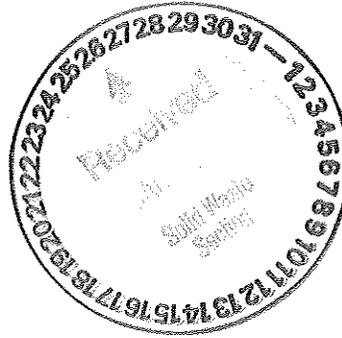




January 26, 2007

Ms. Karyn Pageau, EIT, CPESC
Assistant Regional Engineer
NCDENR - Land Quality Section
3800 Barrett Drive
Raleigh, NC 27609



**Re: Flowers LCID Recycling Center
Request for E&SC Plan Modification
Johnston County, North Carolina**

Dear Ms. Pageau:

On behalf of 42 East, LLC, Richardson Smith Gardner & Associates, Inc. (RSG), formerly G.N. Richardson & Associates, Inc., is submitting the attached modifications to the Erosion and Sedimentation Control Plan (E&SCP) originally approved on July 20, 2006 by the Division (**copy attached**).

Background

The Flowers LCID Recycling Center is located at 1021 Motorcycle Road (SR 1704) in Johnston County, North Carolina. An unimproved entrance road connects the site to Motorcycle Road. As you may recall¹, there is an existing six (6) inch pipe under this road which, in our opinion, is undersized and functionally limited. During initial permitting of the site, determination had not been completed regarding the status of the drainage feature in this area. Therefore, this element of development was omitted from the original permit.

Wetland/Streams Determination

Since that time, determinations² were made by STV/Ralph Whitehead Associates, Inc. which document that a jurisdictional stream does not exist in the vicinity of the road improvements or along the length of the existing pipe. However, two wetland areas up and down gradient of the existing pipe have been identified (**copy attached**). A Nationwide Permit No. 3 (Maintenance Activities) provides pre-approval for "pipe to pipe replacement" of structures in this situation and does not require any notification. Therefore, no further action should be required and has prompted this request for modification.

¹ Correspondence dated June 30, 2006 from Ms. K. Shah and Mr. S. Smith of GNRA to Ms. K. Pageau of NCDENR.

² Correspondence dated December 15, 2006 from Mr. S. Busbee and Mr. M. Iagnocco of STV/Ralph Whitehead Associates, Inc..

Access Road/Driveway Improvements

Additionally, the access road into the site will be improved (widened) without impact to the wetland areas. A NCDOT driveway permit³ has been obtained for access off of Motorcycle Road and has been included in this modification. A revised site plan has been issued including these revisions (**attached**).

Stormwater Analysis

The pipe improvement was reviewed for performance using the HydroCAD model under the 10 year - 24 hour storm and the 25 year - 24 hour storm which shows that the 24" pipe will be adequate to pass both storms without impoundment of stormwater against the road. Additionally, outlet protection has been added at the outfall of the pipe consistent with the current plan. Supporting calculations are **attached**.

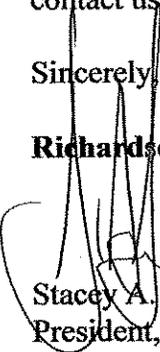
Revised Site Plan

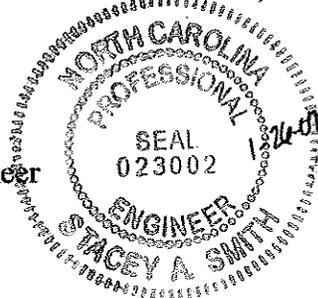
The access road slightly increased the disturbance area, however, did not exceed the original area (16 AC), or part thereof. A revised site plan has been issued including these revisions (**attached**).

We appreciate your attention in this matter and are prepared to promptly respond to any questions or concerns regarding this request. Should you have any questions or require clarification, please contact us at (919) 828-0577 ext. 127 or by email at stacey@rsgengineers.com.

Sincerely,

Richardson Smith Gardner & Associates, Inc.


Stacey A. Smith, P.E.
President, Senior Engineer



Attachments

cc: Gary Lynch, 42 East, LLC
Allen Brown, 42 East, LLC
Johnston County Stormwater Administrator
Toni Wyche, EI, NCDENR
File

Approval letter for the Erosion and Sedimentation Control Plan

REC'D AUG 04 2006

**State of North Carolina
Department of Environment
and Natural Resources
Raleigh Regional Office**

**Michael F. Easley, Governor
William G. (Bill) Ross, Secretary**



DIVISION OF LAND RESOURCES

LETTER OF APPROVAL

July 20, 2006

42 East, LLC
PO Box 20012
Raleigh, NC 27619
Attn: Gary Lynch

RE: Project Name: Flower's LCID Recycling Center
County: Johnston
Submitted by: GN Richardson & Associates
Date Received: 6/21/06; 6/30/06
Date Processing Initiated: 6/30/06
Watershed: Neuse #1/03-04-02
New Submittal (X) Revised ()

Dear Mr. Lynch:

This office has reviewed the subject Erosion and Sedimentation Control Plan. We find the plan to be acceptable and hereby issue this letter of approval. If any modifications, performance reservations, or recommendations are applicable, a list is enclosed and is incorporated as a part of this letter of approval. The enclosed Certificate of Approval should be posted at the job site. In addition, it should be noted that this plan approval shall expire three (3) years following the date of approval, if no land-disturbing activity has been undertaken, in accordance with Title 15A, North Carolina Administrative Code (NCAC) 4B.0029.

If any modifications are not incorporated into the plan and implemented in the field, the site will be in violation of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute (NCGS), 113A-61.1).

15A NCAC 4B.0018(a) requires that a copy of the approved plan be on file at the job site. Also, this letter gives the notice required by NCGS 113A-61.1(a) concerning our right to perform periodic inspections to ensure compliance with the approved plan.

North Carolina's sedimentation pollution control program is performance oriented, requiring protection of the natural resources and adjoining properties. If at any time during this project it is determined that the Erosion and Sedimentation Control Plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (NCGS 113A-51 through 66), this office may require revisions in the plan and its implementation to ensure compliance with the Act.

Acceptance and approval of this plan is conditioned upon your compliance with applicable federal and state water quality laws, regulations and rules. This could include the Division of Water Quality under stormwater or other specific water quality standards, and the U.S. Army Corps of Engineers under Article 404 jurisdiction. Our approval does not supersede any other required permit or approval.

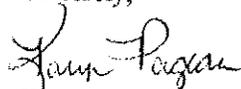
Since this project disturbs one or more acres, one such approval relates to the stormwater that will discharge from your project. This runoff is permitted pursuant to the National Pollutant Discharge Elimination System (NPDES) administered in North Carolina by the Division of Water Quality (DWQ). Attached is the General Stormwater NPDES Permit, NCG010000, as revised October 1, 2001, covering your activity. You are responsible for complying with the General Permit requirements and are subject to enforcement by DWQ for any violations of the General Permit.

Due to the location of this project, it should be noted that a rule to protect and maintain existing buffers along watercourses in the Neuse River Basin became effective on July 22, 1997. The Neuse River Riparian Area Protection and Maintenance Rule (15A NCAC 2B .0233) applies to all perennial and intermittent streams, lakes, ponds and estuaries in the Neuse or Tar-Pamlico River Basins with existing vegetation on the adjacent land or "riparian area". In riparian areas with existing vegetation in the first 30 feet directly adjacent to the stream, the rule prohibits land disturbance or new development within the first 30 feet of land next to the water (the remaining 20 feet of the total buffer must be revegetated upon completion of any proposed land-disturbing activity). In riparian areas with existing vegetation that is less than 30 feet wide, the rule prohibits land disturbance or new development within the area that contains the existing vegetation (but not the entire 50 foot riparian area). For more information about this riparian area rule, please contact the Division of Water Quality's Wetland/401 Unit at 919-733-1786, or a Division of Water Quality representative at this regional office.

Please note that this approval is based in part on the accuracy of the information provided concerning financial responsibility. You are requested to file an amended Financial Responsibility Form if any changes become necessary. In addition, it would be helpful if you would notify this office when the proposed land-disturbing activity covered by this plan is initiated.

Your cooperation is appreciated and we look forward to working with you on this project. If there are any questions, please do not hesitate to contact this office.

Sincerely,



Karyn Pageau, EIT, CPESC
Asst. Regional Engineer
Land Quality Section

KP:clm

cc: Kinjal Shah, GN Richardson & Associates
Regional Supervisor, Division of Water Quality
Stacey Smith, PE, GN Richardson & Associates

Wetland Regulatory Update by STV/Ralph Whitehead Associates



REC'D DEC 21 2006

STV/Ralph Whitehead Associates

1000 West Morehead Street, Suite 200
Charlotte, North Carolina 28208
(704)372-1885 fax:(704)372-3393

Mr. Stacey Smith, Sr. Engineer
G.N. Richardson & Associates
14 North Boylan Avenue
Raleigh, North Carolina 27603

December 15, 2006

SUBJECT: Flowers' LCID Landfill Site
Regulatory Update
Johnston County, North Carolina

Dear Mr. Smith:

STV/Ralph Whitehead Associates, Inc. (STV/RWA) performed a review of the subject site and associated entrance road for the possible presence of wetlands and/or other jurisdictional waters of the U.S. on May 18, 2006. The findings of this field review were summarized in a letter report to G. N. Richardson & Associates dated May 22, 2006. Upon request, this report summarizes the state and federal regulatory conditions and permitting requirements for a pipe maintenance activity to be performed on the entrance road to the subject site. Also included in this report is an update on the U.S. Army Corps of Engineers (USACE) review of jurisdictional features in the vicinity of the subject site and documentation of same.

