

# New Market Square Target Plan:

## I. City Policy for Celliac Lake Area -

OK

- 1- Preserve detention volume below 1350.  
(what's the discharge pipe at peak 100 yr Elev.)
- 2- Runoff After  $\leq$  Runoff Before (open Field Flow)
- 3- Add 100 Ac-ft sto. in City Part of basin

## II. Define existing 1350 boundary - use PGC existing topo and USGS Quad Sheet (162.6 City Datum)

\* Need Vol. below 162.6 existing + volume available after constr. (PGC to furnish) PGC Existing = 12 Ac-ft.

| New Pond Vol's $\approx$  | CMC No's | PGC No's    |
|---|----------|-------------|
| NE Outfall: #1 (C) $\frac{(400)(140)}{43560} \times 12.2' = 15.7$ Ac-ft       | 1.29     | 6.2 No.     |
| NW Pond #2 (B) $\frac{(90)(570)}{43560} \times 14.8' = 17.5$ Ac-ft            | 1.18     | 14.5        |
| Behind Stone Pond #3 (A) $\frac{(100)(600)}{43560} \times 14.8' = 20.4$ Ac-ft | 1.38     | 12.1        |
| <b>Total Pond Sto. Below 162.6 = 53.6 Ac-ft.</b>                              |          | <b>32.8</b> |

## Approx Fill Vol:

|  |                       |
|--|-----------------------|
| (1) (240)(760) $\Rightarrow$                             | 4.19 Ac-ft.           |
| 1 (9.6)(170)(200) $\Rightarrow$                          | 7.49 Ac-ft            |
| 2 (8.6)(180)(160) $\Rightarrow$                          | <del>5.68</del> Ac-ft |
| 3 (6.6)(350)(40) $\Rightarrow$                           | 2.12 Ac-ft.           |
| 4 (9.6)(300)(120) $\Rightarrow$                          | 7.93 Ac-ft.           |
| <b>Total Lake Vol. Filled below 162.6 = 27.41 Ac-ft.</b> |                       |

OK

Looks OK, but have PGC furnish volumes.

Notes:

1- Site is above  $Q_{100} = 1350 = 167.6$

2- Low N. of Stave @ 2 Ponds will be totally submerged.

(\*) How will pump work in this situation?

(\*) 3- Need to show Section D-D!

OK (\*) 4- What's normal ground water elevation? Basings?  
 $143 \pm (1330.4) - \text{Prop. Pond Bottom} = 147.8$

(III) Before/After Runoff

PEC needs to develop before & after hydrographs for this site. Include details on how pump will be set to pump.

(IV) Added Storage

PEC needs to furnish calcs. Looks to add about 26 Ac-ft. Pearson would add 85 Ac-ft.  $\Rightarrow$  OK

## Carrier, Christopher

**From:** Brent Remsberg [Brent.Remsberg@pec1.com]  
**Sent:** Thursday, November 06, 2003 12:58 PM  
**To:** CCarrier@wichita.gov  
**Subject:** Target NW Drainage

Chris,

I'm back and catching up. You had called and requested the following information. I have listed the requests as I understood them and the information is shown in bold text. Let me know if you have questions.

Thanks  
Brent

1. What is the existing storage capacity of the "Target" site below elevation 1350? Approximately 12 acre-feet.
2. What is the displaced storage volume? All of the 12 ac-ft of existing storage is proposed to be filled. Pond A (immediately west of pad site) will provide approximately 12.1 acre-feet, Pond B (north and West of pad) will provide 14.5 ac-ft
3. Including the area to the north of Target, what will be the total detention storage available? This project will include the construction of Ponds A and B to final configuration. Pond C will be constructed to the approximate limits shown on grading plan, subject to fulfilling borrow requirements for Target site. No fill will be placed north of the Target site. This is being referred to as Phase 1. Based upon Phase 1, the detention storage provided will be a total of 90.8 ac-ft (58 exist+12.1 pond A+14.5 Pond B +6.2 Pond C below exist ground). There is the possibility that the entire Pond C will be constructed with this project with borrow placed within the existing ponding area to the east. If the entire Pond C is built the total detention volume will be 78.9 ac-ft.
4. What is the ground water elevation? Geotech report show water at elev 143+/- (1330.5 +/-).
5. Describe the proposed pump operation. Static pool will be maintained at elevation 155.8 (3 feet below flow line of 36" pipe under Maize Rd). A float will activate when the water surface is above 155.8 and will begin timing an 8 hour "no-pump" period. A second float set at elevation 158.8 will activate if water reaches the elevation required for gravity flow to the east. This will shut off the pump if running otherwise will start the pump when water has dropped back to 158.8. Pump will operate until static elevation has been restored.

