compliance with TMDLs, etc. Practices certified to achieve performance beyond the "basic" requirements (i.e., TSS) could be identified as achieving "enhanced treatment," as is done in the TAPE protocol.	Target Pollutants: Based on vendor's claims and tailor to support desired treatment level: Basic and pretreatment (TSS, PSD, pH, etc); Phosphorus (TSS, PSD, pH, TP, ortho-P); enhanced (TSS, PSD, pH, hardness, total and dissolved Cu and Zn, etc.); Oil (TSS, PSD, pH, NWTPH-Dx, visual sheen, etc.) (p. 18)
K-4-m	Virginia should add something akin to the TAPE criteria for this category, establishing the need to conduct appropriate statistical analyses in order to derive dependable performance data. This relates to the data management requirement in the TAPE protocol (item # K-4-p below).	MQOs: Tell how data are affected by systematic errors (bias) and precision of collected/analyzed data (matrix spikes, matrix spike duplicates). Describes how to treat contamination in blanks (p. 22).
K-4-n	Virginia should add something akin to the TAPE criteria for this category. The TAPE protocol essentially makes lab studies optional, but provides examples of when they may be useful or necessary. The subcommittee agrees with this approach. Lab studies should not be accepted to the exclusion of field studies for consideration of full certification. However, they may be appropriate for evaluating certain kinds of data, such as particle size distribution, or for generating initial data about a brand new BMP. Lab studies should be conducted by an objective third party skilled in stormwater-related laboratory analysis procedures.	Full-scale Lab Studies: May precede or augment field studies (can be used to show TSS removal at peak design flow rates)—Have constant flow rates, TSS should have "typical" runoff PSDs, complete at least two tests at 100-200 mg/L TSS influent

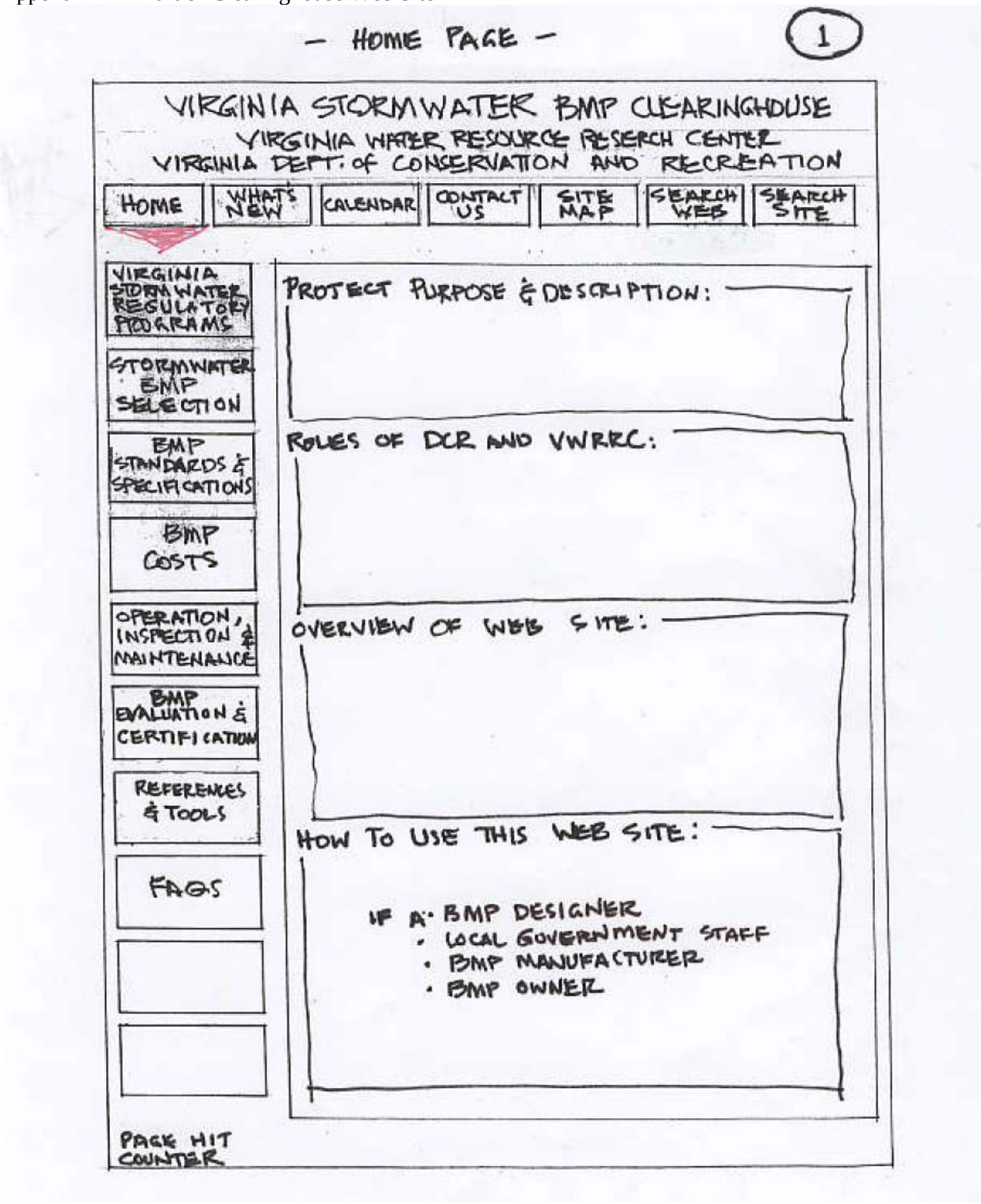
K-4-o	Analytical Laboratory Requirements: Use certified labs, NELAC (p. 13) The subcommittee considers the TARP criteria for this category sufficient. However, the NELAC certification may have changed in title or substance, so we should check this and update as necessary.	Lab QA/QC: Must be WA-certified accredited lab; report results in TEER; Describe QA requirements; List all QC samples performed (at least 10% of total) (p. 24)
K-4-p	Virginia should blend into the TARP protocol whatever us useful in this category from the TAPE protocol.	Data Management: Include QA summary with narrative; Describe problems, corrections, deviations from analytical methods, QC results, etc. (p. 24)
K-4-q	The TARP protocol is okay for this category.	Data Review, Verification, and Validation: Describe data review procedures for field and lab; Determine if MQOs were met; Describe percent recovery and relative SD for QC samples (p. 25)
K-4-r	Calculating BMP Efficiencies: Use ASCE-EPA Technical Memorandum (www.bmpdatabase.org//docs.html) (based on influent/effluent flow and concentration data) (p. 13) Virginia should require vendors to derive average annual pollutant load reductions and removal efficiencies. It is also important to require vendors to describe such issues as how their research is set up to deal with extreme variations in storm patterns during monitoring, the effect of site selection on results, etc.	Treatment Efficiency Calculations: 1-Individual storm reduction in pollutant concentration; 2-aggregate pollutant loading reduction; 3-individual storm reduction pollutant loading; 4-EvTEC approach (Appendix A, p. 28)
K-5. Statistical tests	Must show normal distribution for normal parametric stats. Use non-parametrics for non-normally distributed. If using normal parametric stat analysis, COV should be ± 10% (larger range when justified) (p. 14). The TARP protocol is okay for this category.	Statistically quantify significance of discrete, paired, and mean pollutant values in TEER (p. 25) (Appendix D, p. 34, provides guidance for appropriate statistics)
L. Health and Safety Plan	Plan should cover installation, operation, and maintenance; sample collection (p. 14) The TARP protocol is okay for this category.	
M. Cost Information	Include expenses for design, construction/installation, operation, maintenance, monitoring, etc. Discuss cost effectiveness of technology in terms of pollutant removal; May perform a cost-benefit analysis (p. 15). The TARP protocol addresses this category of information pretty well. However, Virginia may consider adapting some of the cost-related TEER factors from the TAPE protocol.	Report in TEER factors other than treatment performance—includes costs (capital and annual maintenance costs from test results, annualized capital/operating costs based on "design cfs treated basis," facility life) (Appendix B, p. 30)

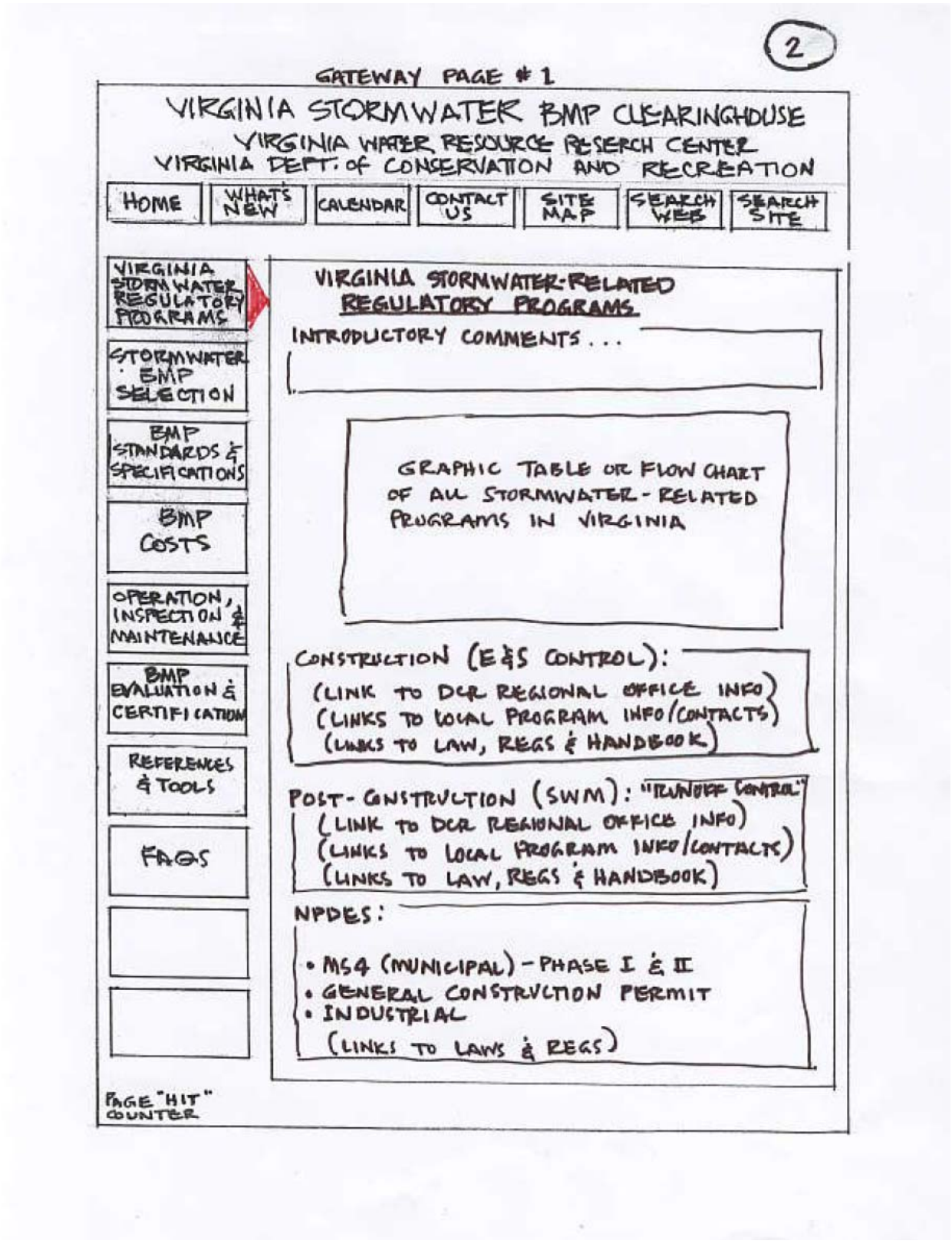
N. Report	Provides format for report, application form to be completed, executive summary, and a signed statement certifying all information is accurate and true to the best of the proponent's knowledge. (p. 15). . The report format explanation in the TAPE protocol provides a standardized format ready to fill in. That form is easy and thorough, so Virginia might consider adapting it	TEER—Contains QAPP objectives, performance claims, applications of technology, deliverables specified in QAPP, technology description, performance test results, statistical analyses, non-TAPE data, toxicity data, conclusions and various recommendations, capital and projected annual costs, executive summary, etc. (p.10); Requirements of results reporting on p. 25
O. Protocol Limits, Release of Liability, and Disclosure	…TARP accepts no responsibility or liability for performance of stormwater technologies being evaluated using this Protocol (p. 15). The TARP protocol is okay for this category.	
P. Confidential Information	The subcommittee agrees there is value in including the TAPE component regarding granting a request of confidentiality (e.g., a non-disclosure agreement, etc.).	Director of Ecology may grant a request of confidentiality (p.10)

Abbreviations

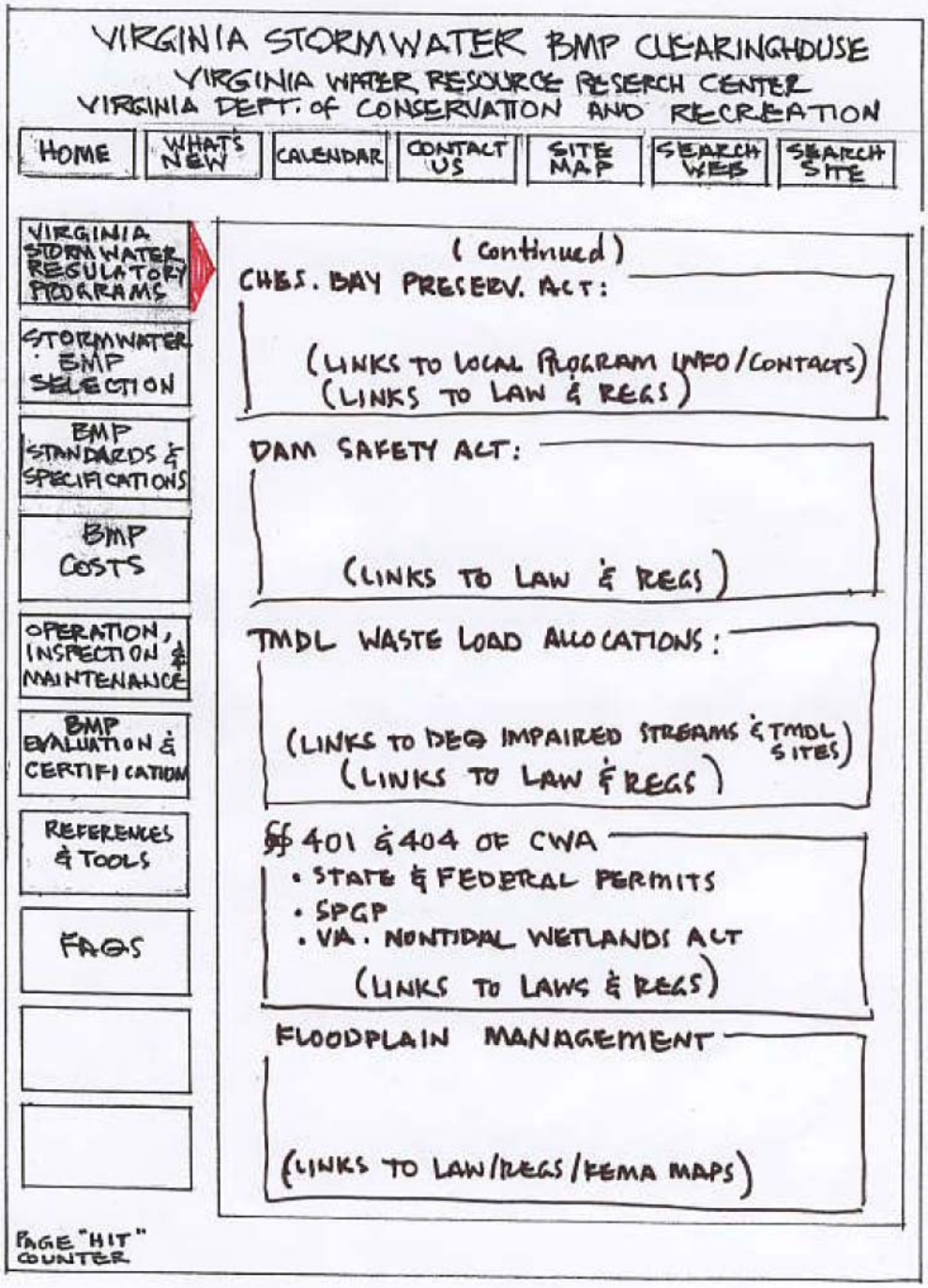
APHA: American Public Health Association
ASCE: American Society of Civil Engineers
ASTM: American Society for Testing and Materials
AWWA: American Water Works Association
b/c: because
BMP: best management practice
CA: California
cfs: cubic feet per second
COV: coefficient of variance
Cu: copper
CUD: Conditional Use Designation
Ecology: Washington State Department of Ecology
EPA: U.S. Environmental Protection Agency
ETV: Environmental Technology Verification
EvTEC: Environmental Technology Evaluation Center
GULD: General Use Level Designation
hr: hour
HSPF: Hydrological Simulation Program--Fortran
MA: Massachusetts
MD: Maryland
Min: minute
MQO: Method Quality Objectives
NELAC: National Environmental Laboratory Accreditation Conference
NJ: New Jersey
NSF: NSF International
NWS: national weather station
ortho-P: orthophosphate
P: phosphorus
PA: Pennsylvania
ppt: precipitation
PSD: Particle Size Distribution
PLD: Pilot Level Designation
QA: quality assurance
QAPP: quality assurance project plan
QC: quality control
SAP: Sampling and Analysis Plan
SD: standard deviation
SM: Standard Methods
SOP: standard operating procedure
SSC: suspended sediment concentration
TAPE: Technology Assessment Protocol - Ecology
TARP: Technology Acceptance and Reciprocity Partnership
TEER: technology evaluation engineering report
TRC: Technical Review Committee
TN: Total nitrogen
TP: total phosphorus
TSS: total suspended solids
VA: Virginia
WA: Washington
Zn: zinc