Background and Methodology

The subject site, known as the Flowers' LCID Landfill, is located north of NC 42 and south of Motorcycle Road in Johnston County, North Carolina (See Attachment A - Figure 1). The site encompasses approximately 16 acres and is currently being used as a stump grinding and mulching area. Adjacent to the site is undeveloped mixed hardwood/pine upland forest. An unimproved (dirt/gravel) entrance road connects the site to Motorcycle Road at the northeast corner of the property. Currently, there is a 6" pipe under the entrance road facilitating the movement of jurisdictional waters. As notified by G.N. Richardson & Associates, plans are proposed to upsize the existing pipe to 24" with no increase in length or impact to adjacent jurisdictional features.

Jurisdictional wetlands are defined by 33 CFR 328.3(b) and protected by Section 404 of the Clean Water Act (33 U.S.C. 1344), which is administered and enforced in North Carolina by the U.S. Army Corps of Engineers (USACE), Wilmington District. Potential wetland areas in proximity of the subject site were determined using the USACE Routine On-Site Determination method as described in the 1987 "Corps of Engineers Wetlands Delineation Manual."¹ This technique uses a multi-parameter approach, which requires positive evidence of hydrophytic vegetation, wetland hydrology, and hydric soils.

Jurisdictional waters identified adjacent to the piped road crossing include two small wetland areas located on opposite sides of the entrance road. The pipe is currently providing the hydrological connection between the two wetlands. A jurisdictional stream is contiguous with the wetland area adjacent to the west side of the entrance road. See Attachment A - Figure 1 for the approximate location of these features. These jurisdictional features were delineated and surveyed in the field on

¹ Environmental Laboratory, 1987, "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

STV/Ralph Whitehead Associates

Flowers' LCID Landfill Site
Johnston County, NC

December 15, 2006

May 26, 2006. A Request for Jurisdictional Determination was submitted to the USACE on July 14, 2006. Delineated jurisdictional boundaries were verified in the field by the USACE on July 25, 2006. However, in wake of the recent Supreme Court decisions in *United States v. Rapanos* and *United States v. Carabell*, the USACE Wilmington District is delaying the processing of Jurisdictional Determinations until new guidance is issued from the USACE and Environmental Protection Agency (EPA).

Regulatory Considerations

Depending on the type and extent of jurisdictional waters of the U.S., including wetlands, to be impacted, Section 404 permitting requirements can range from activities that are considered exempt or preauthorized, to those requiring pre-construction notification (PCN) for a Nationwide Permit (NWP) or requiring a Section 404 Individual Permit (IP) from the USACE.

The NWP most likely to be applicable to this project is NWP No. 3 – Maintenance Activities (See Attachment B). There is no required PCN to the USACE or the state (N.C. Division of Water Quality) for maintenance activities related to the repair, rehabilitation, or replacement of any previously authorized structure provided the adverse environmental effects resulting from said activities are minimal.

Activities conducted under the NWP program regardless of whether a PCN is required must comply with the NWP General Conditions (Attachment C). Of particular note is General Condition number 3, entitled '*Soil Erosion and Sediment*' and number 21, entitled '*Management of Water Flows*'. Use of a NWP is also subject to a series of Regional Permit Conditions promulgated by the Wilmington District (Attachment D). Regional conditions that may be applicable to this project include number 5 which specifies that measures must be taken to prevent live or fresh concrete from entering waters, and number 6 which specifies that riprap for bank stabilization must include filter cloth beneath the riprap.

Closing

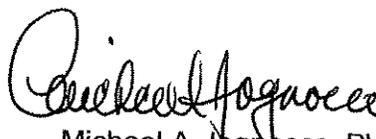
We appreciate the opportunity to assist you with this project. Please do not hesitate to call either of the undersigned if you have any questions.

Sincerely,

STV/RALPH WHITEHEAD ASSOCIATES, INC.



W. Steven Busbee, PWS
Project Environmental Scientist



Michael A. Iagnocco, PWS
Project Manager/Senior Scientist

Cc: Gary Lynch, 42 East, LLC

WSB/MAI.sb

Attachment A – Figures



Reference: Johnston County, NC GIS Aerial Photography

NOTE: STV/Ralph Whitehead Associates, Inc. (STV/RWA) reviewed the subject site on May 18, 2006 for the presence of jurisdictional waters of the U.S., including wetlands, utilizing the 1987 U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual's Routine Determination methodology. Jurisdictional features drawn on this map are approximated. Actual wetland and stream boundaries have been delineated, surveyed, and verified by the USACE.



Not to Scale

Flowers' LCID Landfill Site
Johnston County, NC



**STV/Ralph Whitehead
Associates, Inc.**

**Figure 1. Approximate
Subject Site Location**

Attachment B – Nationwide Permit 3

NATIONWIDE PERMIT 3
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
FINAL NOTICE OF ISSUANCE AND MODIFICATION OF NATIONWIDE PERMITS
FEDERAL REGISTER
AUTHORIZED MARCH 18, 2002

Maintenance: Activities related to:

1. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or replacement, are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction. This nationwide permit authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire, or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the District Engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

2. Discharges of dredged or fill material, including excavation, into all waters of the United States to remove accumulated sediments and debris in the vicinity of, and within, existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) and the placement of new or additional rip rap to protect the structure, provided the permittee notifies the District Engineer in accordance with General Condition 13. The removal of sediment is limited to the minimum necessary to restore the waterway in the immediate vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend further than 200 feet in any direction from the structure. The placement of rip rap must be the minimum necessary to protect the structure or to ensure the safety of the structure. All excavated materials must be deposited and retained in an upland area unless otherwise specifically approved by the District Engineer under separate authorization. Any bank stabilization measures not directly associated with the structure will require a separate authorization from the District Engineer.

3. Discharges of dredged or fill material, including excavation, into all waters of the United States for activities associated with the restoration of upland areas damaged by a storm, flood, or other discrete event, including the construction, placement, or installation of upland protection structures and minor dredging to remove obstructions in waters of the United States. (Uplands lost as a result of a storm, flood, or other discrete event can be replaced without a Section 404 permit provided the uplands are restored to their original pre-event location. This NWP is for the activities in waters of the United States associated with the replacement of the uplands.) The permittee must notify the District Engineer, in accordance with General Condition 13, within 12 months of the date of the damage and the work must commence, or be under contract to commence, within two years of the date of the damage. The permittee should provide evidence, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration. The restoration of the damaged areas cannot exceed the contours, or ordinary high water mark, that existed prior to the damage. The District Engineer retains the right to determine the extent of the pre-existing conditions and the extent of any restoration work authorized by this permit. Minor dredging to remove obstructions from the adjacent waterbody is limited to 50 cubic yards below the plane of the ordinary high water mark, and is limited to the amount necessary to restore the pre-existing bottom contours of the waterbody. The dredging may not be done primarily to obtain fill for any restoration activities. The discharge of dredged or fill material and all related work needed to restore the upland must be part of a single and complete project. This permit cannot be used in conjunction with NWP 18 or NWP 19 to restore damaged upland areas. This permit cannot be used to reclaim historic lands lost, over an extended period, to normal erosion processes.

This permit does not authorize maintenance dredging for the primary purpose of navigation and beach restoration. This permit does not authorize new stream channelization or stream relocation projects. Any work authorized by this permit must not cause more than minimal degradation of water quality, more than minimal changes to the flow characteristics of the stream, or increase flooding (See General Conditions 9 and 21). (Sections 10 and 404)

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Section 404(f) exemption for maintenance.

Attachment C – Nationwide Permit General Conditions

waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

5. *Equipment*. Heavy equipment working in wetlands must be placed on mats, or other measures must be taken to minimize soil disturbance.

6. *Regional and Case-By-Case Conditions*. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)). Additionally, any case specific conditions added by the Corps or by the state or tribe in its Section 401 Water Quality Certification and Coastal Zone Management Act consistency determination.

7. *Wild and Scenic Rivers*. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status; unless the appropriate Federal agency, with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation, or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

8. *Tribal Rights*. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. *Water Quality*. (a) In certain states and tribal lands an individual 401 Water Quality Certification must be obtained or waived (See 33 CFR 330.4(c)).