*Pump Runs only when water elev. is  
between 155.8 and 158.8.*

*3.4 Days to Pump Down 0*

# KANSAS

DEPARTMENT OF AGRICULTURE  
ADRIAN J. POLANSKY, SECRETARY

October 21, 2003

BRENT E REMSBERG PE  
%PROF ENGR CONSULTS PA  
303 S TOPEKA  
WICHITA KS 67202

*11/4/03  
Mr. Carrier,  
Attached are various  
documents pertaining  
to the Target store @  
2727 N. Maurice Rd  
for your files.  
Rick Stuldes*

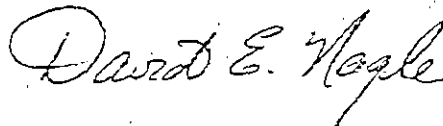
Re.: Approval/Permit Conditions  
Westlink  
Tributary to Cadillac Lake  
Sedgwick County  
WSN's: LSG-0234-C & CSG-0211-L  
Notice No.: 02414

Dear Mr. Remsberg:

Upon review of your submittal, dated October 8, 2003, regarding compliance with approval/permit conditions for wetlands mitigation and detention storage drawdown operation for the above referenced projects, you have met the relevant conditions specified in the approval and permit documents issued for said projects.

Thus, written approval from the Chief Engineer is being granted to begin construction. If you have any questions, please call me at 785-296-6897.

Very truly yours,



David E. Nagle  
Water Structures Engineer

DEN/dn

cc: Larry Chambers, President  
Socora Village Company  
Stafford Field Office

Division of Water Resources David L. Pope, Chief Engineer

109 SW 9th St., 2nd floor Topeka, KS 66612-1233

Voice (785) 296-3717

Fax (785) 296-1176

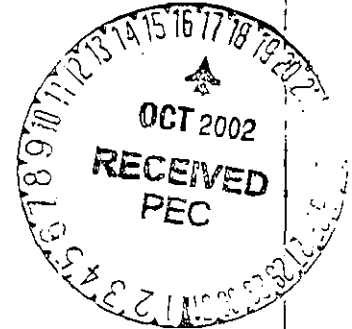
<http://www.accesskansas.org/kda>



DEPARTMENT OF THE ARMY  
KANSAS CITY DISTRICT, CORPS OF ENGINEERS  
STATE REGULATORY PROGRAM OFFICE - KANSAS  
2710 N.E. SHADY CREEK ACCESS ROAD  
EL DORADO, KANSAS 67042

REPLY TO  
ATTENTION OF:

October 16, 2002



Kansas State Regulatory Office  
(200300057)  
(Sedgwick, KS, NPR)

RECEIVED  
OCT 22 2002

Mr. Brent Remsberg, P.E.  
Professional Engineering Consult., P.A.  
303 South Topeka  
Wichita, Kansas 67202

Dear Mr. Remsberg:

This letter concerns your application to the Kansas Department of Agriculture, Notice No. 02414, for placement of floodplain fill in isolated wetlands adjacent to Cadillac Lake. The project is located in Section 6, Township 27 south, Range 1 west, Sedgwick County, Kansas.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-330.

The enclosed Jurisdictional Determination (JD) form describes the extent of waters of the United States on the project site. Also, the enclosed Notification of Administrative Appeal Options and Process and Request for Appeal form (FORM) describes your options in Section E of the FORM.

We have reviewed the information furnished and have determined that the proposed activity will not involve the discharge of dredged or fill material in waters of the United States. Therefore, Department of the Army permit authorization is not required. Other Federal, state and/or local permits may be required, however, and you should verify this yourself.