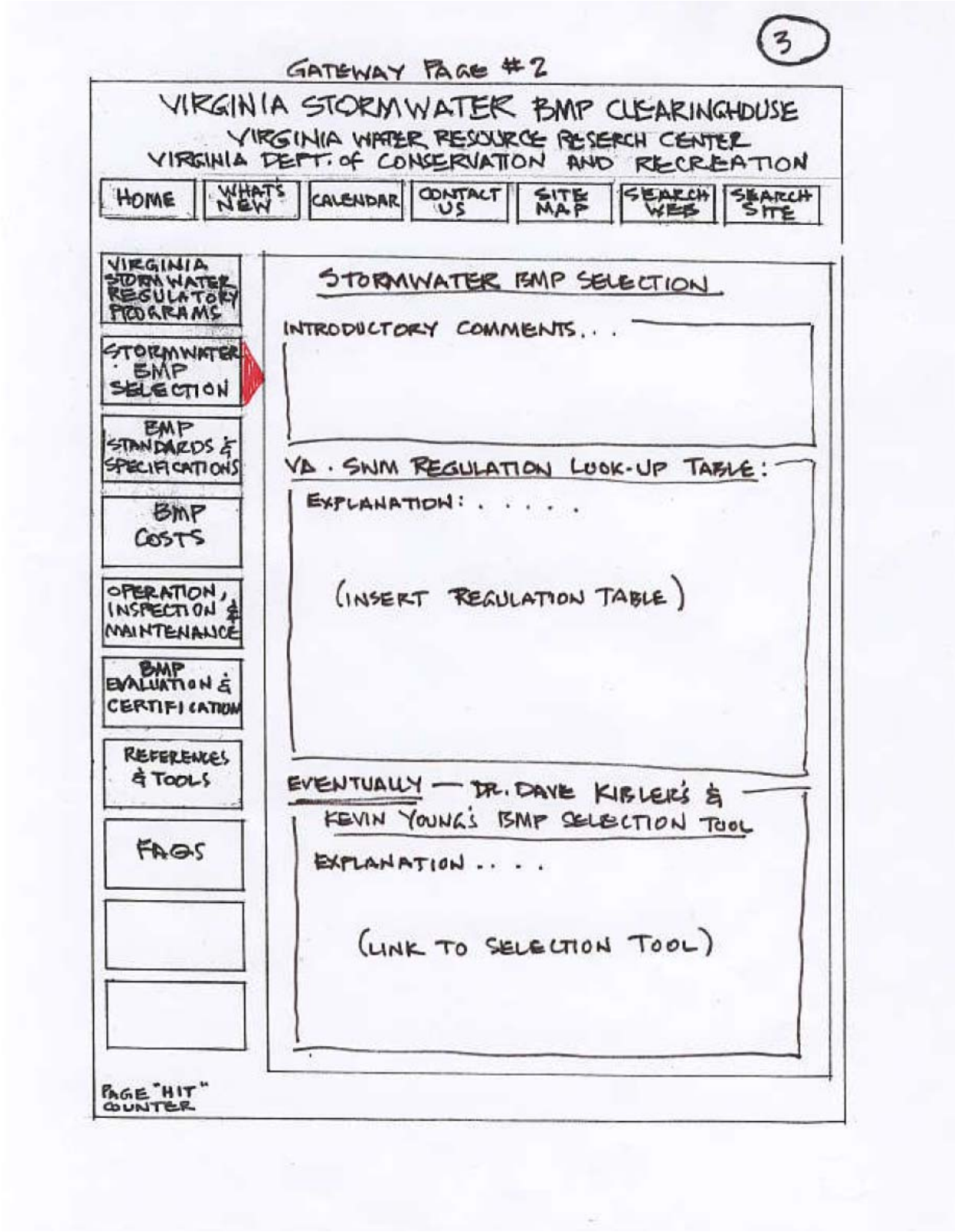
Appendix 2 – Draft of Clearinghouse Web Site

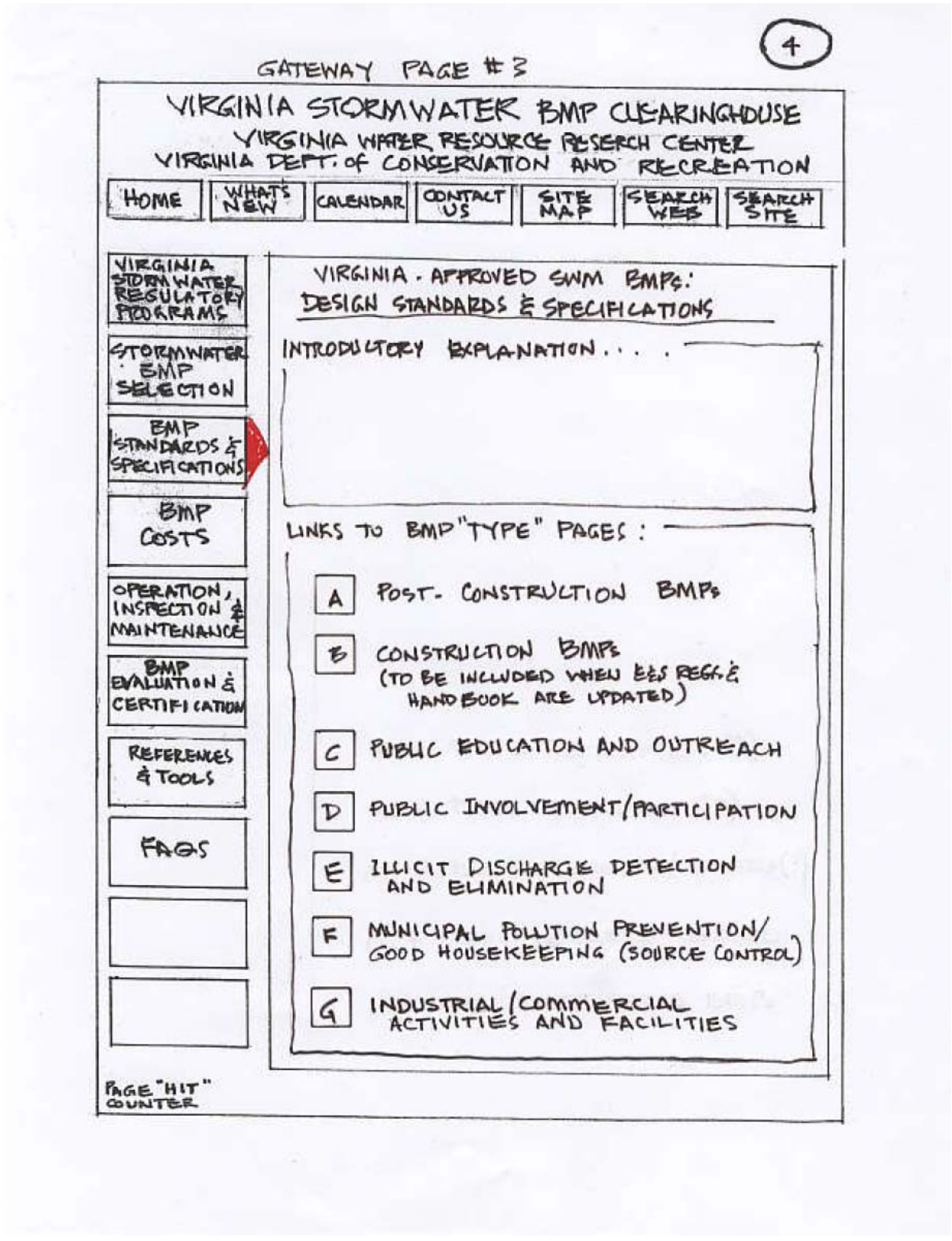



2
GATEWAY PAGE # 1
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
VIRGINIA STORMWATER-RELATED REGULATORY PROGRAMS
INTRODUCTORY COMMENTS . . .
GRAPHIC TABLE OR FLOW CHART OF ALL STORMWATER-RELATED PROGRAMS IN VIRGINIA
CONSTRUCTION (E&S CONTROL):
(LINK TO DCR REGIONAL OFFICE INFO)
(LINKS TO LOCAL PROGRAM INFO/CONTACTS)
(LINKS TO LAW, REGS & HANDBOOK)
POST-CONSTRUCTION (SWM): "RUNOFF CONTROL"
(LINK TO DCR REGIONAL OFFICE INFO)
(LINKS TO LOCAL PROGRAM INFO/CONTACTS)
(LINKS TO LAW, REGS & HANDBOOK)
NPDES:
• MS4 (MUNICIPAL) - PHASE I & II
• GENERAL CONSTRUCTION PERMIT
• INDUSTRIAL
(LINKS TO LAWS & REGS)

(2) - continued


VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
(Continued)
CHES. BAY PRESERV. ACT:
(LINKS TO LOCAL PROGRAM INFO/CONTACTS)
(LINKS TO LAW & REGS)
DAM SAFETY ACT:
(LINKS TO LAW & REGS)
TMDL WASTE LOAD ALLOCATIONS:
(LINKS TO DEQ IMPAIRED STREAMS & TMDL SITES)
(LINKS TO LAW & REGS)
§§ 401 & 404 OF CWA
• STATE & FEDERAL PERMITS
• SPGP
• VA. NONTIDAL WETLANDS ACT
(LINKS TO LAWS & REGS)
FLOODPLAIN MANAGEMENT
(LINKS TO LAW/REGS/FEMA MAPS)