(b) For NWP's 12, 14, 17, 18, 32, 39, 40, 42, 43, and 44, where the state or tribal 401 certification (either generically or individually) does not require or approve water quality management measures, the permittee must provide water quality management measures that will ensure that the authorized work does not result in more than minimal degradation of water quality (or the Corps determines that compliance with state or local standards, where applicable, will ensure no more than minimal adverse effect on water quality). An important component of water quality management includes stormwater management that minimizes degradation of the downstream aquatic system, including water quality (refer to General Condition 21 for stormwater

C. Nationwide Permit General Conditions

The following General Conditions must be followed in order for any authorization by an NWP to be valid:

1. *Navigation*. No activity may cause more than a minimal adverse effect on navigation.

2. *Proper Maintenance*. Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. *Soil Erosion and Sediment Controls*. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

4. *Aquatic Life Movements*. No activity may substantially disrupt the necessary life-cycle movements of those species of aquatic life indigenous to the

management requirements). Another important component of water quality management is the establishment and maintenance of vegetated buffers next to open waters, including streams (refer to General Condition 19 for vegetated buffer requirements for the NWP's).

This condition is only applicable to projects that have the potential to affect water quality. While appropriate measures must be taken, in most cases it is not necessary to conduct detailed studies to identify such measures or to require monitoring.

10. *Coastal Zone Management.* In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (see Section 330.4(d)).

11. *Endangered Species.* (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or is located in the designated critical habitat and shall not begin work on the activity until notified by the District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that may affect Federally-listed endangered or threatened species or designated critical habitat, the notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. As a result of formal or informal consultation with the FWS or NMFS the District Engineer may add species-specific regional endangered species conditions to the NWP's.

(b) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the USFWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the USFWS and NMFS or their world wide web pages at <http://www.fws.gov/r9endspp/>

[endspp.html](http://www.fws.gov/r9endspp.html) and http://www.nfms.gov/prot_res/esahome.html respectively.

12. *Historic Properties.* No activity which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the District Engineer has complied with the provisions of 33 CFR part 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)). For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the notification must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

13. *Notification.*

(a) *Timing:* where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a preconstruction notification (PCN) as early as possible. The District Engineer must determine if the notification is complete within 30 days of the date of receipt and can request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the District Engineer will notify the prospective permittee that the notification is still incomplete and the PCN review process will not commence until all of the requested information has been received by the District Engineer. The prospective permittee shall not begin the activity:

- (1) Until notified in writing by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division Engineer; or
- (2) If notified in writing by the District or Division Engineer that an Individual Permit is required; or
- (3) Unless 45 days have passed from the District Engineer's receipt of the complete notification and the prospective permittee has not received

written notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) *Contents of Notification:* The notification must be in writing and include the following information:

- (1) Name, address and telephone numbers of the prospective permittee;
- (2) Location of the proposed project;
- (3) Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), Regional General Permit(s), or Individual Permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP (Sketches usually clarify the project and when provided result in a quicker decision.);

(4) For NWP's 7, 12, 14, 18, 21, 34, 38, 39, 41, 42, and 43, the PCN must also include a delineation of affected special aquatic sites, including wetlands, vegetated shallows (e.g., submerged aquatic vegetation, seagrass beds), and riffle and pool complexes (see paragraph 13(f));

(5) For NWP 7 (Outfall Structures and Maintenance), the PCN must include information regarding the original design capacities and configurations of those areas of the facility where maintenance dredging or excavation is proposed;

(6) For NWP 14 (Linear Transportation Crossings), the PCN must include a compensatory mitigation proposal to offset permanent losses of waters of the US and a statement describing how temporary losses of waters of the US will be minimized to the maximum extent practicable;

(7) For NWP 21 (Surface Coal Mining Activities), the PCN must include an Office of Surface Mining (OSM) or state-approved mitigation plan, if applicable. To be authorized by this NWP, the District Engineer must determine that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are minimal both individually and cumulatively and must notify the project sponsor of this determination in writing;

(8) For NWP 27 (Stream and Wetland Restoration), the PCN must include documentation of the prior condition of the site that will be reverted by the permittee;

(9) For NWP 29 (Single-Family Housing), the PCN must also include:

(i) Any past use of this NWP by the Individual Permittee and/or the permittee's spouse;

(ii) A statement that the single-family housing activity is for a personal residence of the permittee;

(iii) A description of the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring ¼-acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of wetlands that exists on the property. For parcels greater than ¼-acre in size, formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f));

(iv) A written description of all land (including, if available, legal descriptions) owned by the prospective permittee and/or the prospective permittee's spouse, within a one mile radius of the parcel, in any form of ownership (including any land owned as a partner, corporation, joint tenant, co-tenant, or as a tenant-by-the-entirety) and any land on which a purchase and sale agreement or other contract for sale or purchase has been executed;

(10) For NWP 31 (Maintenance of Existing Flood Control Projects), the prospective permittee must either notify the District Engineer with a PCN prior to each maintenance activity or submit a five year (or less) maintenance plan. In addition, the PCN must include all of the following:

(i) Sufficient baseline information identifying the approved channel depths and configurations and existing facilities. Minor deviations are authorized, provided the approved flood control protection or drainage is not increased;

(ii) A delineation of any affected special aquatic sites, including wetlands; and,

(iii) Location of the dredged material disposal site;

(11) For NWP 33 (Temporary Construction, Access, and Dewatering), the PCN must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources;

(12) For NWPs 39, 43 and 44, the PCN must also include a written statement to the District Engineer explaining how avoidance and minimization for losses of waters of the US were achieved on the project site;

(13) For NWP 39 and NWP 42, the PCN must include a compensatory mitigation proposal to offset losses of

waters of the US or justification explaining why compensatory mitigation should not be required. For discharges that cause the loss of greater than 300 linear feet of an intermittent stream bed, to be authorized, the District Engineer must determine that the activity complies with the other terms and conditions of the NWP, determine adverse environmental effects are minimal both individually and cumulatively, and waive the limitation on stream impacts in writing before the permittee may proceed;

(14) For NWP 40 (Agricultural Activities), the PCN must include a compensatory mitigation proposal to offset losses of waters of the US. This NWP does not authorize the relocation of greater than 300 linear-feet of existing serviceable drainage ditches constructed in non-tidal streams unless, for drainage ditches constructed in intermittent non-tidal streams, the District Engineer waives this criterion in writing, and the District Engineer has determined that the project complies with all terms and conditions of this NWP, and that any adverse impacts of the project on the aquatic environment are minimal, both individually and cumulatively;

(15) For NWP 43 (Stormwater Management Facilities), the PCN must include, for the construction of new stormwater management facilities, a maintenance plan (in accordance with state and local requirements, if applicable) and a compensatory mitigation proposal to offset losses of waters of the US. For discharges that cause the loss of greater than 300 linear feet of an intermittent stream bed, to be authorized, the District Engineer must determine that the activity complies with the other terms and conditions of the NWP, determine adverse environmental effects are minimal both individually and cumulatively, and waive the limitation on stream impacts in writing before the permittee may proceed;

(16) For NWP 44 (Mining Activities), the PCN must include a description of all waters of the US adversely affected by the project, a description of measures taken to minimize adverse effects to waters of the US, a description of measures taken to comply with the criteria of the NWP, and a reclamation plan (for all aggregate mining activities in isolated waters and non-tidal wetlands adjacent to headwaters and any hard rock/mineral mining activities);

(17) For activities that may adversely affect Federally-listed endangered or threatened species, the PCN must include the name(s) of those endangered or threatened species that may be

affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work; and (18) For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

(c) *Form of Notification:* The standard Individual Permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PCN and must include all of the information required in (b) (1)-(18) of General Condition 13. A letter containing the requisite information may also be used.

(d) *District Engineer's Decision:* In reviewing the PCN for the proposed activity, the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. The prospective permittee may submit a proposed mitigation plan with the PCN to expedite the process. The District Engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the District Engineer will notify the permittee and include any conditions the District Engineer deems necessary. The District Engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the District Engineer will expeditiously review the proposed compensatory mitigation plan. The District Engineer must review the plan within 45 days of receiving a complete PCN and determine whether the conceptual or specific proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the District Engineer to

be minimal, the District Engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then the District Engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an Individual Permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the District Engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level. When conceptual mitigation is included, or a mitigation plan is required under item (2) above, no work in waters of the US will occur until the District Engineer has approved a specific mitigation plan.

(e) *Agency Coordination*: The District Engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

For activities requiring notification to the District Engineer that result in the loss of greater than 1/2-acre of waters of the US, the District Engineer will provide immediately (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy to the appropriate Federal or state offices (USFWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision

on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. As required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act, the District Engineer will provide a response to NMFS within 30 days of receipt of any Essential Fish Habitat conservation recommendations. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.

(f) *Wetland Delineations*: Wetland delineations must be prepared in accordance with the current method required by the Corps (For NWP 29 see paragraph (b)(9)(iii) for parcels less than 1/4-acre in size). The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 45-day period will not start until the wetland delineation has been completed and submitted to the Corps, where appropriate.

14. *Compliance Certification*. Every permittee who has received NWP verification from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter and will include:

(a) A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

15. *Use of Multiple Nationwide Permits*. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the US authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit (e.g. if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the US for the total project cannot exceed 1/2-acre).