Ms. Shannon J. Warner, Regulatory Specialist, reviewed the information furnished and made this determination. If you have any questions concerning this matter, please feel free to contact Ms. Warner at 316-322-8247 (FAX 316-322-8259).

Enclosure

Copies Furnished:

Environmental Protection Agency,  
Water Resources Protection Branch wo/enclosure

Kansas Department of Wildlife  
and Parks wo/enclosure

Kansas Department of Agriculture wo/enclosure



RECEIVED

SEP 18 2003

See Attached Sheet for Instructions

NOTICE OF INTENT (NOI)
For Stormwater Runoff from Construction Activities
Authorized by a Kansas Water Pollution Control General Permit
Under the National Pollutant Discharge Elimination System

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form requests authorization for coverage under the Kansas Water Pollution Control general permit, or KDHE authorized successors, issued for stormwater runoff from construction activities in the State of Kansas. Becoming a permittee obligates the discharger to comply with the terms and conditions of the general permit. Completion of this NOI does not provide automatic coverage under the general permit. Coverage is provided and discharge permitted when the Kansas Department of Health and Environment (KDHE) authorizes the NOI. A signed and dated copy of the authorized NOI will be provided to the owner or operator. Upon authorization of the NOI, a Kansas permit number and a Federal permit number will be assigned to the construction project. ONLY COMPLETE APPLICATIONS ACCOMPANIED BY THE \$60 ANNUAL PERMIT FEE WILL BE PROCESSED. KDHE WILL NOTIFY APPLICANTS WHOSE APPLICATIONS ARE INCOMPLETE, DEFICIENT, OR DENIED. Please Print or Type.

I. OWNER OR OPERATOR ADDRESS & RECORD LOCATION INFORMATION

Owner or Operator's Name: SLAWSON COMPANIES
Company Name: SAME
Owner or Operator's Phone: (316) 263-3201
Mailing Address: 727 N. WACO, SUITE 400
City: WICHITA State: KS Zip Code: 67203
Owner's Contact Name: GEORGE SHERMAN
Company Name: SLAWSON COMPANIES
Contact Phone: (316) 263-3201
Mailing Address: 727 N. WACO, SUITE 400
City: WICHITA State: KS Zip Code: 67203
Will permit records be located on site? [X] Y; [ ] N
Company Name:
Street Address:
City: State: Zip Code:

II. SITE INFORMATION

A. LOCATION

Project Name: EVERGREEN LOT 21, BLOCK 9
Street Address: N/A
City: WICHITA State: KS Zip Code:
On-Site Contact Name: R. PATRICK AYARS
Company Name: KEY CONSTRUCTION
Contact Phone: (316) 263-9515
Mailing Address: 721 W. 2ND
Physical Location: NORTH OF CENTRAL PARK, W OF MALZE City: WICHITA State: KS Zip Code: 67203
N1/2 SE NE 6 27 South 1 Range
County: SEDGWICK

For Official Use Only:

Table with 3 columns: Received, Paid, Authorized. Rows include Date, Initials, Check No, Reviewer, Secretary, Date, KS Permit No., Federal Permit No.

To receive a hard copy of the general permit information packet check yes: [ ] Y; [ ] N

Name of Project: EVERGREEN LOT 21, BLOCK 9

Notice of Intent (NOI)

**B. EXISTING CONDITIONS/USES**

Is any part of the project located on Indian lands?  Y;  N

If yes, contact EPA regarding discharging stormwater runoff from construction activities on Indian lands.

If site runoff goes into a Municipal Separate Storm Sewer System; Owner/Operator's Name: \_\_\_\_\_

Name of the first receiving water, stream, or lake: CADILLAC LAKE River Basin: ARKANSAS RIVER

Are there any known soil contamination areas which will be disturbed by the construction activity?  Y;  N

Are contaminated soils or hazardous wastes present on the site?  Y;  N

Are there any surface water intakes for public drinking water supplies located within 1/2 mile of the site discharge points?  Y;  N

Are there any known historical or archeological sites present within the site boundary?  Y;  N

Are any threatened or endangered species known to be present within the site boundary or in the receiving water body?  Y;  N

If yes, list species and describe habitat location in relation to project location: \_\_\_\_\_

Are any Critical Water Quality Management Areas, Special Aquatic Life Use Waters, or Outstanding National Resource Waters located within 1/2 mile of the site boundary?  Y;  N

**C. PROJECT DESCRIPTION**

Project Description: GRADING, PAVING, VARIOUS UTILITY LINE INSTALLATION, BUILDING CONSTRUCTION AND LANDSCAPING FOR RETAIL CENTER.