3
GATEWAY PAGE #2
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
STORMWATER BMP SELECTION
INTRODUCTORY COMMENTS. . .
VA. SWM REGULATION LOOK-UP TABLE:
EXPLANATION: . . . . .
(INSERT REGULATION TABLE)
EVENTUALLY — DR. DAVE KIBLER'S & KEVIN YOUNG'S BMP SELECTION TOOL
EXPLANATION . . . .
(LINK TO SELECTION TOOL)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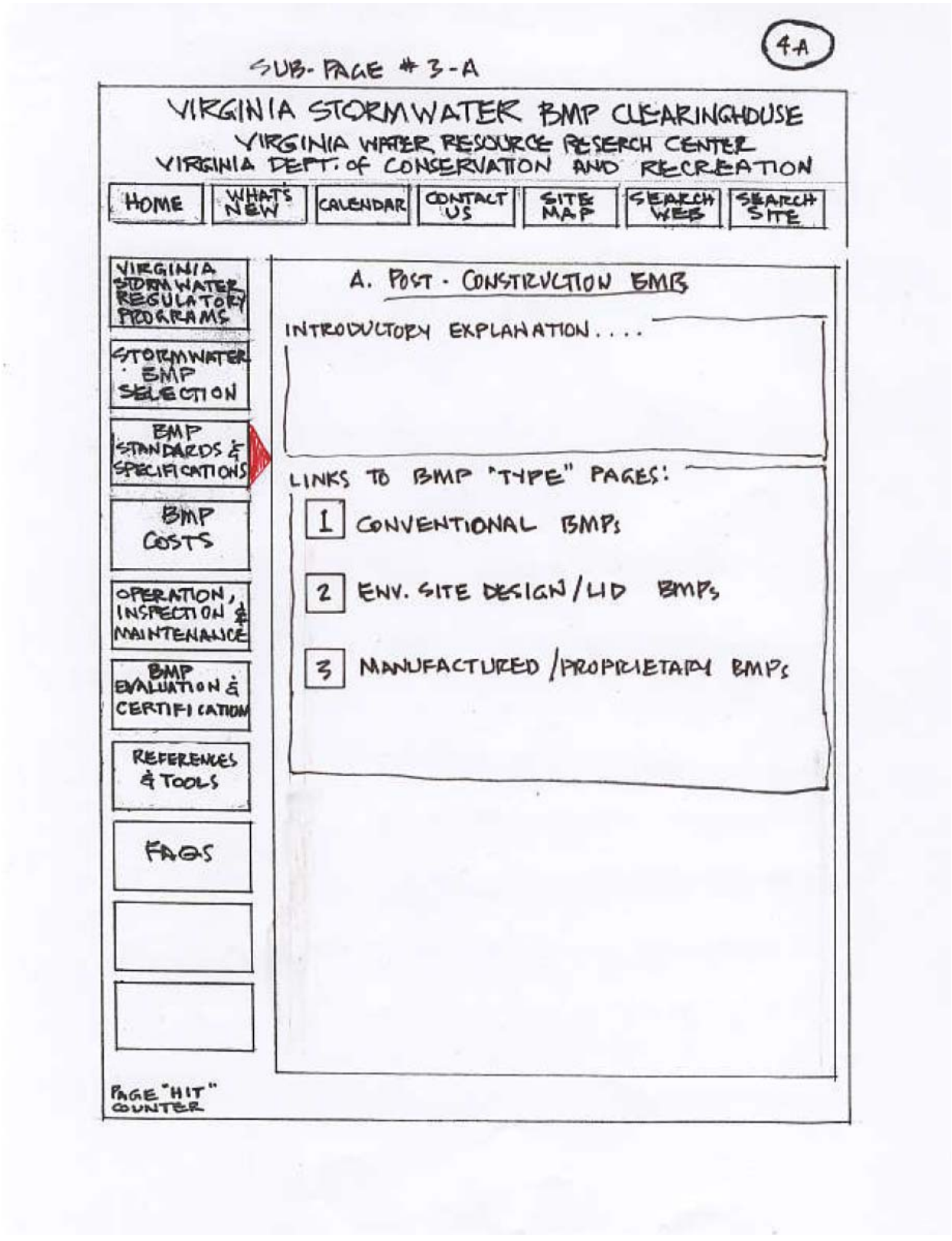
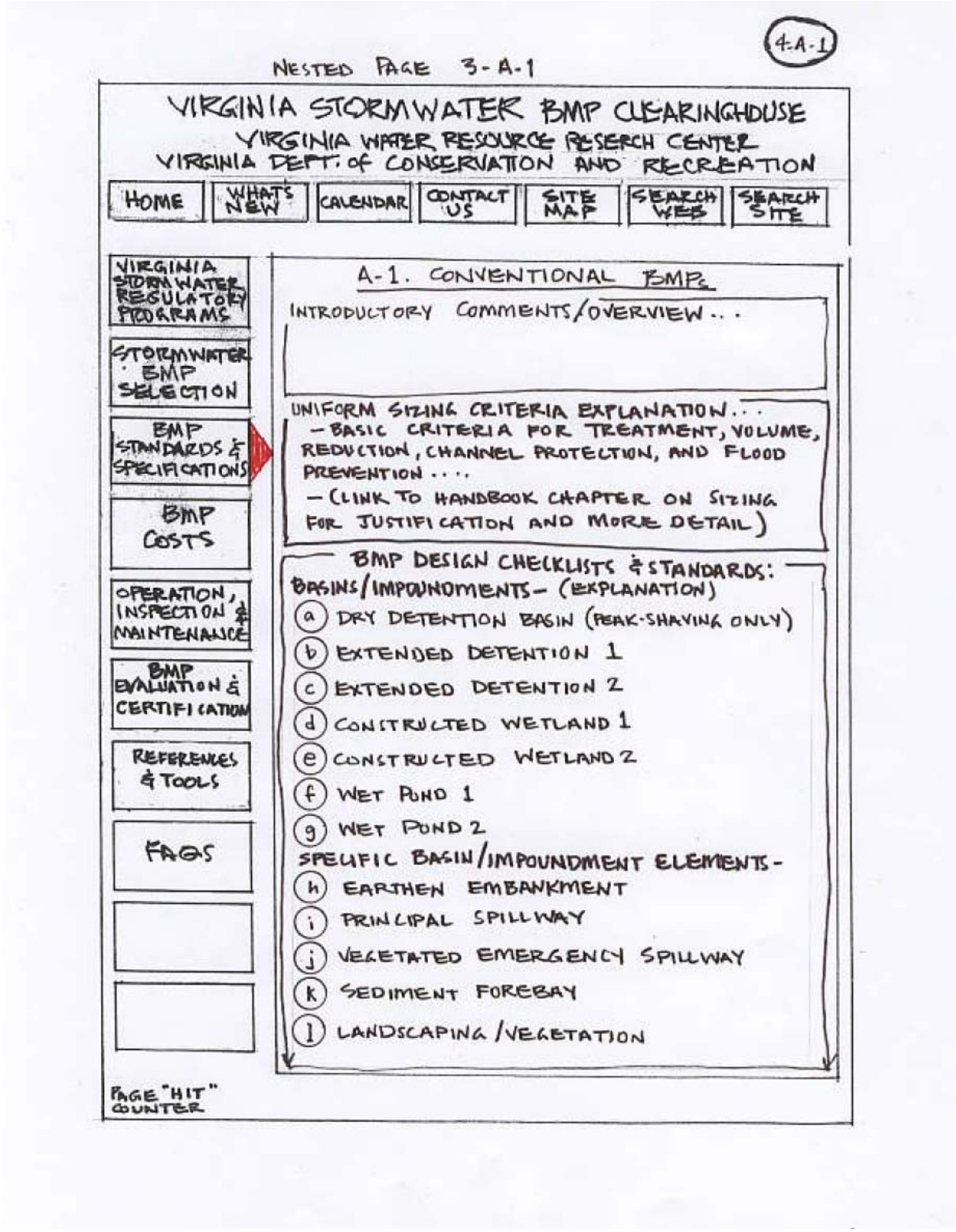
GATEWAY PAGE #3
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
VIRGINIA - APPROVED SWM BMPs:
DESIGN STANDARDS & SPECIFICATIONS
INTRODUCTORY EXPLANATION . . . .
LINKS TO BMP "TYPE" PAGES :
A POST-CONSTRUCTION BMPs
B CONSTRUCTION BMPs (TO BE INCLUDED WHEN E&S REGS & HANDBOOK ARE UPDATED)
C PUBLIC EDUCATION AND OUTREACH
D PUBLIC INVOLVEMENT/PARTICIPATION
E ILLICIT DISCHARGE DETECTION AND ELIMINATION
F MUNICIPAL POLLUTION PREVENTION/ GOOD HOUSEKEEPING (SOURCE CONTROL)
G INDUSTRIAL/COMMERCIAL ACTIVITIES AND FACILITIES


4A
SUB-PAGE #3-A
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
A. POST-CONSTRUCTION BMPS
INTRODUCTORY EXPLANATION....
LINKS TO BMP "TYPE" PAGES:
1 CONVENTIONAL BMPs
2 ENV. SITE DESIGN/LID BMPs
3 MANUFACTURED/PROPRIETARY BMPs


4-A-1
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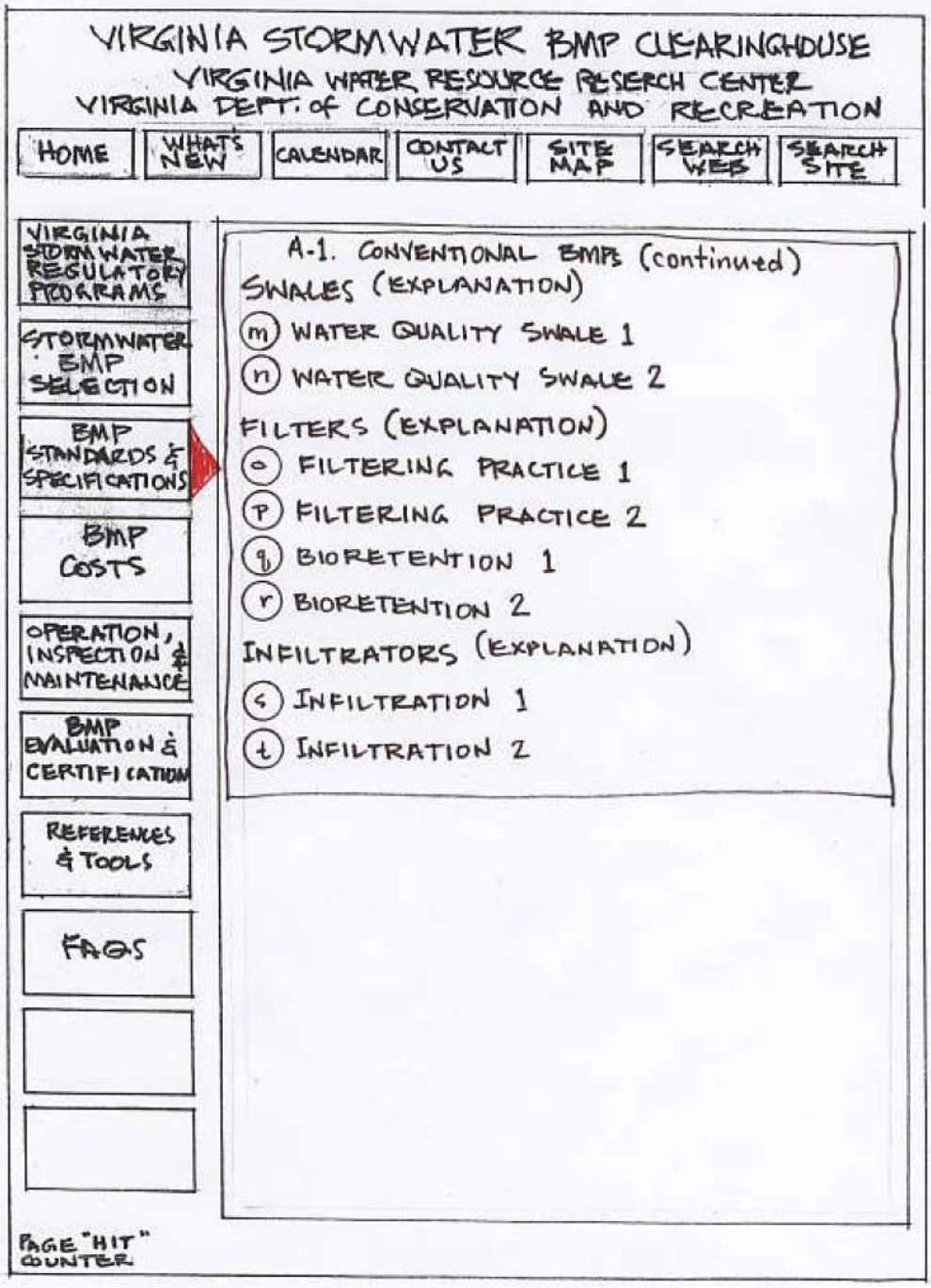
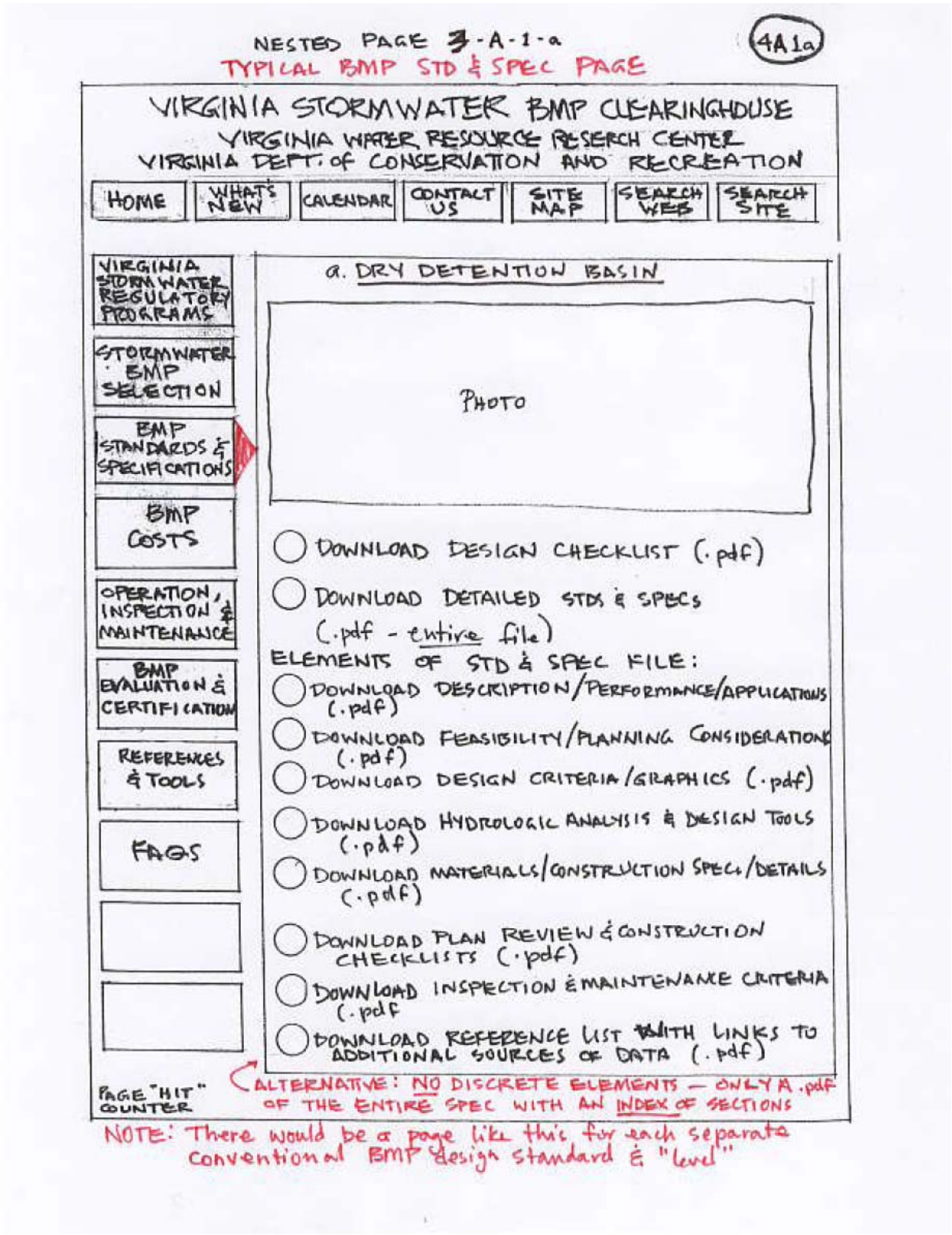
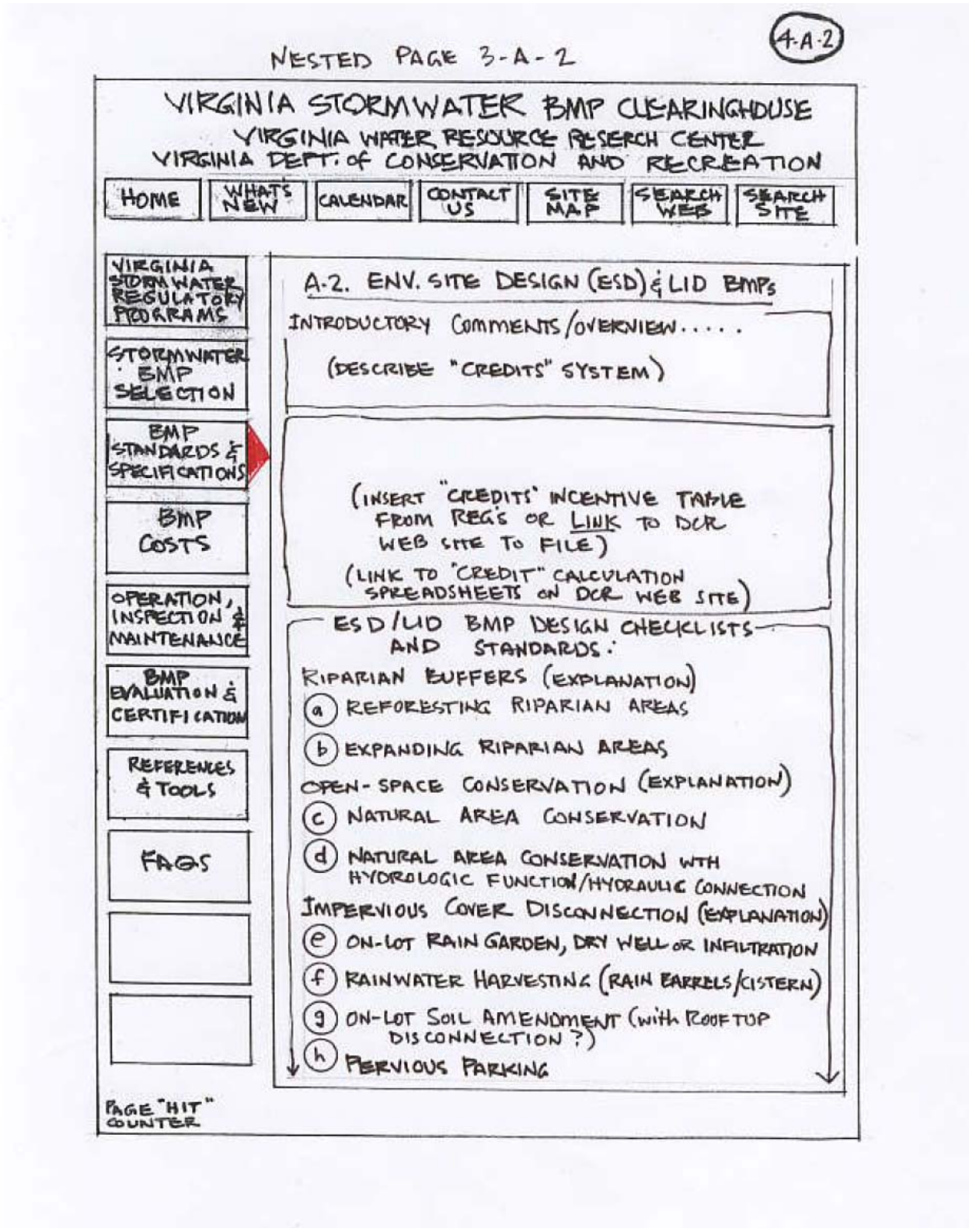
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
A-1. CONVENTIONAL BMPs
INTRODUCTORY COMMENTS/OVERVIEW...
UNIFORM SIZING CRITERIA EXPLANATION...
- BASIC CRITERIA FOR TREATMENT, VOLUME, REDUCTION, CHANNEL PROTECTION, AND FLOOD PREVENTION....
- (LINK TO HANDBOOK CHAPTER ON SIZING FOR JUSTIFICATION AND MORE DETAIL)
BMP DESIGN CHECKLISTS & STANDARDS:
BASINS/IMPOUNDMENTS - (EXPLANATION)
(a) DRY DETENTION BASIN (PEAK-SHAVING ONLY)
(b) EXTENDED DETENTION 1
(c) EXTENDED DETENTION 2
(d) CONSTRUCTED WETLAND 1
(e) CONSTRUCTED WETLAND 2
(f) WET POND 1
(g) WET POND 2
SPECIFIC BASIN/IMPOUNDMENT ELEMENTS -
(h) EARTHEN EMBANKMENT
(i) PRINCIPAL SPILLWAY
(j) VEGETATED EMERGENCY SPILLWAY
(k) SEDIMENT FOREBAY
(l) LANDSCAPING/VEGETATION