16. *Water Supply Intakes*. No activity, including structures and work in navigable waters of the US or discharges of dredged or fill material, may occur in

the proximity of a public water supply intake except where the activity is for repair of the public water supply intake structures or adjacent bank stabilization.

17. *Shellfish Beds*. No activity, including structures and work in navigable waters of the US or discharges of dredged or fill material, may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP 4.

18. *Suitable Material*. No activity, including structures and work in navigable waters of the US or discharges of dredged or fill material, may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.) and material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the CWA).

19. *Mitigation*. The District Engineer will consider the factors discussed below when determining the acceptability of appropriate and practicable mitigation necessary to offset adverse effects on the aquatic environment that are more than minimal.

(a) The project must be designed and constructed to avoid and minimize adverse effects to waters of the US to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland impacts requiring a PCN, unless the District Engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. Consistent with National policy, the District Engineer will establish a preference for restoration of wetlands as compensatory mitigation, with preservation used only in exceptional circumstances.

(d) Compensatory mitigation (i.e., replacement or substitution of aquatic resources for those impacted) will not be used to increase the acreage losses allowed by the acreage limits of some of the NWPs. For example, 1/4-acre of wetlands cannot be created to change a 3/4-acre loss of wetlands to a 1/2-acre loss associated with NWP 39 verification. However, 1/2-acre of created wetlands can be used to reduce the impacts of a 1/2-acre loss of wetlands to the minimum impact level in order to meet the

minimal impact requirement associated with NWP's.

(e) To be practicable, the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of the overall project purposes. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferably in the same watershed.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., easements, deed restrictions) of vegetated buffers to open waters. In many cases, vegetated buffers will be the only compensatory mitigation required. Vegetated buffers should consist of native species. The width of the vegetated buffers required will address documented water quality or aquatic habitat loss concerns. Normally, the vegetated buffer will be 25 to 50 feet wide on each side of the stream, but the District Engineers may require slightly wider vegetated buffers to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the Corps will determine the appropriate compensatory mitigation (e.g., stream buffers or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where vegetated buffers are determined to be the most appropriate form of compensatory mitigation, the District Engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland impacts.

(g) Compensatory mitigation proposals submitted with the "notification" may be either conceptual or detailed. If conceptual plans are approved under the verification, then the Corps will condition the verification to require detailed plans be submitted and approved by the Corps prior to construction of the authorized activity in waters of the US.

(h) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases that require compensatory mitigation, the mitigation provisions will specify the party responsible for

accomplishing and/or complying with the mitigation plan.

20. *Spawning Areas.* Activities, including structures and work in navigable waters of the US or discharges of dredged or fill material, in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., excavate, fill, or smother downstream by substantial turbidity) of an important spawning area are not authorized.

21. *Management of Water Flows.* To the maximum extent practicable, the activity must be designed to maintain preconstruction downstream flow conditions (e.g., location, capacity, and flow rates). Furthermore, the activity must not permanently restrict or impede the passage of normal or expected high flows (unless the primary purpose of the fill is to impound waters) and the structure or discharge of dredged or fill material must withstand expected high flows. The activity must, to the maximum extent practicable, provide for retaining excess flows from the site, provide for maintaining surface flow rates from the site similar to preconstruction conditions, and provide for not increasing water flows from the project site, relocating water, or redirecting water flow beyond preconstruction conditions. Stream channelizing will be reduced to the minimal amount necessary, and the activity must, to the maximum extent practicable, reduce adverse effects such as flooding or erosion downstream and upstream of the project site, unless the activity is part of a larger system designed to manage water flows. In most cases, it will not be a requirement to conduct detailed studies and monitoring of water flow.

This condition is only applicable to projects that have the potential to affect waterflows. While appropriate measures must be taken, it is not necessary to conduct detailed studies to identify such measures or require monitoring to ensure their effectiveness. Normally, the Corps will defer to state and local authorities regarding management of water flow.

22. *Adverse Effects From Impoundments.* If the activity creates an impoundment of water, adverse effects to the aquatic system due to the acceleration of the passage of water, and/or the restricting its flow shall be minimized to the maximum extent practicable. This includes structures and work in navigable waters of the US, or discharges of dredged or fill material.

23. *Waterfowl Breeding Areas.* Activities, including structures and work in navigable waters of the US or

discharges of dredged or fill material, into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

24. *Removal of Temporary Fills.* Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

25. *Designated Critical Resource Waters.* Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, National Wild and Scenic Rivers, critical habitat for Federally listed threatened and endangered species, coral reefs, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the District Engineer after notice and opportunity for public comment. The District Engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Except as noted below, discharges of dredged or fill material into waters of the US are not authorized by NWP's 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, and 44 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. Discharges of dredged or fill materials into waters of the US may be authorized by the above NWP's in National Wild and Scenic Rivers if the activity complies with General Condition 7. Further, such discharges may be authorized in designated critical habitat for Federally listed threatened or endangered species if the activity complies with General Condition 11 and the USFWS or the NMFS has concurred in a determination of compliance with this condition.

(b) For NWP's 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with General Condition 13, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The District Engineer may authorize activities under these NWP's only after it is determined that the impacts to the critical resource waters will be no more than minimal.

26. *Fills Within 100-Year Floodplains.* For purposes of this General Condition, 100-year floodplains will be identified through the existing Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps or FEMA-approved local floodplain maps.

(a) *Discharges in Floodplain; Below Headwaters.* Discharges of dredged or fill material into waters of the US within the mapped 100-year floodplain, below

headwaters (i.e. five cfs), resulting in permanent above-grade fills, are not authorized by NWP's 39, 40, 42, 43, and 44.

(b) *Discharges in Floodway; Above Headwaters.* Discharges of dredged or fill material into waters of the US within the FEMA or locally mapped floodway, resulting in permanent above-grade fills, are not authorized by NWP's 39, 40, 42, and 44.

(c) The permittee must comply with any applicable FEMA-approved state or local floodplain management requirements.

27. Construction Period. For activities that have not been verified by the Corps and the project was commenced or under contract to commence by the expiration date of the NWP (or modification or revocation date), the work must be completed within 12-months after such date (including any modification that affects the project).

For activities that have been verified and the project was commenced or under contract to commence within the verification period, the work must be completed by the date determined by the Corps.

For projects that have been verified by the Corps, an extension of a Corps approved completion date maybe requested. This request must be submitted at least one month before the previously approved completion date.

D. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWP's do not obviate the need to obtain other Federal, state, or local permits, approvals, or authorizations required by law.

3. NWP's do not grant any property rights or exclusive privileges.

4. NWP's do not authorize any injury to the property or rights of others.

5. NWP's do not authorize interference with any existing or proposed Federal project.

E. Definitions

Best Management Practices (BMPs): BMPs are policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural. A BMP policy may affect the limits on a development.

Compensatory Mitigation: For purposes of Section 10/404, compensatory mitigation is the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic

resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Creation: The establishment of a wetland or other aquatic resource where one did not formerly exist.

Enhancement: Activities conducted in existing wetlands or other aquatic resources that increase one or more aquatic functions.

Ephemeral Stream: An ephemeral stream has flowing water only during and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Farm Tract: A unit of contiguous land under one ownership that is operated as a farm or part of a farm.

Flood Fringe: That portion of the 100-year floodplain outside of the floodway (often referred to as "floodway fringe").

Floodway: The area regulated by Federal, state, or local requirements to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than a designated amount (not to exceed one foot as set by the National Flood Insurance Program) within the 100-year floodplain.

Independent Utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Intermittent Stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of Waters of the US: Waters of the US that include the filled area and other waters that are permanently adversely affected by flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent above-grade, at-grade, or below-grade fills that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or

change the use of a waterbody. The acreage of loss of waters of the US is the threshold measurement of the impact to existing waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and values. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the US temporarily filled, flooded, excavated, or drained, but restored to preconstruction contours and elevations after construction, are not included in the measurement of loss of waters of the US. Impacts to ephemeral waters are only not included in the acreage or linear foot measurements of loss of waters of the US or loss of stream bed, for the purpose of determining compliance with the threshold limits of the NWP's.

Non-tidal Wetland: A non-tidal wetland is a wetland (i.e., a water of the US) that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open Water: An area that, during a year with normal patterns of precipitation, has standing or flowing water for sufficient duration to establish an ordinary high water mark. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. The term "open water" includes rivers, streams, lakes, and ponds. For the purposes of the NWP's, this term does not include ephemeral waters.

Perennial Stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Permanent Above-grade Fill: A discharge of dredged or fill material into waters of the US, including wetlands, that results in a substantial increase in ground elevation and permanently converts part or all of the waterbody to dry land. Structural fills authorized by NWP's 3, 25, 36, etc. are not included.