Anticipated Start Date: OCT. 1, 2003 and Completion Date: OCT. 1, 2004

Estimated area to be disturbed: 12 Acres Total area of the site: 20 Acres

Do you plan to disturb ten or more acres that are within a common drainage area?  Y;  N

If yes, will a sedimentation basin be installed in that drainage area?  Y;  N

If not, on a separate sheet, explain what similarly effective erosion and sediment control measures that will be implemented in lieu of a sedimentation basin.

**D. EROSION CONTROL PLAN AND BEST MANAGEMENT PRACTICES**

Attach a site plan showing the erosion control measures and the locations of stormwater management or pollution control features including BMPs. Incorporate details and notes as necessary to describe the erosion control plans and BMPs.

Attach a description of the best management practices which will be utilized to control erosion, sedimentation and other pollutants in stormwater runoff during construction. Include a description of applicable local erosion and sediment control requirements.

Describe the BMPs which will be permanent stormwater management or pollution control features. Include a description of applicable local stormwater pollution control requirements for permanent stormwater management features.

Summarize the sequence of major soil disturbing activities and the corresponding erosion control measures or BMPs.

**E. AREA MAP**

Attach a topographic map showing the project location and significant features in the surrounding area.

**III. ANNUAL FEE**

Enclose a check for the first year of the annual permit fee specified in K.A.R. 28-16-56 et seq. as amended. Make the check payable to "KDHE". Per K.A.R. 28-16-56, as amended, the current annual permit fee for this general permit is \$60. An annual bill will be sent to the contact person requesting a permit fee until such time as the permit holder submits a Notice of Termination (NOT).

Name of Project: EVERGREEN LOT 21, BLOCK 9

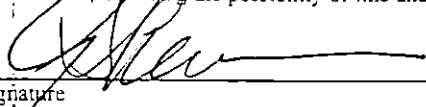
Notice of Intent (NOI)

IV. APPLICANT CERTIFICATIONS

I, the undersigned, certify that a Stormwater Pollution Prevention Plan will be or has been developed for the construction site listed in Section II of this NOI. I further certify that the plan will be implemented at the time construction begins, and, as required by the NPDES general permit for Stormwater Runoff from Construction Activity, will revise the SWP2 plan if necessary.

I understand that continued coverage under the NPDES general permit for Stormwater Runoff from Construction Activities is contingent upon maintaining eligibility as provided for in the requirements and conditions of the general permit, and paying the annual fee.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

  
\_\_\_\_\_  
Signature

9/16/03  
\_\_\_\_\_  
Date

GEORGE SHERMAN, V.P.  
\_\_\_\_\_  
Name and Official Title (Please Print)

STATE OF KANSAS

BILL GRAVES, GOVERNOR  
Jamie Clover Adams, Secretary of Agriculture  
109 SW 9th Street  
Topeka, Kansas 66612-1280  
(785) 296-3558  
FAX: (785) 296-8389



Division of Water Resources  
David L. Pope, Chief Engineer  
109 SW 9th Street, 2nd Floor  
Topeka, KS 66612-1283  
(785) 296-3717 FAX (785) 296-1176

KANSAS DEPARTMENT OF AGRICULTURE

November 22, 2002

SOCORA VILLAGE COMPANY  
LARRY CHAMBERS PRESIDENT  
PO BOX 2907  
WICHITA KS 67201

RE: Westlink  
Tributary to Cadillac Lake  
Sedgwick County  
WSN's: LSG-0234-C & CSG-0211-L  
Notice No.: 02414

Dear Mr. Chambers:

Consideration has been given to your application for the approval of plans relating to the placement of fill and the construction of a channel change in, along, and across a tributary to Cadillac Lake at a location in the NE 1/4 and in the N 1/2 of the SE 1/4, all in the NE 1/4 of Section 6, Township 27 South, Range 1 West, Sedgwick County, Kansas.