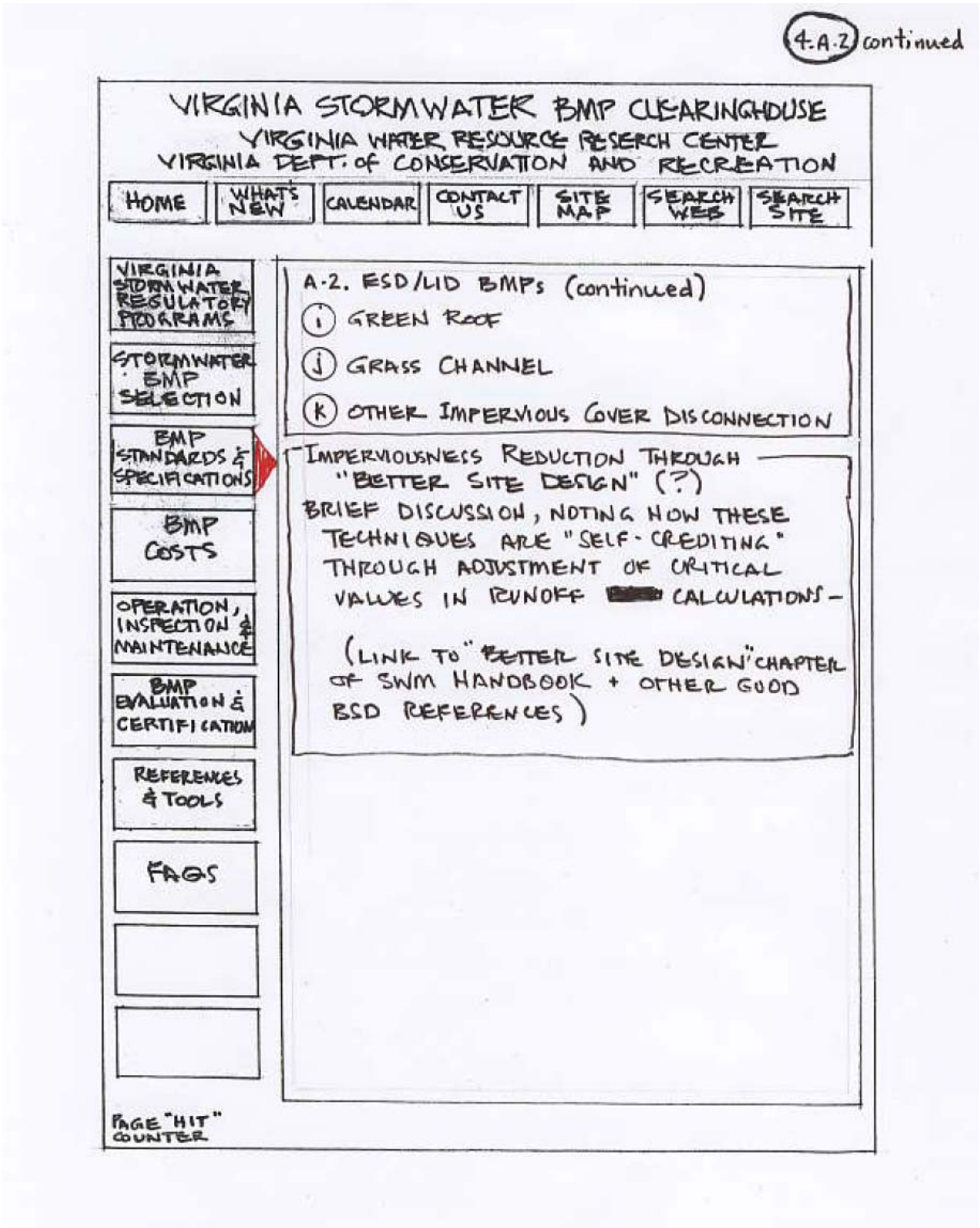
4. A-1 continued




NESTED PAGE 3-A-1-a
4A1a
TYPICAL BMP STD & SPEC PAGE
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
a. DRY DETENTION BASIN
PHOTO
DOWNLOAD DESIGN CHECKLIST (.pdf)
DOWNLOAD DETAILED STDS & SPECS (.pdf - entire file)
ELEMENTS OF STD & SPEC FILE:
DOWNLOAD DESCRIPTION/PERFORMANCE/APPLICATIONS (.pdf)
DOWNLOAD FEASIBILITY/PLANNING CONSIDERATIONS (.pdf)
DOWNLOAD DESIGN CRITERIA/GRAPHICS (.pdf)
DOWNLOAD HYDROLOGIC ANALYSIS & DESIGN TOOLS (.pdf)
DOWNLOAD MATERIALS/CONSTRUCTION SPECS/DETAILS (.pdf)
DOWNLOAD PLAN REVIEW & CONSTRUCTION CHECKLISTS (.pdf)
DOWNLOAD INSPECTION & MAINTENANCE CRITERIA (.pdf)
DOWNLOAD REFERENCE LIST WITH LINKS TO ADDITIONAL SOURCES OF DATA (.pdf)
ALTERNATIVE: NO DISCRETE ELEMENTS — ONLY A .pdf OF THE ENTIRE SPEC WITH AN INDEX OF SECTIONS
PAGE "HIT" COUNTER
NOTE: There would be a page like this for each separate conventional BMP design standard & "level"


4-A-2
NESTED PAGE 3-A-2
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
A-2. ENV. SITE DESIGN (ESD) & LID BMPs
INTRODUCTORY COMMENTS/OVERVIEW.....
(DESCRIBE "CREDITS" SYSTEM)
(INSERT "CREDITS" INCENTIVE TABLE FROM REG'S OR LINK TO DCR WEB SITE TO FILE)
(LINK TO "CREDIT" CALCULATION SPREADSHEETS ON DCR WEB SITE)
ESD/LID BMP DESIGN CHECKLISTS AND STANDARDS:
RIPARIAN BUFFERS (EXPLANATION)
(a) REFORESTING RIPARIAN AREAS
(b) EXPANDING RIPARIAN AREAS
OPEN-SPACE CONSERVATION (EXPLANATION)
(c) NATURAL AREA CONSERVATION
(d) NATURAL AREA CONSERVATION WITH HYDROLOGIC FUNCTION/HYDRAULIC CONNECTION
IMPERVIOUS COVER DISCONNECTION (EXPLANATION)
(e) ON-LOT RAIN GARDEN, DRY WELL OR INFILTRATION
(f) RAINWATER HARVESTING (RAIN BARRELS/CISTERN)
(g) ON-LOT SOIL AMENDMENT (with ROOFTOP DISCONNECTION?)
(h) PERVIOUS PARKING

4.A.2 continued



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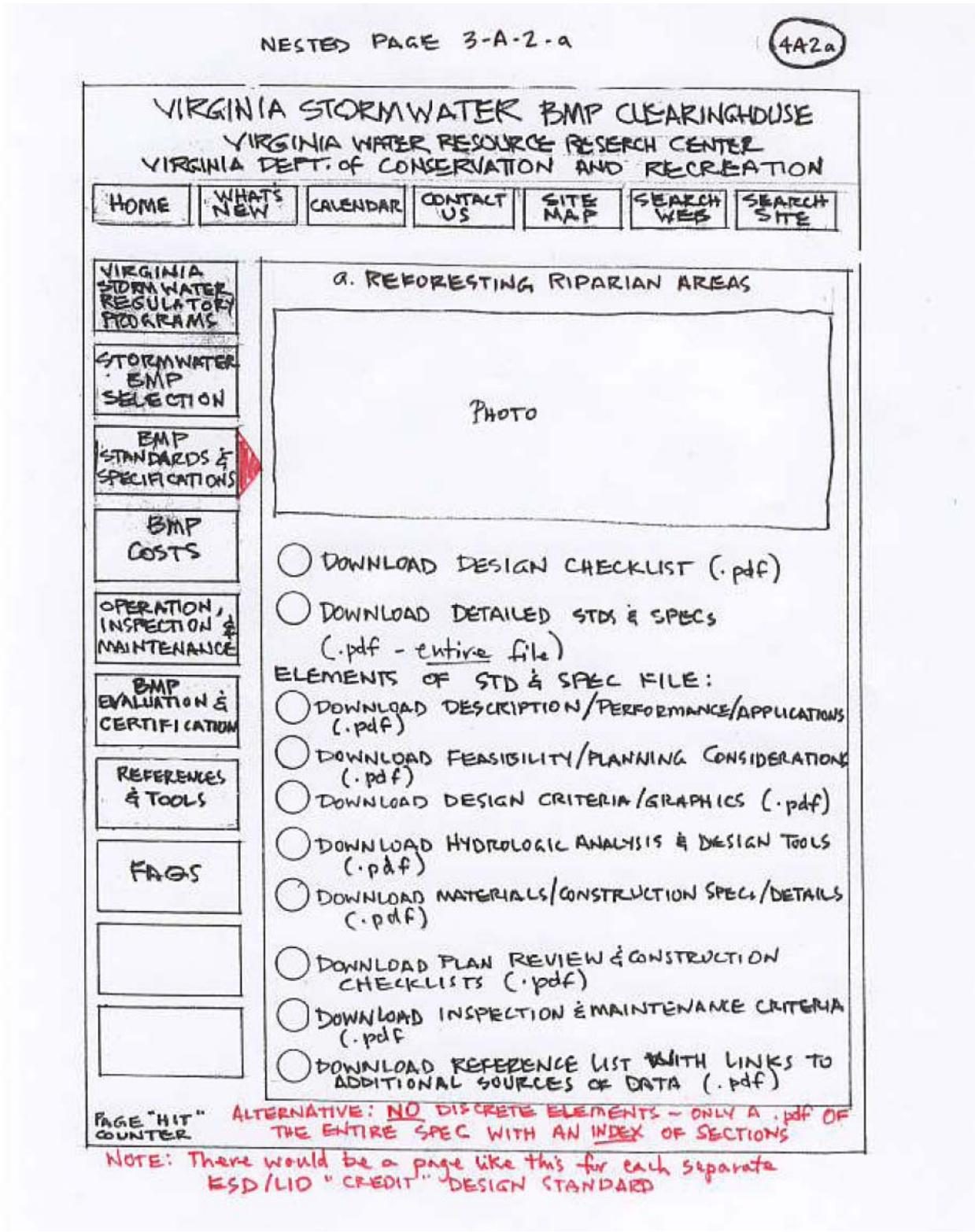