Preservation: The protection of ecologically important wetlands or other aquatic resources in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation may include protection of upland areas adjacent to wetlands as necessary to

Attachment D – Nationwide Permits Regional Conditions

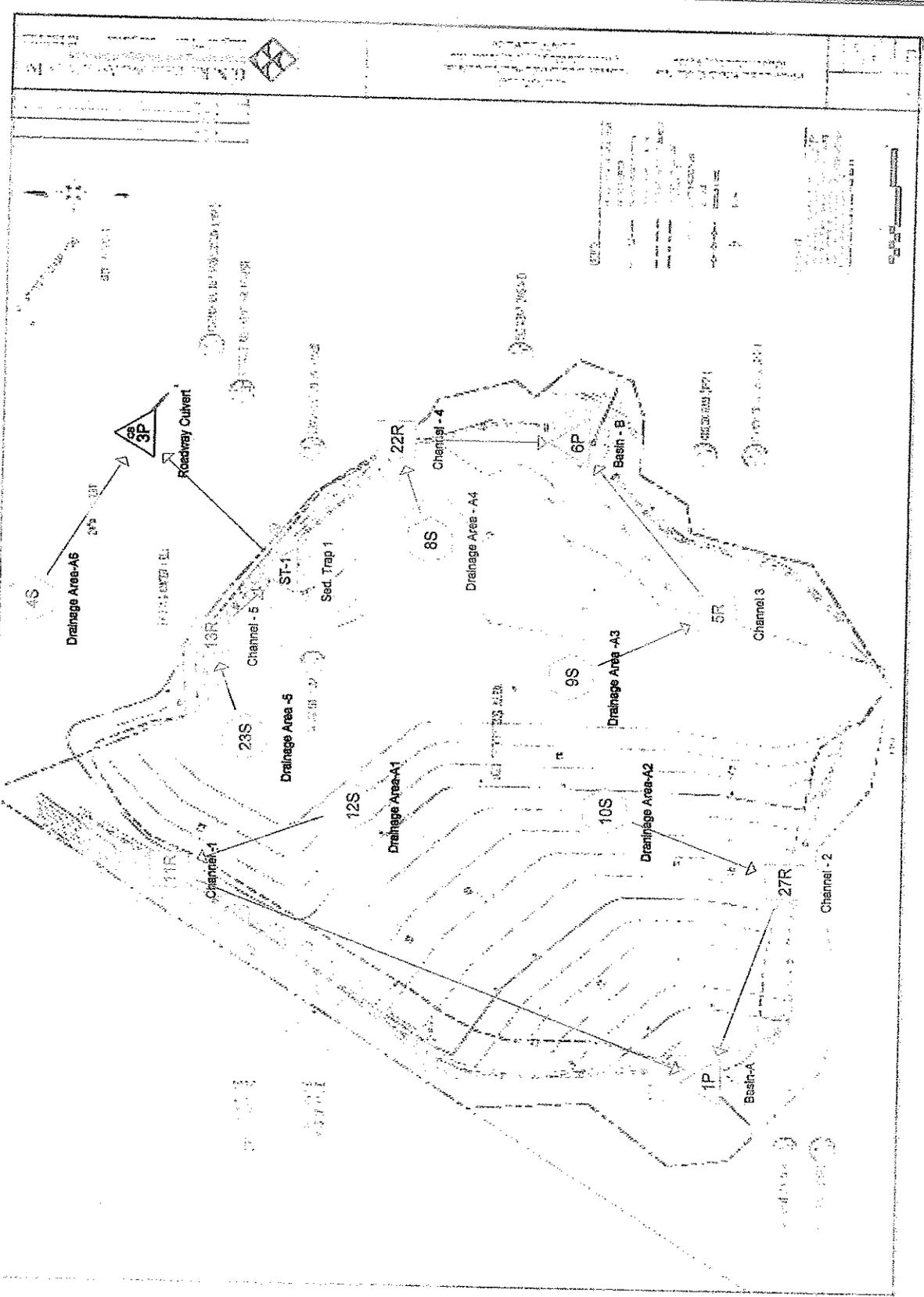


**USACE Wilmington District
Regional Conditions for all Nationwide Permits**

1. Notification required if:
 - a. Greater than a total of 150 linear feet of perennial or aquatically important stream channel. Mitigation typically required for any project requiring notification.
 - b. Work performed in *designated waters* – Outstanding Resource Waters (ORW), High Quality Waters (HQW), Inland Primary Nursery Areas (IPNA) or contiguous wetlands, Primary Nursery Areas (PNA)
 - c. Work performed on a Barrier Island
 - d. Work performed in a Mountain or Piedmont Bog, as identified by NCNHP
 - e. Work performed in Mountain Trout Waters
2. CAMA permit required for work in Areas of Environmental Concern in the 20 coastal counties.
3. Notification to NCDENR Shellfish Sanitation required if dredging in an area closed to shell fishing.
4. Disposal of sand to the beach should occur between November 1 and April 30. Otherwise a swim advisory should be posted.
5. Measures to be taken to prevent live or fresh concrete, including bags of uncured concrete from entering waters.
6. Riprap for bank stabilization (for all NWPs) must include filter cloth beneath the riprap.
7. For culvert construction/installation – measures will be taken to provide for the safe passage of fish and other aquatic life.
 - a. All culverts in CAMA coastal counties must be buried to a depth of 12 inches below stream bed
 - b. All other locations:
 - Culverts >48” diameter must be buried to a depth of 12 inches
 - Culverts ≤48” must be buried to a depth equal to or greater than 20% of pipe diameter
8. Discharges into following waters are prohibited from use of the NWP program during the specified dates:
 - a. Anadromous fish spawning areas between February 15 and June 30 without prior written approval from NC Marine Fisheries or NC Wildlife Resources Commission, and the USACE.
 - b. Sturgeon spawning areas between February 1 and June 30 without prior written approval from National Marine Fisheries

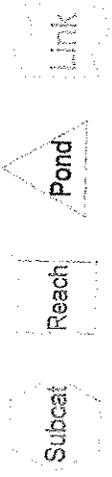
Supporting Calculations for 24" Roadway Culvert
(1) HydroCAD Analysis & (2) Riprap Outlet Protection

**HydroCAD Analysis
For
10-Year 24-Hour Storm**



Drainage Diagram for Flowers LCID

Prepared by G.N. Richardson & Associates, Inc. 6/2/2006
 HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC



Flowers LCID

Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Prepared by G.N. Richardson & Associates, Inc.

Page 2

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

5/23/2006

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 4S: Drainage Area-A6Runoff Area=11.500 ac Runoff Depth>0.20"
Tc=5.0 min CN=36 Runoff=0.63 cfs 0.187 af**Subcatchment 8S: Drainage Area - A4**Runoff Area=1.500 ac Runoff Depth>0.85"
Flow Length=300' Tc=13.9 min CN=49 Runoff=1.53 cfs 0.106 af**Subcatchment 9S: Drainage Area -A3**Runoff Area=3.000 ac Runoff Depth>0.85"
Flow Length=250' Tc=8.4 min CN=49 Runoff=3.93 cfs 0.213 af**Subcatchment 10S: Drainage Area-A2**Runoff Area=4.100 ac Runoff Depth>0.85"
Flow Length=400' Tc=13.2 min CN=49 Runoff=4.29 cfs 0.290 af**Subcatchment 12S: Drainage Area-A1**Runoff Area=6.000 ac Runoff Depth>0.85"
Flow Length=540' Tc=18.9 min CN=49 Runoff=5.05 cfs 0.423 af**Subcatchment 23S: Drainage Area -5**Runoff Area=1.200 ac Runoff Depth>0.85"
Flow Length=170' Tc=10.4 min CN=49 Runoff=1.44 cfs 0.085 af**Reach 5R: Channel 3**Peak Depth=0.20' Max Vel=4.1 fps Inflow=3.93 cfs 0.213 af
n=0.025 L=377.0' S=0.0477 '/' Capacity=293.54 cfs Outflow=3.65 cfs 0.212 af**Reach 11R: Channel -1**Peak Depth=0.28' Max Vel=3.5 fps Inflow=5.05 cfs 0.423 af
n=0.025 L=832.0' S=0.0246 '/' Capacity=210.87 cfs Outflow=4.69 cfs 0.418 af**Reach 13R: Channel - 5**Peak Depth=0.14' Max Vel=2.9 fps Inflow=1.44 cfs 0.085 af
n=0.025 L=230.0' S=0.0391 '/' Capacity=232.34 cfs Outflow=1.35 cfs 0.085 af**Reach 22R: Channel - 4**Peak Depth=0.15' Max Vel=2.1 fps Inflow=1.53 cfs 0.106 af
n=0.025 L=370.0' S=0.0189 '/' Capacity=453.75 cfs Outflow=1.46 cfs 0.105 af**Reach 27R: Channel - 2**Peak Depth=0.20' Max Vel=4.6 fps Inflow=4.29 cfs 0.290 af
n=0.025 L=431.0' S=0.0615 '/' Capacity=333.11 cfs Outflow=4.10 cfs 0.289 af**Pond 1P: Basin-A**Peak Elev=234.83' Storage=18,549 cf Inflow=7.42 cfs 0.707 af
Outflow=0.51 cfs 0.298 af**Pond 3P: Roadway Culvert**Peak Elev=232.40' Inflow=1.22 cfs 0.261 af
24.0" x 140.0' Culvert Outflow=1.22 cfs 0.261 af**Pond 6P: Basin - B**Peak Elev=242.13' Storage=6,478 cf Inflow=4.51 cfs 0.317 af
Outflow=0.37 cfs 0.207 af**Pond ST-1: Sed. Trap 1**Peak Elev=256.60' Storage=819 cf Inflow=1.35 cfs 0.085 af
Primary=0.67 cfs 0.074 af Secondary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.074 af

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Total Runoff Area = 27.300 ac Runoff Volume = 1.303 af Average Runoff Depth = 0.57"

Flowers LCID

Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Prepared by G.N. Richardson & Associates, Inc.

Page 4

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

5/23/2006

Subcatchment 4S: Drainage Area-A6

Runoff = 0.63 cfs @ 12.06 hrs, Volume= 0.187 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Area (ac)	CN	Description
11.500	36	Woods, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Worst Case

Subcatchment 8S: Drainage Area - A4

Runoff = 1.53 cfs @ 12.09 hrs, Volume= 0.106 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Area (ac)	CN	Description
1.500	49	50-75% Grass cover, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	300	0.0400	0.4		Lag/CN Method,

Subcatchment 9S: Drainage Area -A3

Runoff = 3.93 cfs @ 12.02 hrs, Volume= 0.213 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Area (ac)	CN	Description
3.000	49	50-75% Grass cover, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	250	0.0810	0.5		Lag/CN Method,

Subcatchment 10S: Drainage Area-A2

Runoff = 4.29 cfs @ 12.08 hrs, Volume= 0.290 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Flowers LCID

Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Area (ac)	CN	Description
4.100	49	50-75% Grass cover, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	400	0.0700	0.5		Lag/CN Method,

Subcatchment 12S: Drainage Area-A1

Runoff = 5.05 cfs @ 12.16 hrs, Volume= 0.423 af, Depth > 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Area (ac)	CN	Description
6.000	49	50-75% Grass cover, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	540	0.0550	0.5		Lag/CN Method,

Subcatchment 23S: Drainage Area -5

Runoff = 1.44 cfs @ 12.05 hrs, Volume= 0.085 af, Depth > 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Area (ac)	CN	Description
1.200	49	50-75% Grass cover, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	170	0.0400	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 3.80"

Reach 5R: Channel 3

Inflow Area = 3.000 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
Inflow = 3.93 cfs @ 12.02 hrs, Volume= 0.213 af
Outflow = 3.65 cfs @ 12.07 hrs, Volume= 0.212 af, Atten= 7%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.1 fps, Min. Travel Time= 1.5 min

Avg. Velocity = 1.5 fps, Avg. Travel Time= 4.2 min

max. velocity = 4.1 fps < 2 fps

for Base grain

-> Add check dam.

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.

Page 6

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

5/23/2006

Peak Depth= 0.20' @ 12.04 hrs
 Capacity at bank full= 293.54 cfs
 Inlet Invert= 262.00', Outlet Invert= 244.00'
 4.00' x 2.00' deep channel, n= 0.025
 Side Slope Z-value= 3.0 ' Top Width= 16.00'
 Length= 377.0' Slope= 0.0477 ' /'

Reach 11R: Channel -1

Inflow Area = 6.000 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
 Inflow = 5.05 cfs @ 12.16 hrs, Volume= 0.423 af
 Outflow = 4.69 cfs @ 12.27 hrs, Volume= 0.418 af, Atten= 7%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.5 fps, Min. Travel Time= 3.9 min
 Avg. Velocity = 1.6 fps, Avg. Travel Time= 8.9 min

max velocity = 3.5 fps < 2 fps
 for Bare ground
 ∴ Add check dam.

Peak Depth= 0.28' @ 12.21 hrs
 Capacity at bank full= 210.87 cfs
 Inlet Invert= 256.00', Outlet Invert= 235.50'
 4.00' x 2.00' deep channel, n= 0.025
 Side Slope Z-value= 3.0 ' Top Width= 16.00'
 Length= 832.0' Slope= 0.0246 ' /'

Reach 13R: Channel - 5

Inflow Area = 1.200 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
 Inflow = 1.44 cfs @ 12.05 hrs, Volume= 0.085 af
 Outflow = 1.35 cfs @ 12.09 hrs, Volume= 0.085 af, Atten= 6%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.9 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.1 fps, Avg. Travel Time= 3.5 min

max. velocity = 2.9 fps < 2 fps
 for bare ground

Peak Depth= 0.14' @ 12.06 hrs
 Capacity at bank full= 232.34 cfs
 Inlet Invert= 264.00', Outlet Invert= 255.00'
 3.00' x 2.00' deep channel, n= 0.025
 Side Slope Z-value= 3.0 ' Top Width= 15.00'
 Length= 230.0' Slope= 0.0391 ' /'

∴ Add check dam.

Reach 22R: Channel - 4

Inflow Area = 1.500 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
 Inflow = 1.53 cfs @ 12.09 hrs, Volume= 0.106 af
 Outflow = 1.46 cfs @ 12.17 hrs, Volume= 0.105 af, Atten= 5%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.1 fps, Min. Travel Time= 2.9 min
 Avg. Velocity = 0.9 fps, Avg. Travel Time= 6.8 min

max. velocity = 2.1 fps < 2 fps
 for bare ground
 ∴ Add check dam.

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Peak Depth= 0.15' @ 12.12 hrs
 Capacity at bank full= 453.75 cfs
 Inlet Invert= 251.00', Outlet Invert= 244.00'
 4.00' x 3.00' deep channel, n= 0.025
 Side Slope Z-value= 3.0 ' Top Width= 22.00'
 Length= 370.0' Slope= 0.0189 ' /'

Reach 27R: Channel - 2

Inflow Area = 4.100 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
 Inflow = 4.29 cfs @ 12.08 hrs, Volume= 0.290 af
 Outflow = 4.10 cfs @ 12.13 hrs, Volume= 0.289 af, Atten= 4%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.6 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 1.8 fps, Avg. Travel Time= 4.0 min

*Max velocity = 4.6 fps < 2 fps
 for bare ground
 = Add check dam.*

Peak Depth= 0.20' @ 12.10 hrs
 Capacity at bank full= 333.11 cfs
 Inlet Invert= 262.00', Outlet Invert= 235.50'
 4.00' x 2.00' deep channel, n= 0.025
 Side Slope Z-value= 3.0 ' Top Width= 16.00'
 Length= 431.0' Slope= 0.0615 ' /'

Pond 1P: Basin-A

Inflow Area = 10.100 ac, Inflow Depth > 0.84" for 10 Year - 24 Hour Storm event
 Inflow = 7.42 cfs @ 12.21 hrs, Volume= 0.707 af
 Outflow = 0.51 cfs @ 17.08 hrs, Volume= 0.298 af, Atten= 93%, Lag= 292.2 min
 Primary = 0.51 cfs @ 17.08 hrs, Volume= 0.298 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 234.83' @ 17.08 hrs Surf.Area= 6,432 sf Storage= 18,549 cf
 Flood Elev= 238.00' Surf.Area= 9,820 sf Storage= 43,638 cf
 Plug-Flow detention time= 246.5 min calculated for 0.298 af (42% of inflow)
 Center-of-Mass det. time= 135.7 min (986.1 - 850.5)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	43,638 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
231.00	3,155	0	0
232.00	3,907	3,531	3,531
234.00	5,605	9,512	13,043
236.00	7,585	13,190	26,233
238.00	9,820	17,405	43,638

Flowers LCID

Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Prepared by G.N. Richardson & Associates, Inc.

Page 8

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

5/23/2006

Device	Routing	Invert	Outlet Devices
#1	Primary	231.00'	18.0" x 100.0' long Culvert - Barrel RCP, square edge headwall, Ke= 0.500 Outlet Invert= 0.00' S= 2.3100 '/' Cc= 0.900 n= 0.013
#2	Device 1	233.00'	0.7" Vert. Side Opening X 16.00 columns X 2 rows with 6.0" cc spacing C= 0.600
#3	Device 1	235.00'	24.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Primary	236.00'	12.0' long x 20.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.51 cfs @ 17.08 hrs HW=234.83' (Free Discharge)

- 1=Culvert - Barrel (Passes 0.51 cfs of 14.94 cfs potential flow)
 2=Side Opening (Orifice Controls 0.51 cfs @ 6.0 fps)
 3=Riser (Controls 0.00 cfs)
 4=Emergency Spillway (Controls 0.00 cfs)

Pond 3P: Roadway Culvert

Inflow Area = 12.700 ac, Inflow Depth > 0.25" for 10 Year - 24 Hour Storm event
 Inflow = 1.22 cfs @ 12.24 hrs, Volume= 0.261 af
 Outflow = 1.22 cfs @ 12.24 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.22 cfs @ 12.24 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 232.40' @ 12.24 hrs
 Flood Elev= 234.00'
 Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	24.0" x 140.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 230.00' S= 0.0143 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=1.21 cfs @ 12.24 hrs HW=232.40' (Free Discharge)