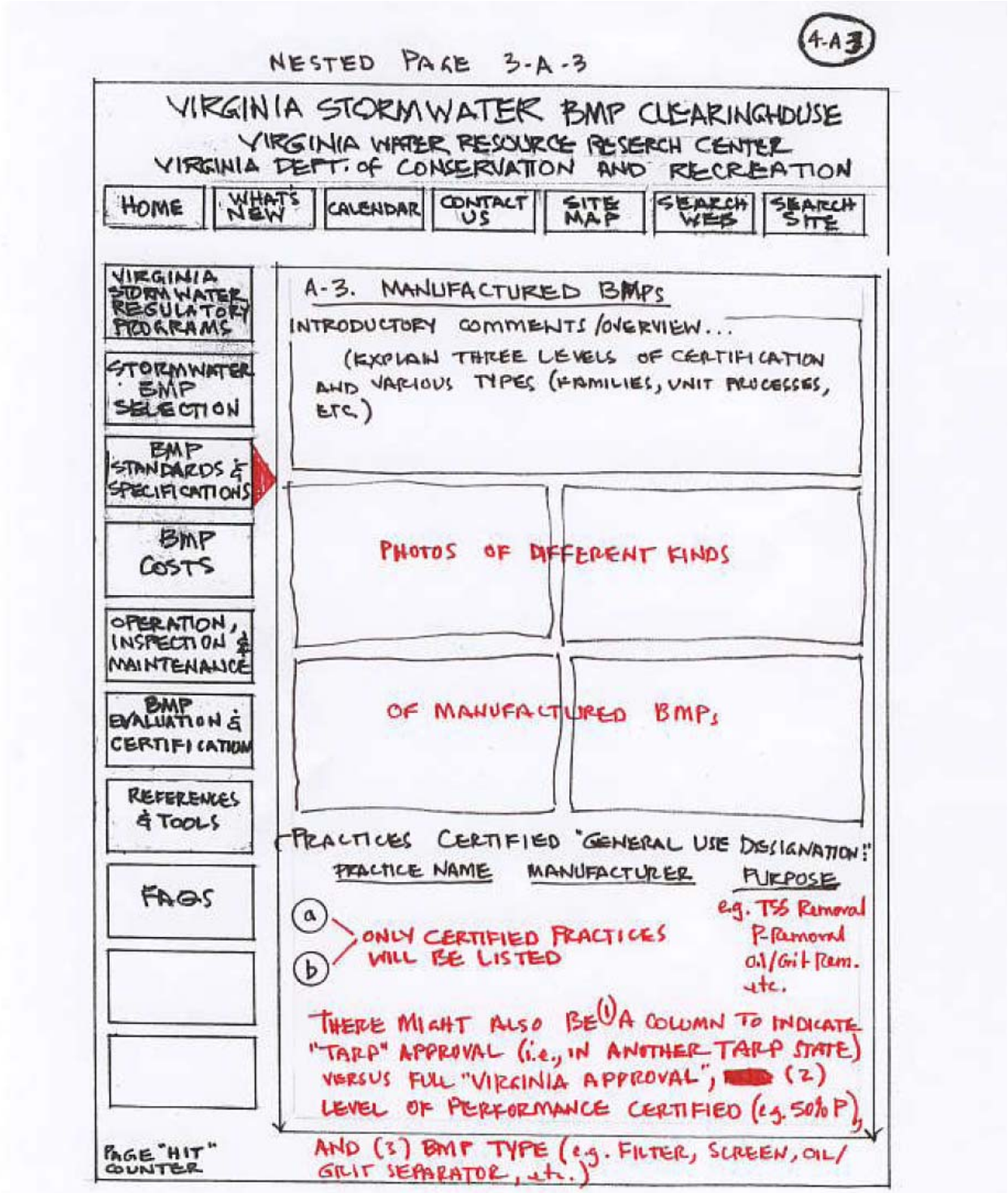
4-A3
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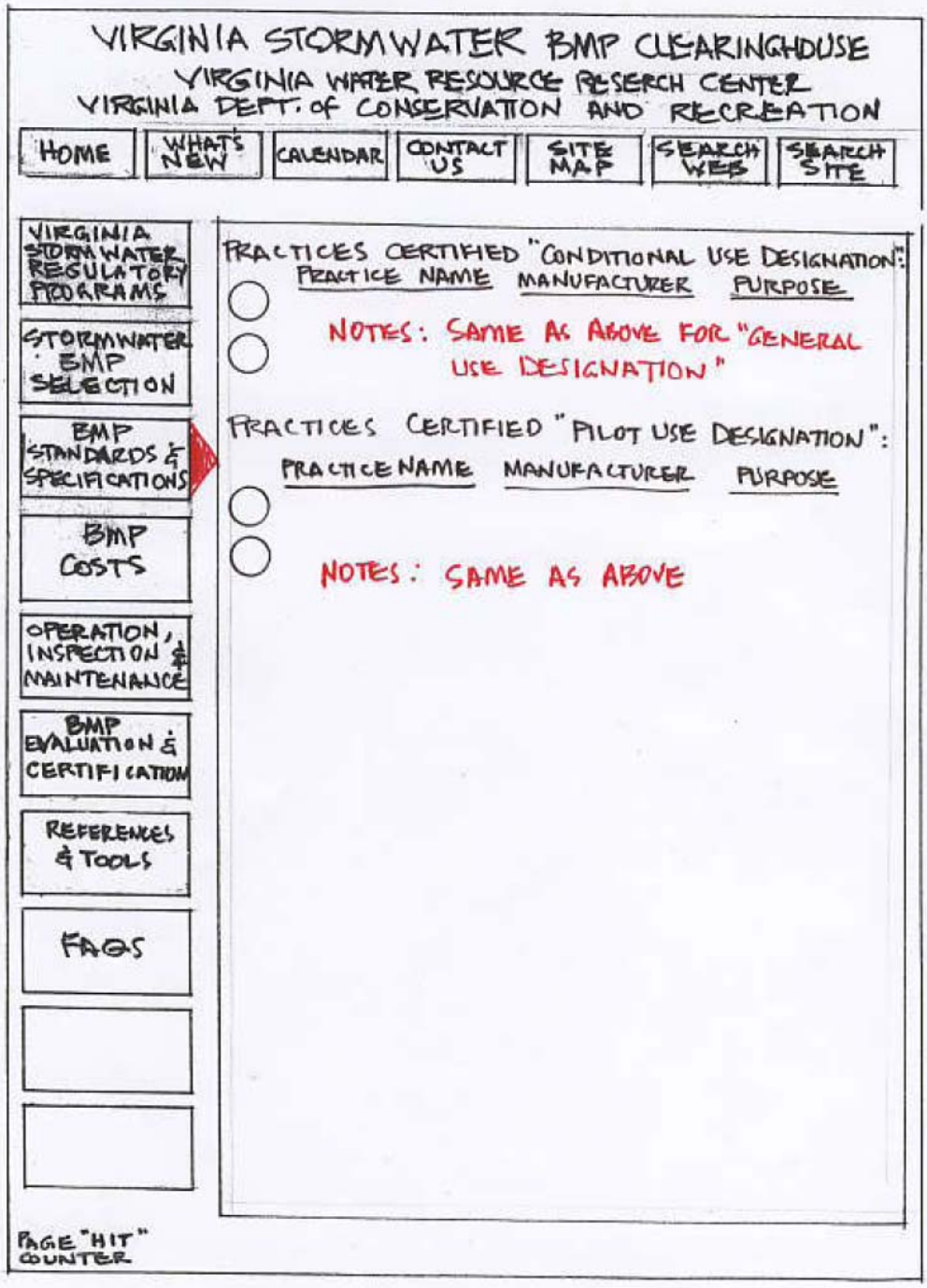
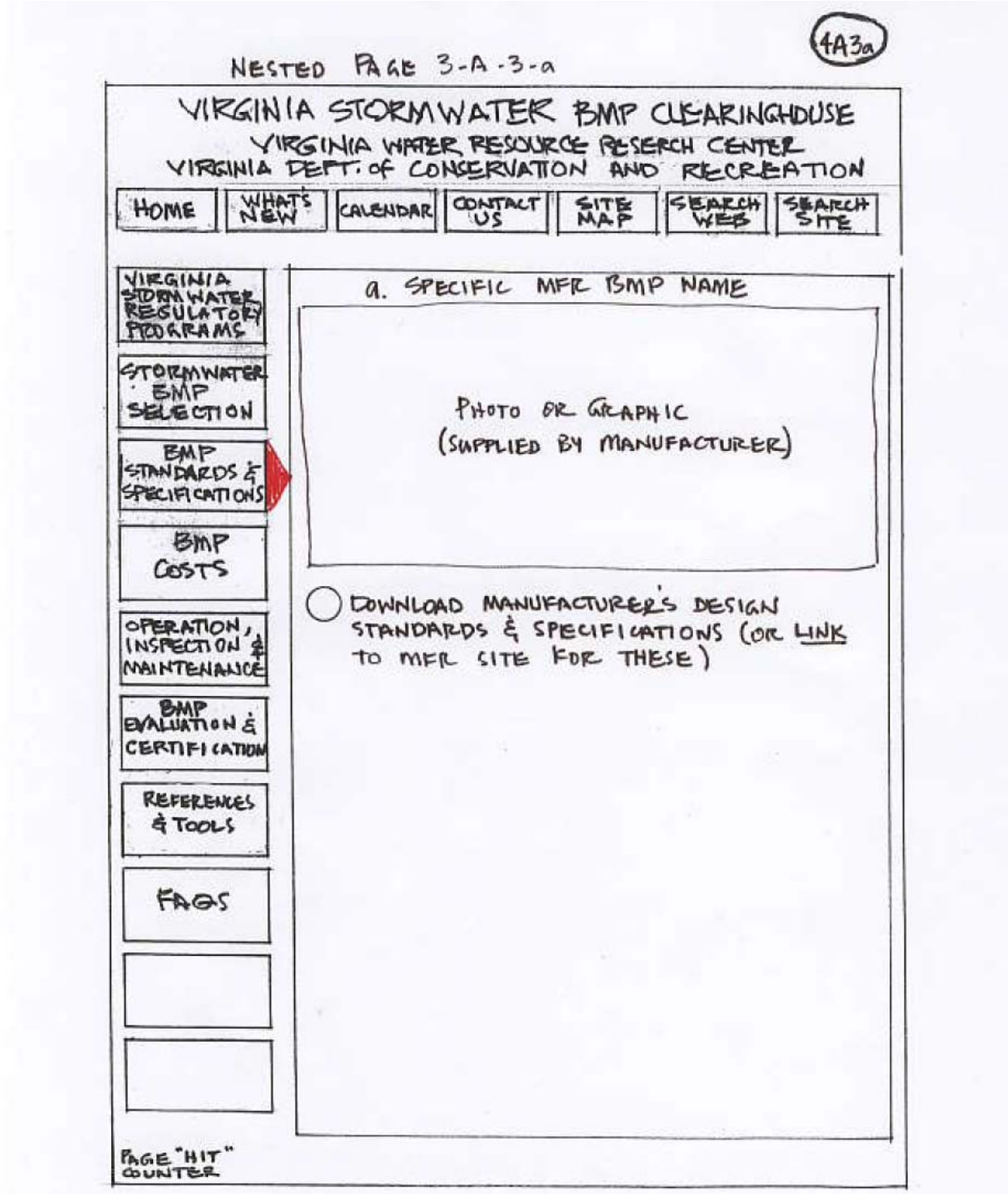
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
A-3. MANUFACTURED BMPs
INTRODUCTORY COMMENTS/OVERVIEW...
(EXPLAIN THREE LEVELS OF CERTIFICATION AND VARIOUS TYPES (FAMILIES, UNIT PROCESSES, ETC.)
PHOTOS OF DIFFERENT KINDS
OF MANUFACTURED BMPs
PRACTICES CERTIFIED "GENERAL USE DESIGNATION"
PRACTICE NAME
MANUFACTURER
PURPOSE
e.g. TSS Removal
P-Removal
Oil/Grit Rem.
etc.
(a)
(b)
ONLY CERTIFIED PRACTICES WILL BE LISTED
THERE MIGHT ALSO BE (1) A COLUMN TO INDICATE "TARP" APPROVAL (i.e., IN ANOTHER TARP STATE) VERSUS FULL "VIRGINIA APPROVAL", (2) LEVEL OF PERFORMANCE CERTIFIED (e.g. 50% P), AND (3) BMP TYPE (e.g. FILTER, SCREEN, OIL/GRIT SEPARATOR, etc.)

4-A-3 continued

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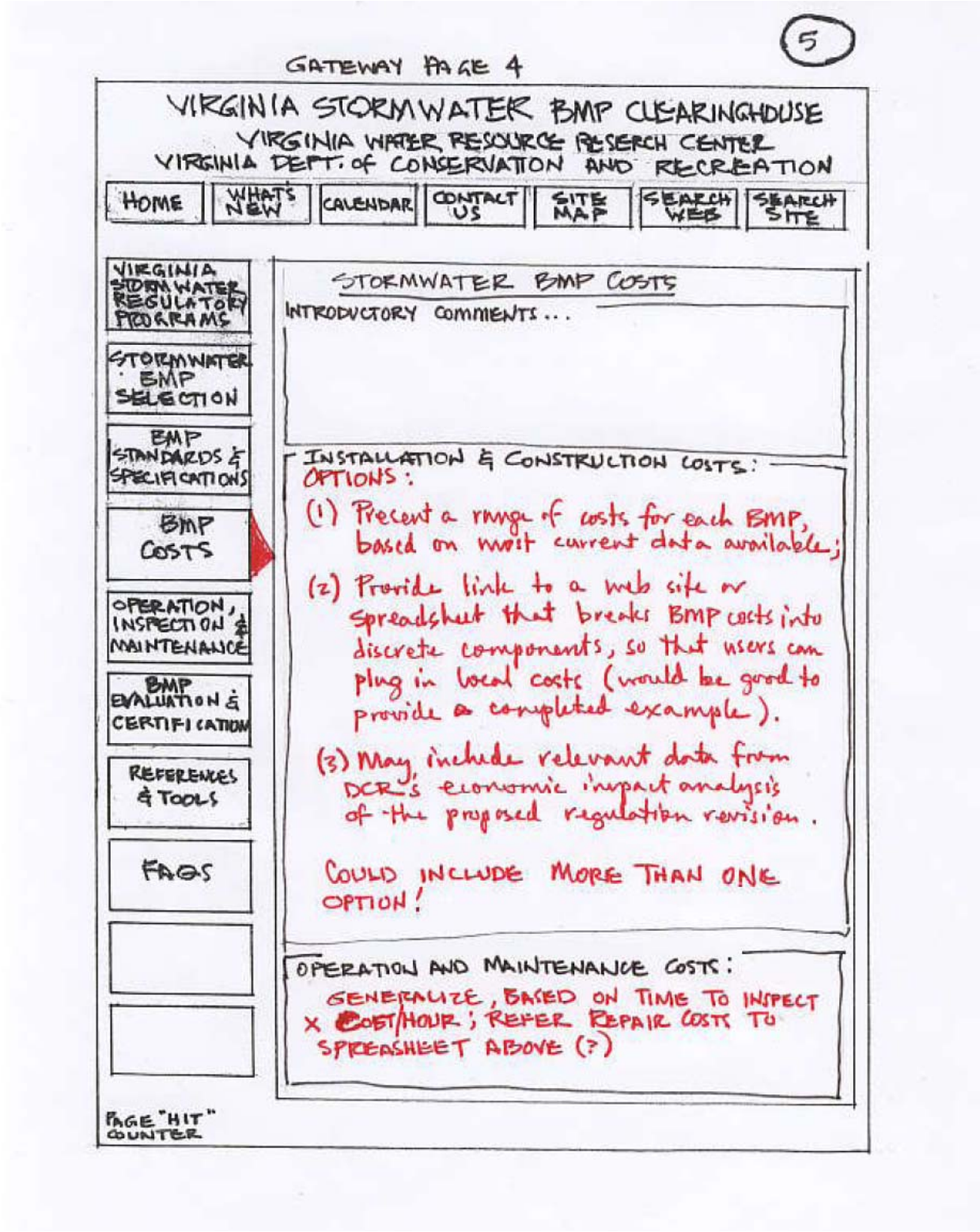
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
a. SPECIFIC MFR BMP NAME
PHOTO OR GRAPHIC
(SUPPLIED BY MANUFACTURER)
DOWNLOAD MANUFACTURER'S DESIGN STANDARDS & SPECIFICATIONS (OR LINK TO MFR SITE FOR THESE)


5
GATEWAY PAGE 4
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
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VIRGINIA STORMWATER REGULATORY PROGRAMS
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REFERENCES & TOOLS
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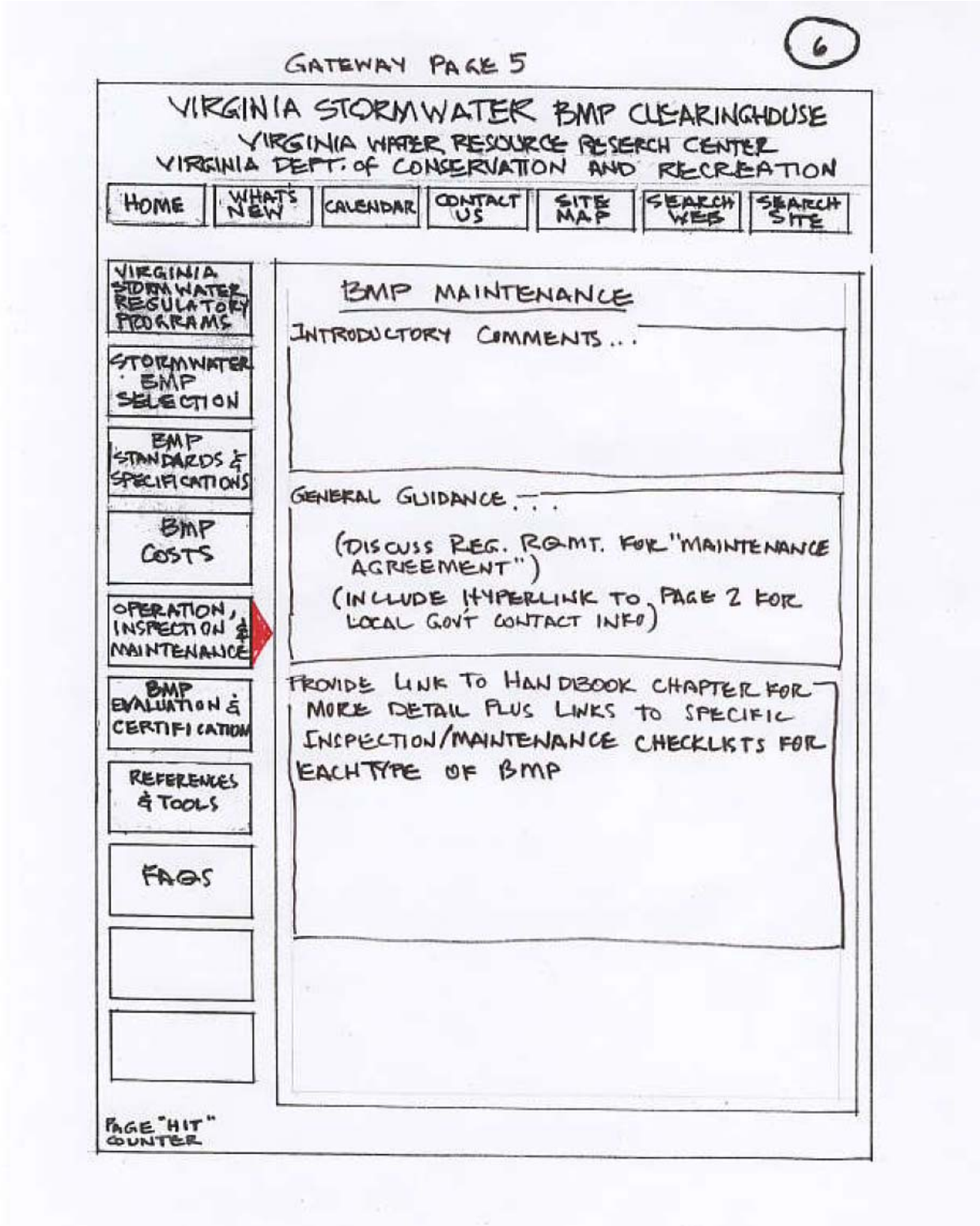
PAGE "HIT" COUNTER
STORMWATER BMP COSTS
INTRODUCTORY COMMENTS...
INSTALLATION & CONSTRUCTION COSTS:
OPTIONS:
(1) Present a range of costs for each BMP, based on most current data available;
(2) Provide link to a web site or spreadsheet that breaks BMP costs into discrete components, so that users can plug in local costs (would be good to provide a completed example).
(3) May include relevant data from DCR's economic impact analysis of the proposed regulation revision.
COULD INCLUDE MORE THAN ONE OPTION!
OPERATION AND MAINTENANCE COSTS:
GENERALIZE, BASED ON TIME TO INSPECT X COST/HOUR; REFER REPAIR COSTS TO SPREADSHEET ABOVE (?)


6
GATEWAY PAGE 5
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
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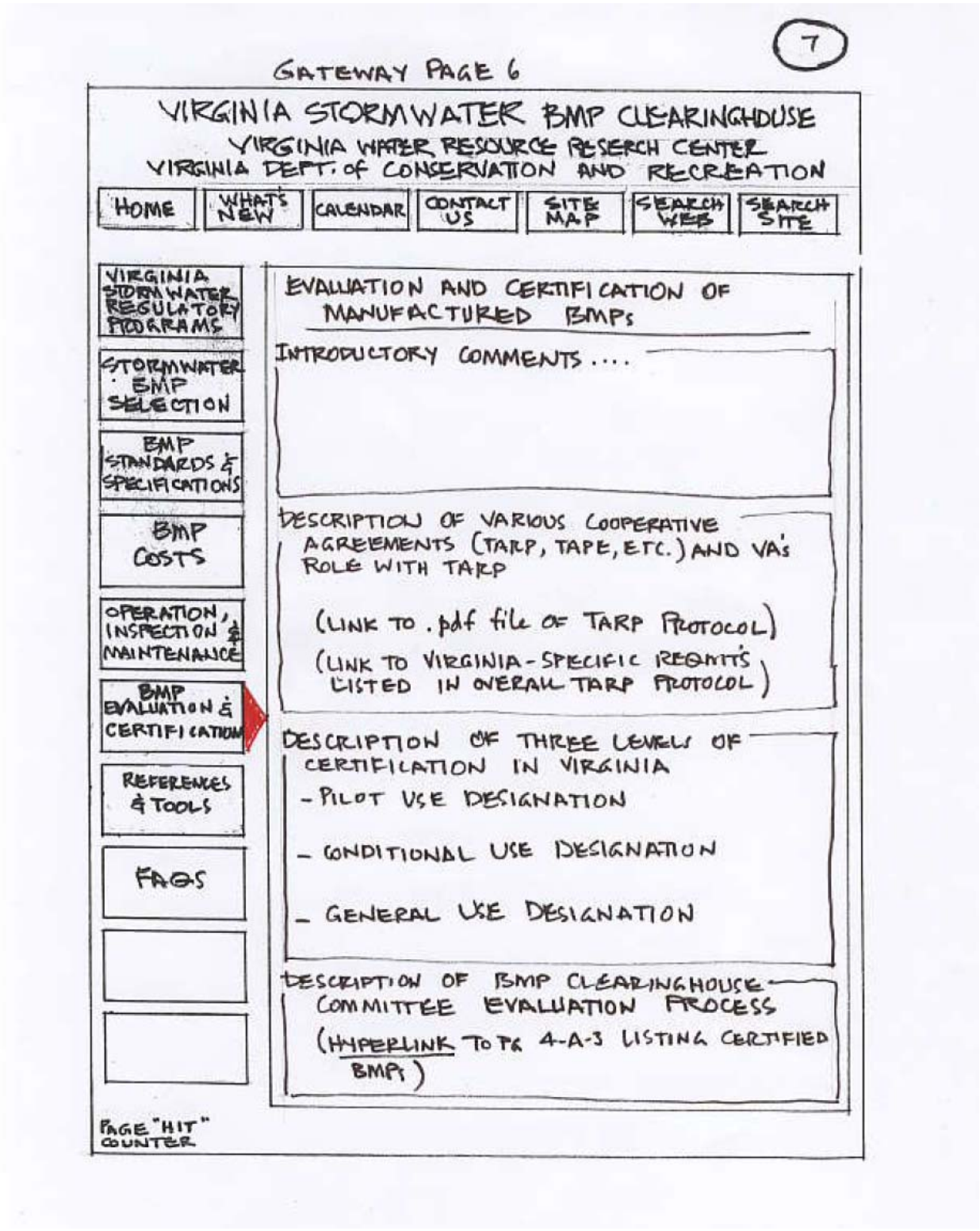
FAQS
PAGE "HIT" COUNTER
BMP MAINTENANCE
INTRODUCTORY COMMENTS...
GENERAL GUIDANCE...
(DISCUSS REG. RQMT. FOR "MAINTENANCE AGREEMENT")
(INCLUDE HYPERLINK TO PAGE 2 FOR LOCAL GOVT CONTACT INFO)
PROVIDE LINK TO HANDBOOK CHAPTER FOR MORE DETAIL PLUS LINKS TO SPECIFIC INSPECTION/MAINTENANCE CHECKLISTS FOR EACH TYPE OF BMP


7
GATEWAY PAGE 6
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
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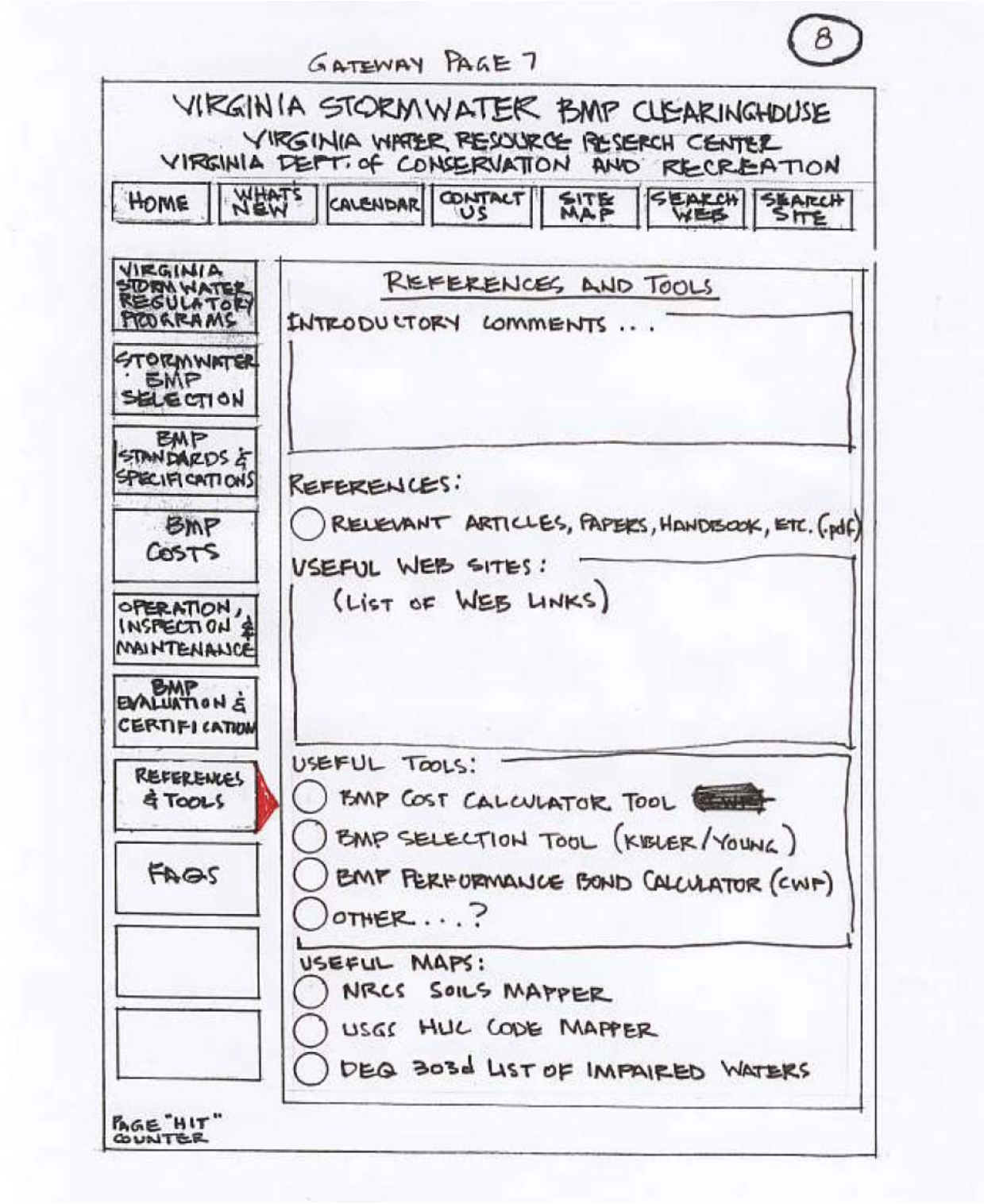
EVALUATION AND CERTIFICATION OF MANUFACTURED BMPs
INTRODUCTORY COMMENTS ....
DESCRIPTION OF VARIOUS COOPERATIVE AGREEMENTS (TARP, TAPE, ETC.) AND VA's ROLE WITH TARP
(LINK TO .pdf file OF TARP PROTOCOL)
(LINK TO VIRGINIA-SPECIFIC REQMTS LISTED IN OVERALL TARP PROTOCOL)
DESCRIPTION OF THREE LEVELS OF CERTIFICATION IN VIRGINIA
- PILOT USE DESIGNATION
- CONDITIONAL USE DESIGNATION
- GENERAL USE DESIGNATION
DESCRIPTION OF BMP CLEARINGHOUSE COMMITTEE EVALUATION PROCESS
(HYPERLINK TO Pg 4-A-3 LISTING CERTIFIED BMPs)
PAGE "HIT" COUNTER


8
GATEWAY PAGE 7
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
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VIRGINIA STORMWATER REGULATORY PROGRAMS
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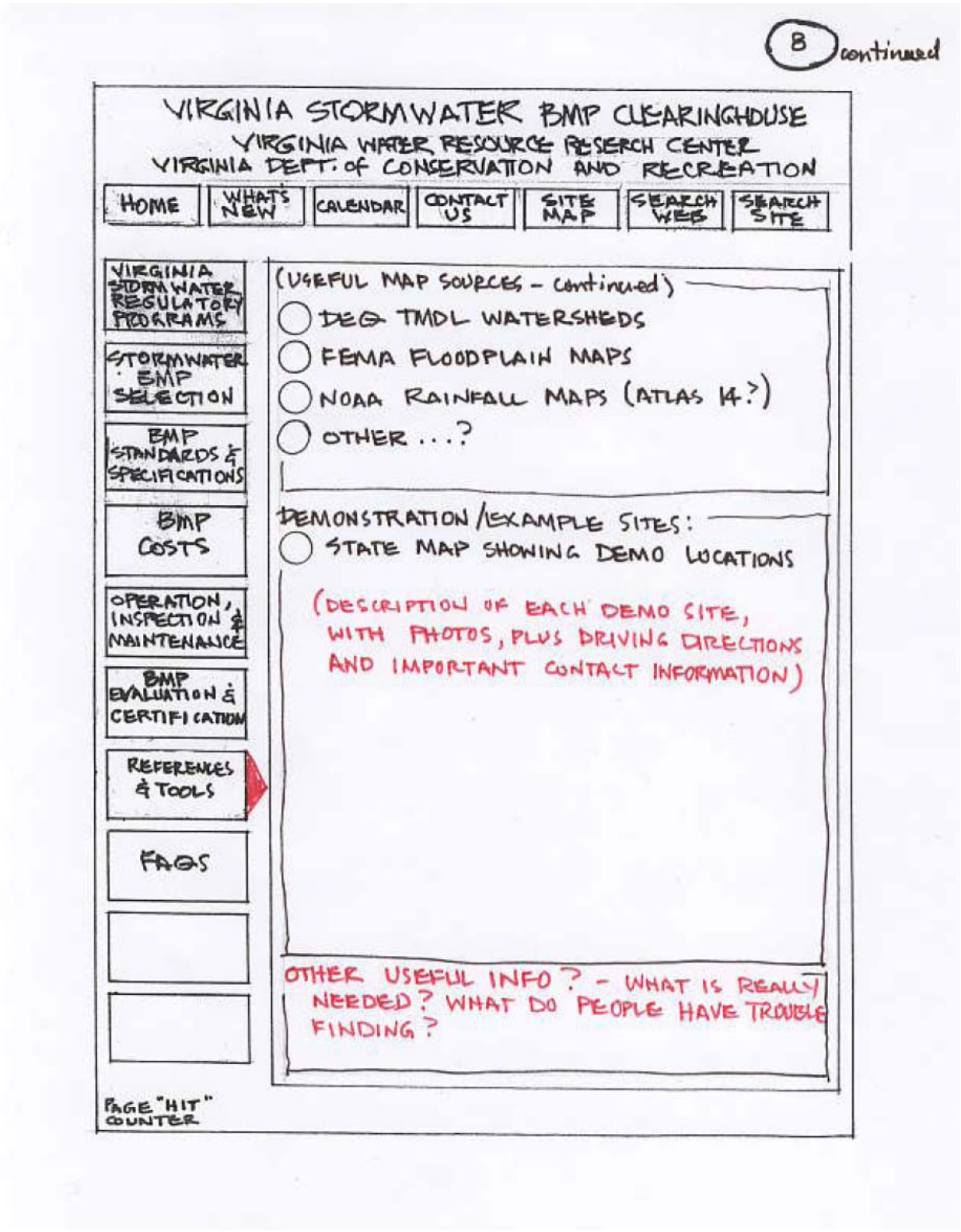
FAQS
PAGE "HIT" COUNTER
REFERENCES AND TOOLS
INTRODUCTORY COMMENTS . . .
REFERENCES:
RELEVANT ARTICLES, PAPERS, HANDBOOK, ETC. (.pdf)
USEFUL WEB SITES:
(LIST OF WEB LINKS)
USEFUL TOOLS:
BMP COST CALCULATOR TOOL
BMP SELECTION TOOL (KIBLER/YOUNG)
BMP PERFORMANCE BOND CALCULATOR (CWP)
OTHER . . . ?
USEFUL MAPS:
NRCS SOILS MAPPER
USGS HUC CODE MAPPER
DEQ 303d LIST OF IMPAIRED WATERS