- 1=Culvert (Inlet Controls 1.21 cfs @ 2.7 fps)

Pond 6P: Basin - B

Inflow Area = 4.500 ac, Inflow Depth > 0.85" for 10 Year - 24 Hour Storm event
 Inflow = 4.51 cfs @ 12.09 hrs, Volume= 0.317 af
 Outflow = 0.37 cfs @ 14.14 hrs, Volume= 0.207 af, Atten= 92%, Lag= 122.9 min
 Primary = 0.37 cfs @ 14.14 hrs, Volume= 0.207 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 242.13' @ 14.14 hrs Surf.Area= 3,718 sf Storage= 6,478 cf
 Flood Elev= 250.00' Surf.Area= 8,140 sf Storage= 28,540 cf
 Plug-Flow detention time= 198.8 min calculated for 0.206 af (65% of inflow)
 Center-of-Mass det. time= 111.7 min (956.2 - 844.5)

Flowers LCID

Type II 24-hr 10 Year - 24 Hour Storm Rainfall=5.80"

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,540 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	2,300	0	0
242.00	3,600	5,900	5,900
244.00	5,450	9,050	14,950
246.00	8,140	13,590	28,540

Device	Routing	Invert	Outlet Devices
#1	Primary	240.00'	18.0" x 80.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 0.00' S= 3.0000 '/ Cc= 0.900 n= 0.013
#2	Device 1	241.00'	0.7" Vert. Side Opening A X 16.00 columns X 2 rows with 6.0" cc spacing C= 0.600
#3	Device 1	244.00'	24.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Primary	245.00'	12.0' long x 20.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.38 cfs @ 14.14 hrs HW=242.13' (Free Discharge)

- 1=Culvert (Passes 0.38 cfs of 9.99 cfs potential flow)
- 2=Side Opening A (Orifice Controls 0.38 cfs @ 4.4 fps)
- 3=Riser (Controls 0.00 cfs)
- 4=Emergency Spillway (Controls 0.00 cfs)

Pond ST-1: Sed. Trap 1

Inflow Area =	1.200 ac,	Inflow Depth > 0.85"	for 10 Year - 24 Hour Storm event
Inflow =	1.35 cfs @	12.09 hrs,	Volume= 0.085 af
Outflow =	0.67 cfs @	12.23 hrs,	Volume= 0.074 af, Atten= 50%, Lag= 8.8 min
Primary =	0.67 cfs @	12.23 hrs,	Volume= 0.074 af
Secondary =	0.00 cfs @	0.00 hrs,	Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 256.60' @ 12.23 hrs Surf.Area= 596 sf Storage= 819 cf
 Plug-Flow detention time= 64.3 min calculated for 0.074 af (87% of inflow)
 Center-of-Mass det. time= 25.3 min (868.6 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	2,194 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	350	0	0
256.00	494	422	422
258.00	836	1,330	1,752
258.50	933	442	2,194

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	Rock Dam Head (feet) 0.00 0.50 1.00 1.50 2.00 Disch. (cfs) 0.000 0.410 1.750 4.220 8.000
#2	Secondary	258.50'	143.0 deg x 10.0' long Sharp-Crested Vee/Trap Weir C= 2.47

Primary OutFlow Max=0.66 cfs @ 12.23 hrs HW=256.59' (Free Discharge)

↳ **1=Rock Dam** (Custom Controls 0.66 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=255.00' (Free Discharge)

↳ **2=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

**HydroCAD Analysis
For
25-Year 24-Hour Storm**

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.
 HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Pond 1P: Basin-A

Inflow Area = 10.100 ac, Inflow Depth > 1.19" for 25 Year-24 hrs event
 Inflow = 11.92 cfs @ 12.19 hrs, Volume= 1.002 af
 Outflow = 1.86 cfs @ 13.18 hrs, Volume= 0.554 af, Atten= 84%, Lag= 59.6 min
 Primary = 1.86 cfs @ 13.18 hrs, Volume= 0.554 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 235.16' @ 13.18 hrs Surf.Area= 6,750 sf Storage= 20,673 cf
 Flood Elev= 238.00' Surf.Area= 9,820 sf Storage= 43,638 cf
 Plug-Flow detention time= 187.9 min calculated for 0.554 af (55% of inflow)
 Center-of-Mass det. time= 92.1 min (932.6 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	43,638 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
231.00	3,155	0	0
232.00	3,907	3,531	3,531
234.00	5,605	9,512	13,043
236.00	7,585	13,190	26,233
238.00	9,820	17,405	43,638

Device	Routing	Invert	Outlet Devices
#1	Primary	231.00'	18.0" x 100.0' long Culvert - Barrel RCP, square edge headwall, Ke= 0.500 Outlet Invert= 0.00' S= 2.3100 '/' Cc= 0.900 n= 0.013
#2	Device 1	233.00'	0.7" Vert. Side Opening X 16.00 columns X 2 rows with 6.0" cc spacing C= 0.600
#3	Device 1	235.00'	24.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Primary	236.00'	12.0' long x 20.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.84 cfs @ 13.18 hrs HW=235.16' (Free Discharge)
 1=Culvert - Barrel (Passes 1.84 cfs of 15.70 cfs potential flow)
 2=Side Opening (Orifice Controls 0.56 cfs @ 6.6 fps)
 3=Riser (Weir Controls 1.27 cfs @ 1.3 fps)
 4=Emergency Spillway (Controls 0.00 cfs)

Pond 3P: Roadway Culvert

Inflow Area = 12.700 ac, Inflow Depth > 0.43" for 25 Year-24 hrs event
 Inflow = 3.71 cfs @ 12.02 hrs, Volume= 0.456 af
 Outflow = 3.71 cfs @ 12.02 hrs, Volume= 0.456 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.71 cfs @ 12.02 hrs, Volume= 0.456 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.

HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Peak Elev= 232.73' @ 12.02 hrs

Flood Elev= 234.00'

Plug-Flow detention time= 0.0 min calculated for 0.456 af (100% of inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Device	Routing	Invert	Outlet Devices
#1	Primary	232.00'	24.0" x 140.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 230.00' S= 0.0143 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=3.41 cfs @ 12.02 hrs HW=232.69' (Free Discharge)

1=Culvert (Inlet Controls 3.41 cfs @ 3.5 fps)

Pond 6P: Basin - B

Inflow Area = 4.500 ac, Inflow Depth > 1.20" for 25 Year-24 hrs event

Inflow = 7.08 cfs @ 12.07 hrs, Volume= 0.449 af

Outflow = 0.51 cfs @ 14.08 hrs, Volume= 0.299 af, Atten= 93%, Lag= 120.2 min

Primary = 0.51 cfs @ 14.08 hrs, Volume= 0.299 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 242.81' @ 14.08 hrs Surf.Area= 4,348 sf Storage= 9,560 cf

Flood Elev= 250.00' Surf.Area= 8,140 sf Storage= 28,540 cf

Plug-Flow detention time= 205.6 min calculated for 0.299 af (67% of inflow)

Center-of-Mass det. time= 122.6 min (957.2 - 834.7)

Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,540 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	2,300	0	0
242.00	3,600	5,900	5,900
244.00	5,450	9,050	14,950
246.00	8,140	13,590	28,540

Device	Routing	Invert	Outlet Devices
#1	Primary	240.00'	18.0" x 80.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 0.00' S= 3.0000 '/' Cc= 0.900 n= 0.013
#2	Device 1	241.00'	0.7" Vert. Side Opening A X 16.00 columns X 2 rows with 6.0" cc spacing C= 0.600
#3	Device 1	244.00'	24.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Primary	245.00'	12.0' long x 20.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.51 cfs @ 14.08 hrs HW=242.81' (Free Discharge)

1=Culvert (Passes 0.51 cfs of 12.21 cfs potential flow)

2=Side Opening A (Orifice Controls 0.51 cfs @ 5.9 fps)

3=Riser (Controls 0.00 cfs)

4=Emergency Spillway (Controls 0.00 cfs)

Flowers LCID

Prepared by G.N. Richardson & Associates, Inc.
 HydroCAD® 7.10 s/n 001426 © 2005 HydroCAD Software Solutions LLC

Pond ST-1: Sed. Trap 1

Inflow Area = 1.200 ac, Inflow Depth > 1.20" for 25 Year-24 hrs event
 Inflow = 2.07 cfs @ 12.07 hrs, Volume= 0.120 af
 Outflow = 1.47 cfs @ 12.17 hrs, Volume= 0.109 af, Atten= 29%, Lag= 5.7 min
 Primary = 1.47 cfs @ 12.17 hrs, Volume= 0.109 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 256.89' @ 12.17 hrs Surf.Area= 647 sf Storage= 1,017 cf
 Plug-Flow detention time= 48.3 min calculated for 0.109 af (91% of inflow)
 Center-of-Mass det. time= 18.8 min (852.3 - 833.5)