8 continued
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VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
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OPERATION, INSPECTION & MAINTENANCE
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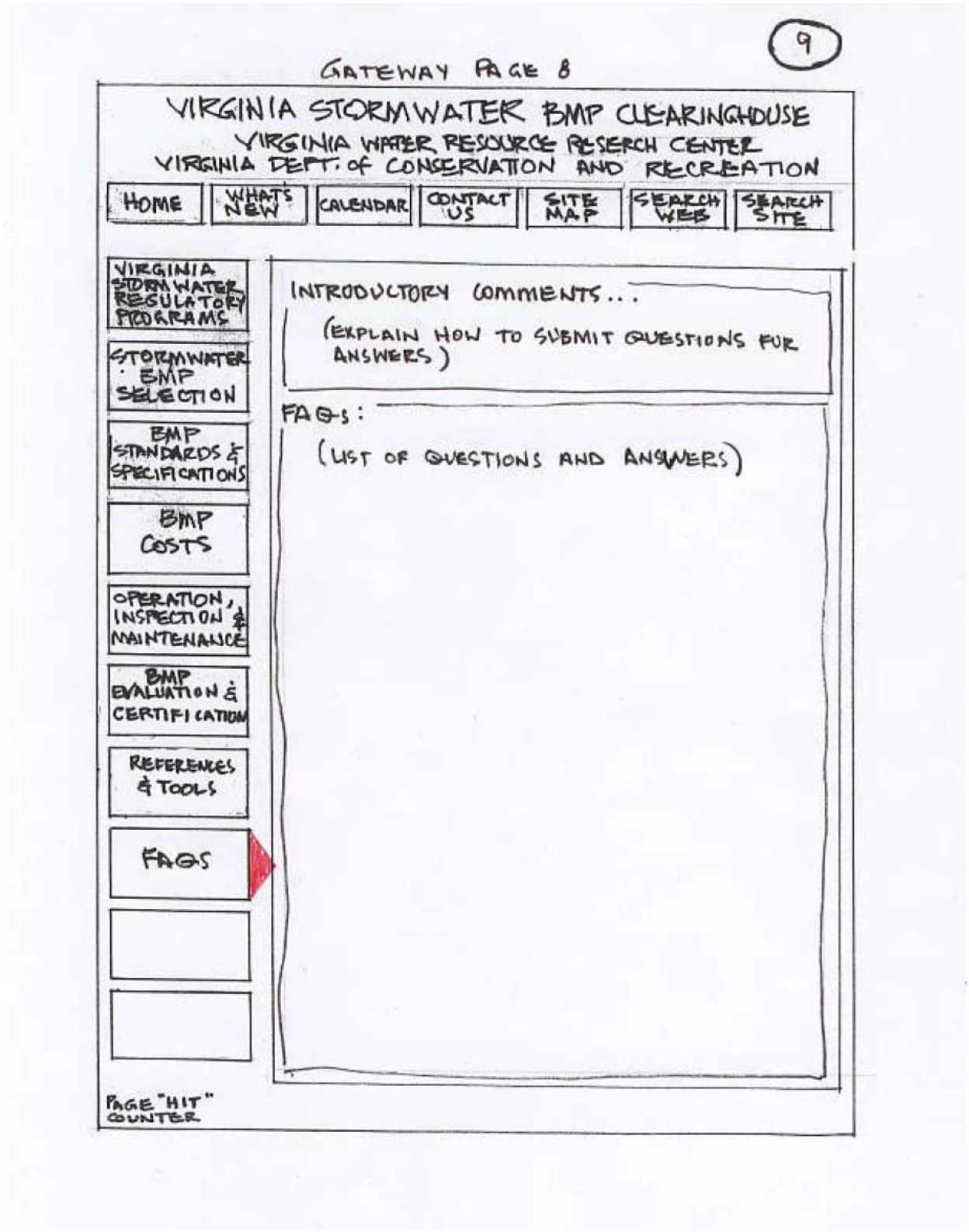
PAGE "HIT" COUNTER
(USEFUL MAP SOURCES - continued)
DEQ TMDL WATERSHEDS
FEMA FLOODPLAIN MAPS
NOAA RAINFALL MAPS (ATLAS 14.?)
OTHER ...?
DEMONSTRATION/EXAMPLE SITES:
STATE MAP SHOWING DEMO LOCATIONS
(DESCRIPTION OF EACH DEMO SITE, WITH PHOTOS, PLUS DRIVING DIRECTIONS AND IMPORTANT CONTACT INFORMATION)
OTHER USEFUL INFO? - WHAT IS REALLY NEEDED? WHAT DO PEOPLE HAVE TROUBLE FINDING?


9
GATEWAY PAGE 8
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
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VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
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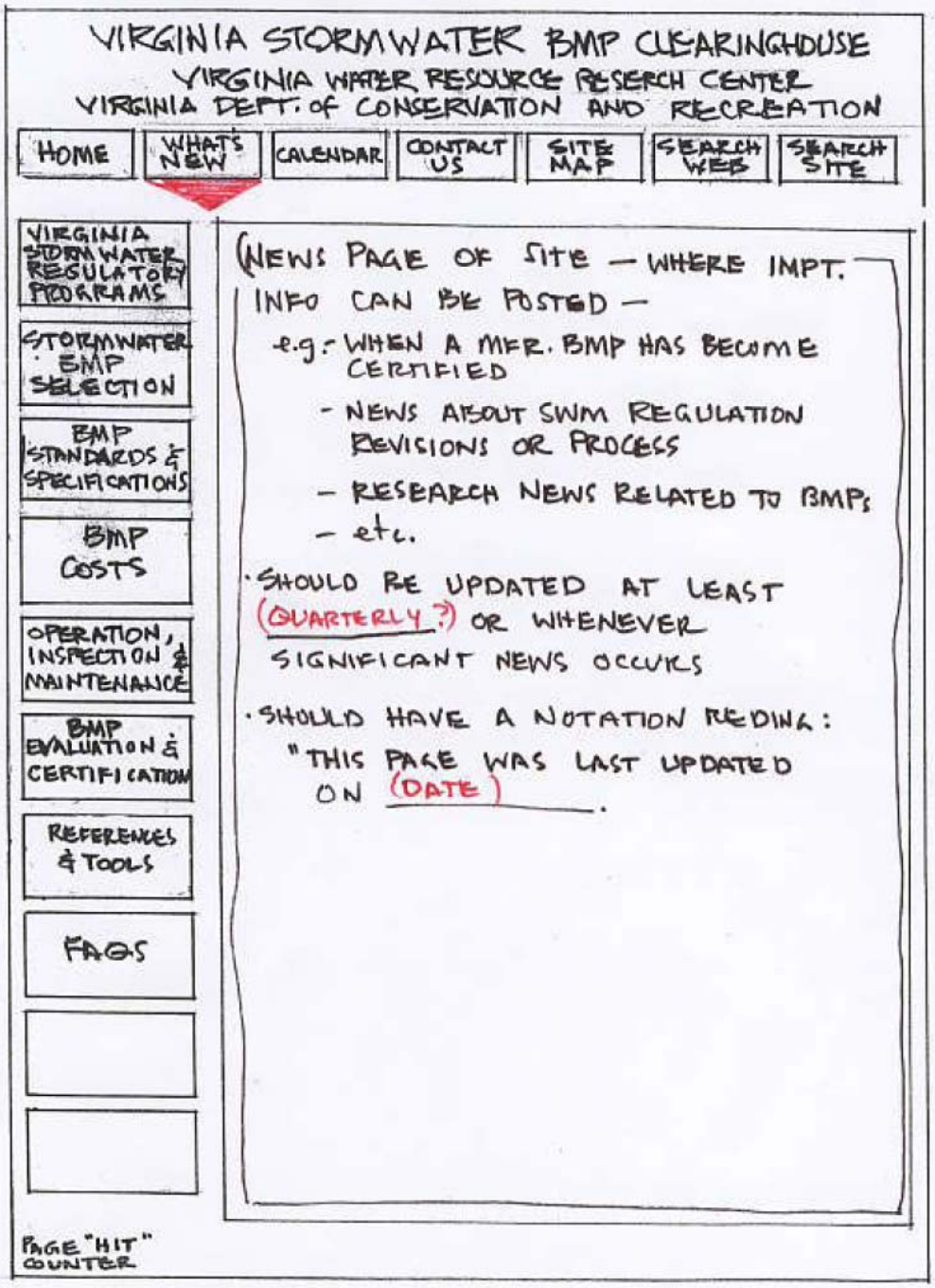
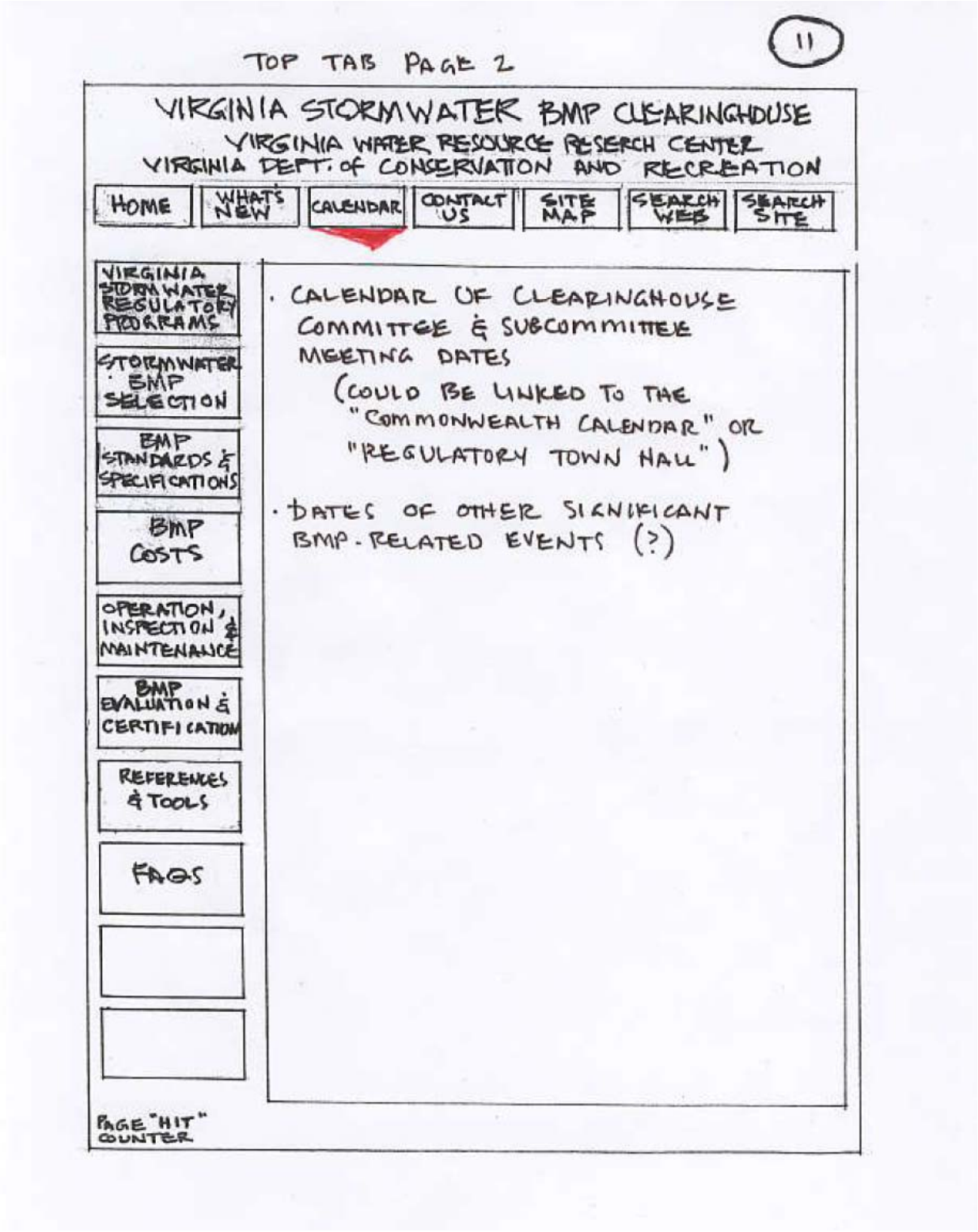
(EXPLAIN HOW TO SUBMIT QUESTIONS FOR ANSWERS)
FAQ-S:
(LIST OF QUESTIONS AND ANSWERS)
PAGE "HIT" COUNTER

TOP TAB PAGE 1

10




11
TOP TAB PAGE 2
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
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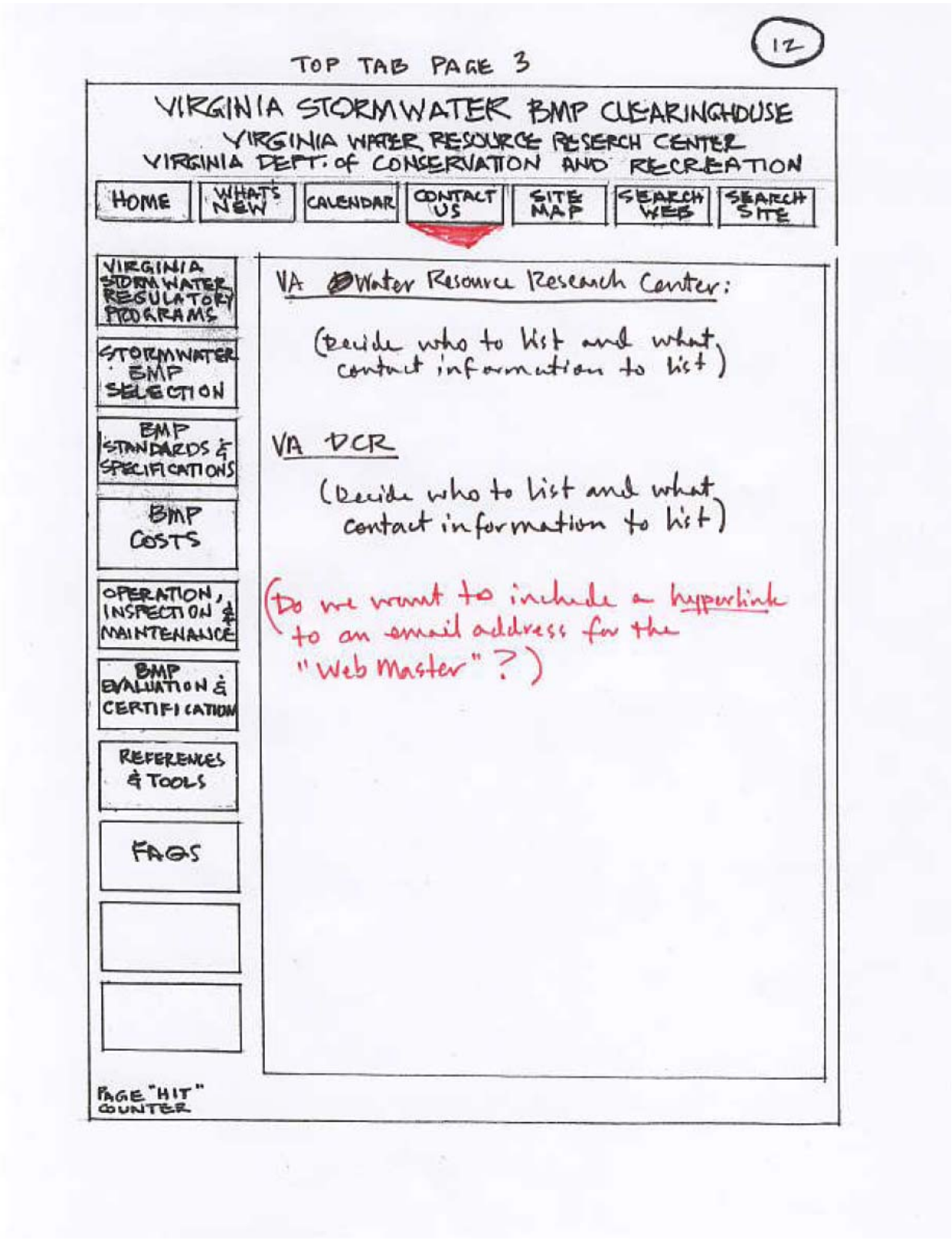
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
· CALENDAR OF CLEARINGHOUSE COMMITTEE & SUBCOMMITTEE MEETING DATES
(COULD BE LINKED TO THE "COMMONWEALTH CALENDAR" OR "REGULATORY TOWN HALL")
· DATES OF OTHER SIGNIFICANT BMP-RELATED EVENTS (?)


12
TOP TAB PAGE 3
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
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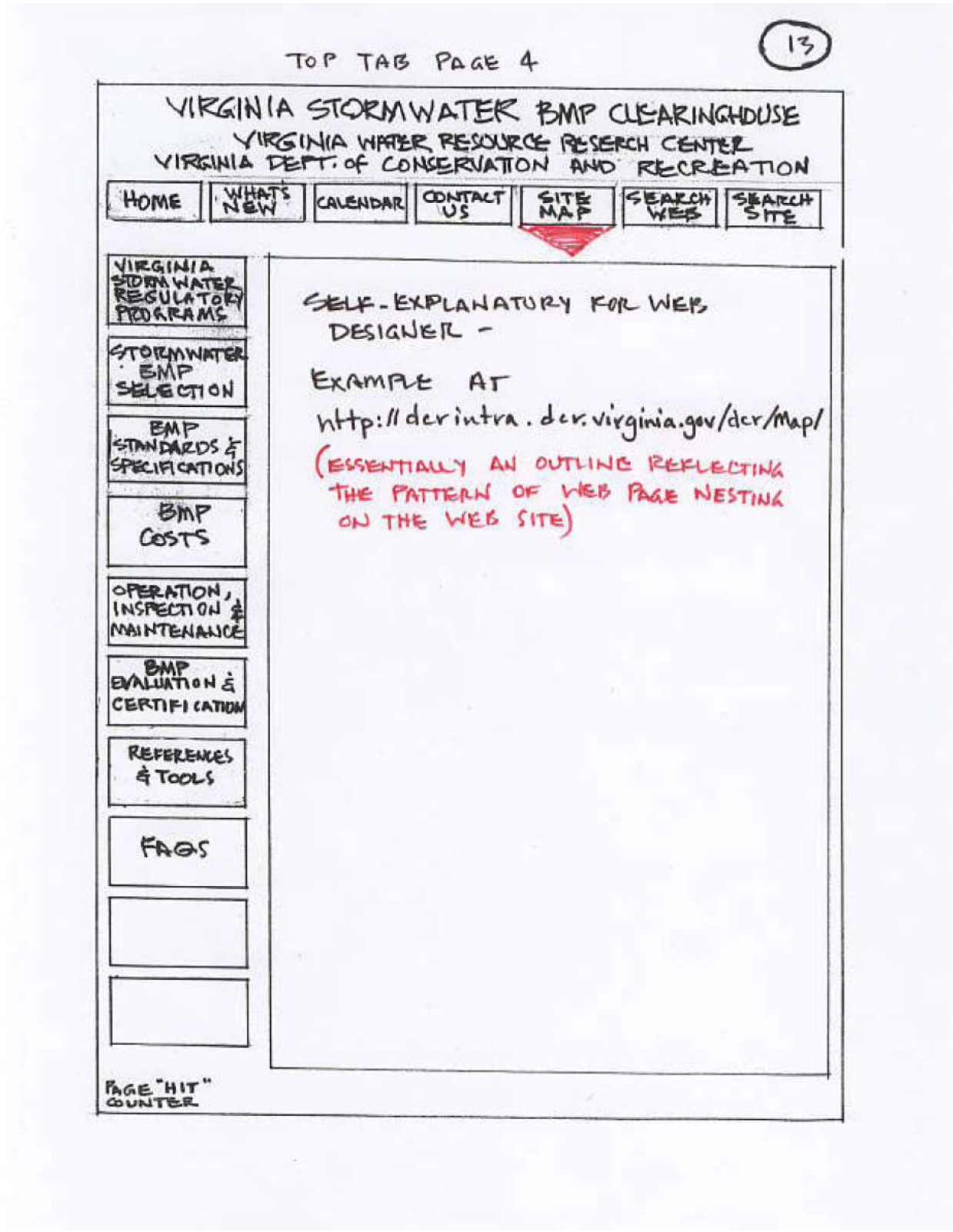
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
VA Water Resource Research Center:
(Decide who to list and what contact information to list)
VA DCR
(Decide who to list and what contact information to list)
(Do we want to include a hyperlink to an email address for the "Web Master"?)


13
TOP TAB PAGE 4
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
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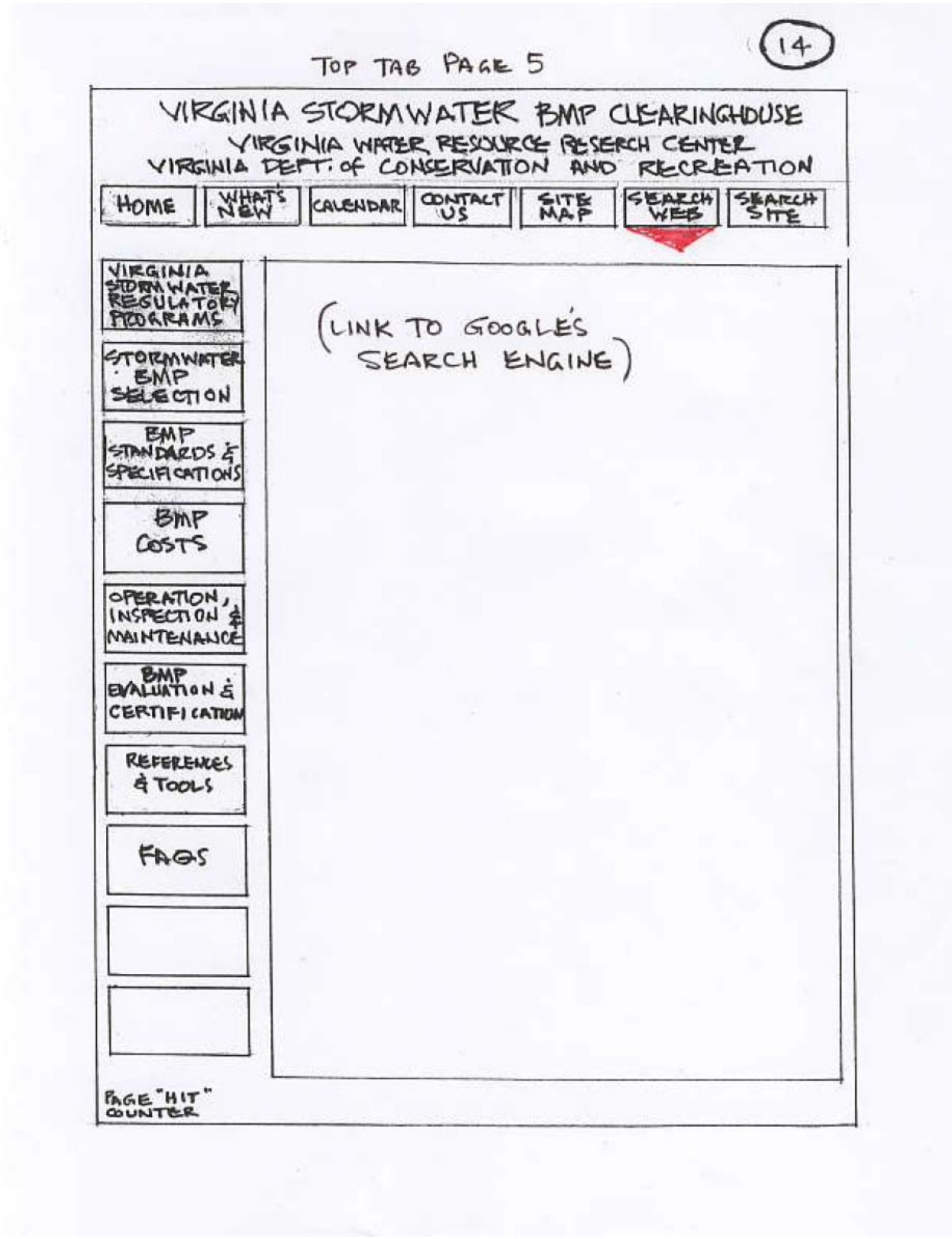
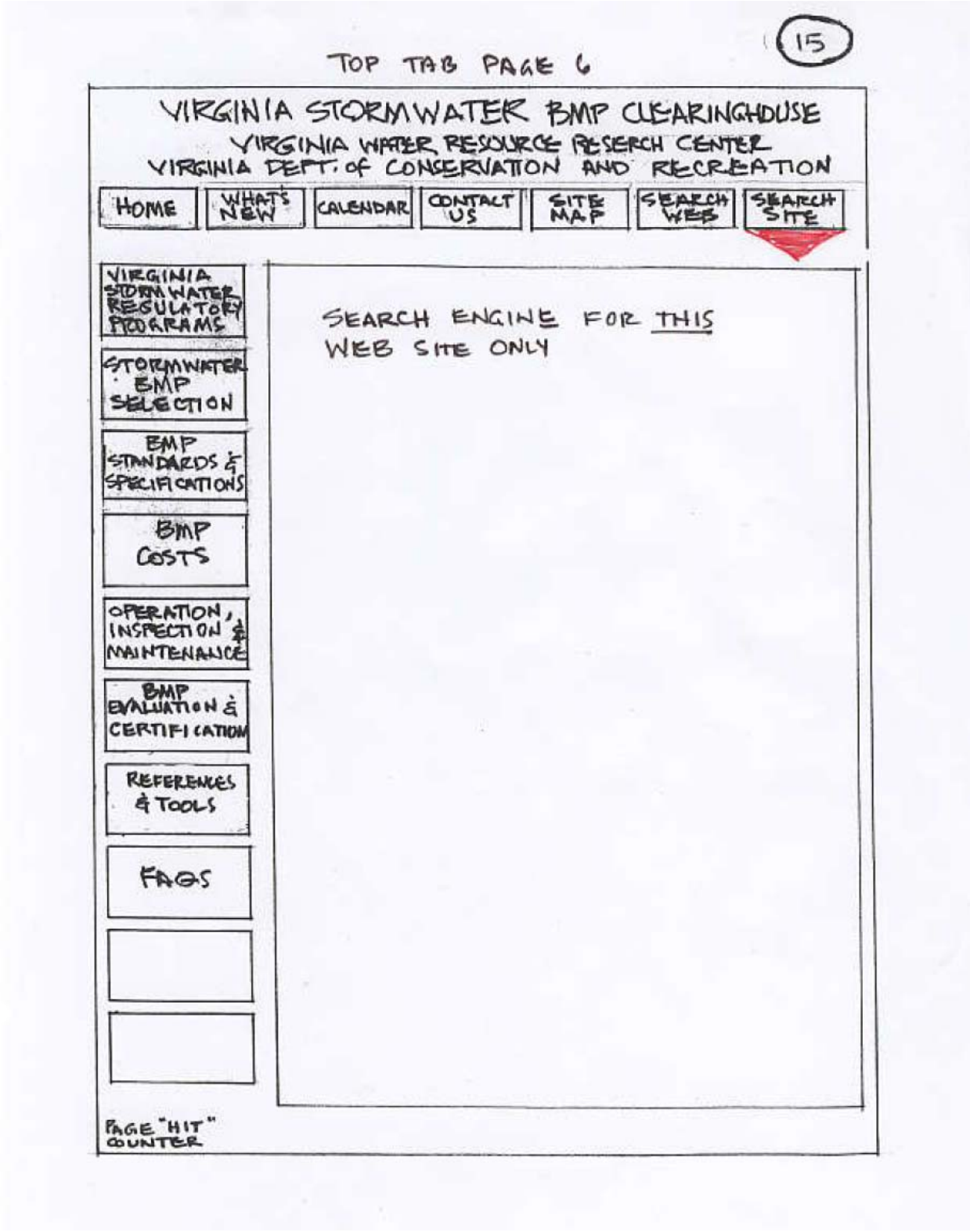
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
PAGE "HIT" COUNTER
SELF-EXPLANATORY FOR WEB DESIGNER -
EXAMPLE AT
http://dcrintra.dcr.virginia.gov/dcr/Map/
(ESSENTIALLY AN OUTLINE REFLECTING THE PATTERN OF WEB PAGE NESTING ON THE WEB SITE)


14
TOP TAB PAGE 5
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESEARCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
BMP COSTS
OPERATION, INSPECTION & MAINTENANCE
BMP EVALUATION & CERTIFICATION
REFERENCES & TOOLS
FAQS
(LINK TO GOOGLE'S SEARCH ENGINE)
PAGE "HIT" COUNTER


15
TOP TAB PAGE 6
VIRGINIA STORMWATER BMP CLEARINGHOUSE
VIRGINIA WATER RESOURCE RESERCH CENTER
VIRGINIA DEPT. of CONSERVATION AND RECREATION
HOME
WHAT'S NEW
CALENDAR
CONTACT US
SITE MAP
SEARCH WEB
SEARCH SITE
VIRGINIA STORMWATER REGULATORY PROGRAMS
STORMWATER BMP SELECTION
BMP STANDARDS & SPECIFICATIONS
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FAQS
SEARCH ENGINE FOR THIS WEB SITE ONLY
PAGE "HIT" COUNTER