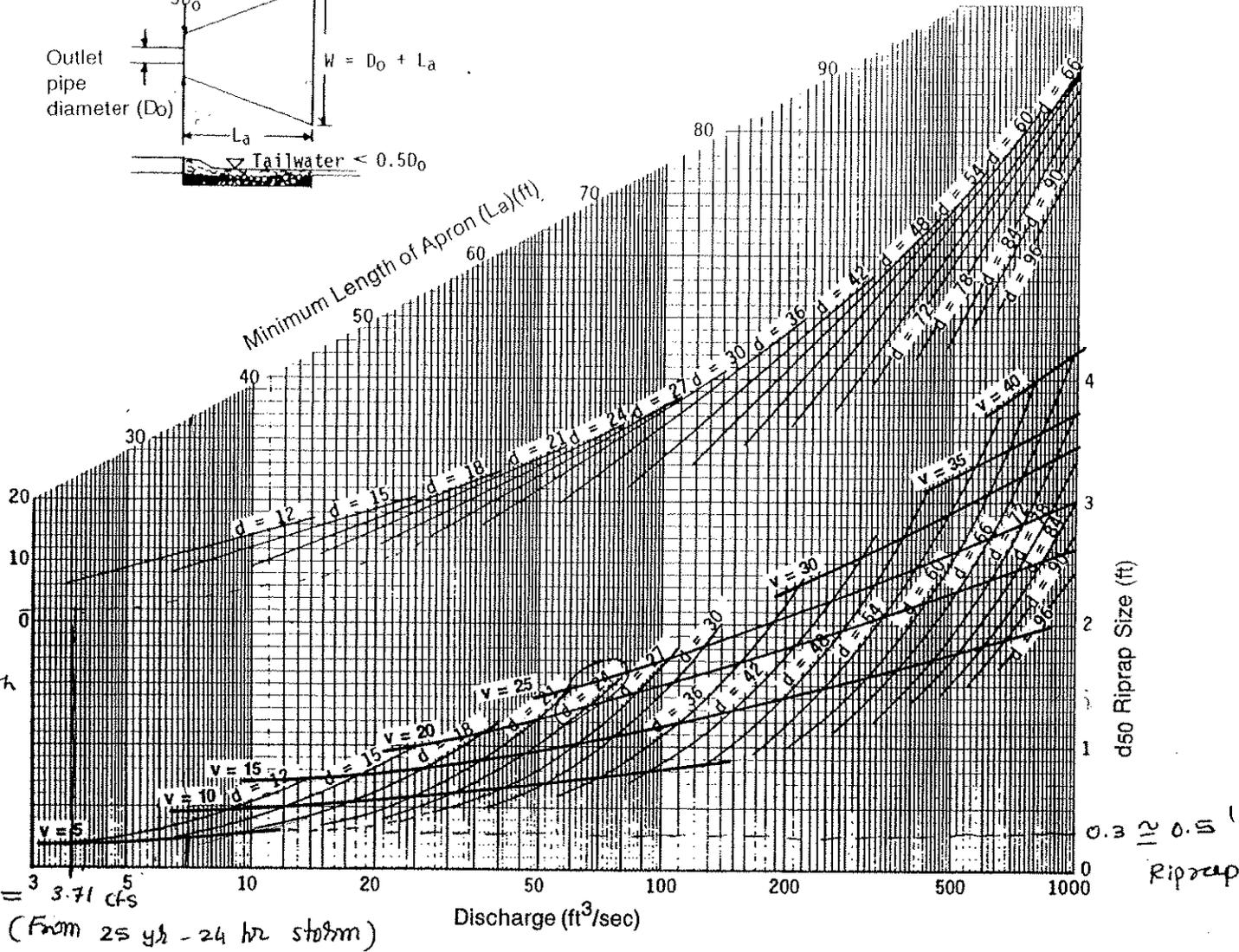
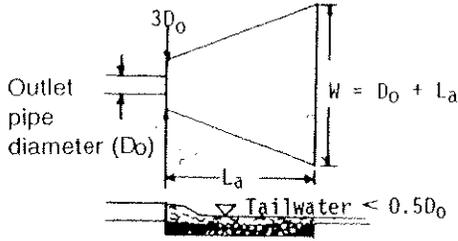
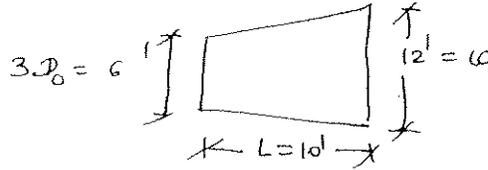
Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	2,194 cf	Custom Stage Data (Prismatic) Listed below
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	350	0	0
256.00	494	422	422
258.00	836	1,330	1,752
258.50	933	442	2,194

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	Rock Dam Head (feet) 0.00 0.50 1.00 1.50 2.00 Disch. (cfs) 0.000 0.410 1.750 4.220 8.000
#2	Secondary	258.50'	143.0 deg x 10.0' long Sharp-Crested Vee/Trap Weir C= 2.47

Primary OutFlow Max=1.42 cfs @ 12.17 hrs HW=256.88' (Free Discharge)
 ↳1=Rock Dam (Custom Controls 1.42 cfs)

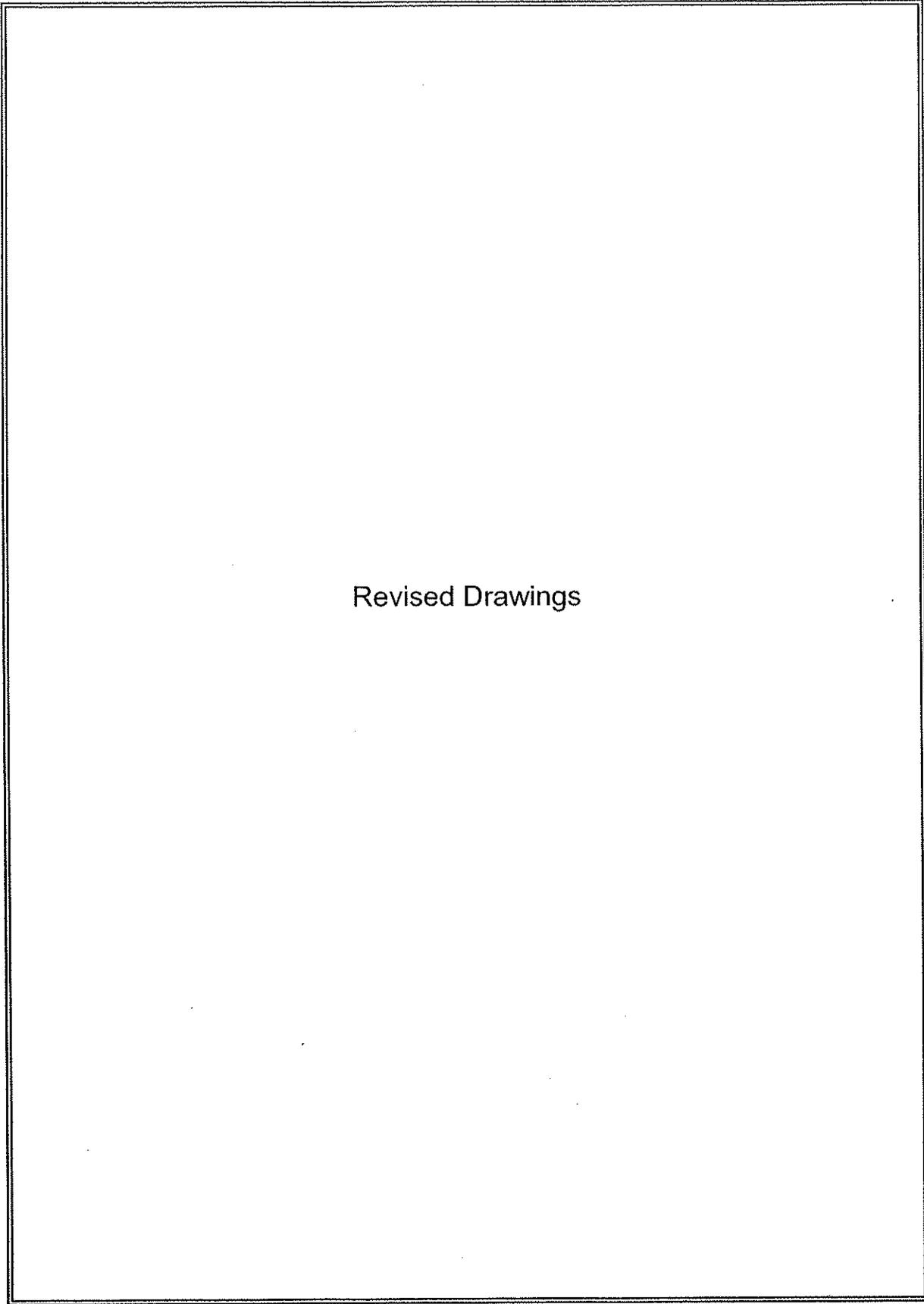
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=255.00' (Free Discharge)
 ↳2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

outlet protection for Roadway culvert



Curves may not be extrapolated.

Figure 8.06a Design of outlet protection protection from a round pipe flowing full, minimum tailwater condition ($T_w < 0.5$ diameter).



Revised Drawings

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100