In accordance with the provisions of K.S.A. 24-126 and K.S.A. 82a-301 thru 305a, the Chief Engineer has approved the plans submitted on August 27, 2002 and issued the enclosed approval and permit of application, authorizing construction of the proposed project. Please note the approval and permit conditions on the reverse side of the approval and permit documents. Conditions No. 9 require the owner to notify this office within 30 days after the project is completed. Notice and Proof of Completion forms are enclosed for this purpose. Other special conditions have been added to limit the removal of timber and vegetation, to prohibit the introduction of toxic or deleterious materials into the watercourse, to prohibit excess material from being deposited in the floodplain not shown on the approved plans, to establish a benchmark to which all project elevations are referenced, to endeavor to maximize the amount of emergent wetland on site, and prior to construction, to receive from the Division of Water Resources written approval regarding the design, operation and logistical details of the detention pump.

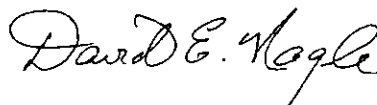
The one set of plans submitted to this office has been endorsed with the Chief Engineer's approval and will be retained in our files. Should you desire any copies of the plans with the Chief Engineer's approval shown thereon, please submit the required number.

Comments about this proposed project were received from several agencies during the environmental review process. Copies of the letters with recommendations from the environmental review agencies are enclosed for your information.

Socora Village Company  
WSN's: LSG-0234-C & CSG-0211-L  
Notice No. 02414  
page 2

The work has been authorized to be completed on or before January 1, 2005. Approval for construction of this project will expire on that date unless the time is subsequently specifically extended by the Chief Engineer. Any desired extension of time should be requested in writing approximately 30 days prior to the expiration date.

Sincerely,



David E. Nagle  
Water Structures Engineer

DEN/dn  
Enclosure

pc: Brent Remsberg, P.E.  
Prof. Engr. Consult., P.A.

THE STATE



OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE  
Jamie Clover Adams, Secretary of Agriculture

DIVISION OF WATER RESOURCES  
David L. Pope, Chief Engineer

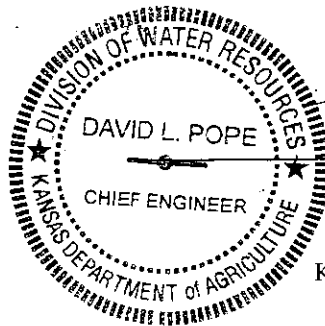
**PERMIT NO. CSG-0211-L**

K.S.A. 82a-301 *et seq.*

The Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, by virtue of the powers and duties imposed by K.S.A. 82a-301 to 305a, hereby issues this permit to Socora Village Company, giving his consent to the construction of a channel change in, along, and across a tributary to Cadillac Lake at a location in the NE 1/4 and in the N 1/2 of the SE 1/4, all in the NE 1/4 of Section 6, Township 27 South, Range 1 West, Sedgewick County, Kansas.

All work authorized by this permit shall be performed in accordance with the maps, plans, profiles and specifications filed with the application and approved by the Chief Engineer, and in accordance with plans for any changes or modifications subsequently approved by the Chief Engineer subject to the provisions of the aforementioned statutes, their regulations and the attached permit conditions.

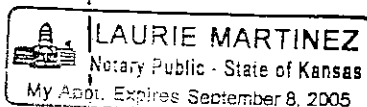
Witness my hand this 22<sup>nd</sup> day of November, 2002.



Matt A. Scherer III, P.E. for  
David L. Pope, P.E.  
Chief Engineer  
Division of Water Resources  
Kansas Department of Agriculture

State of Kansas )  
)SS  
County of Shawnee )

The foregoing instrument was acknowledged before me this 22nd day of November, 2002, by Matt A. Scherer III, as authorized agent of David L. Pope, Chief Engineer, Division of Water Resources, Kansas Department of Agriculture.



Notary Public

**RECORD THIS PERMIT WITH THE REGISTER OF DEEDS  
OF THE COUNTY WHEREIN THE WORK IS LOCATED**

**APPROVAL CONDITIONS**

1. This approval grants no water rights nor other property rights, nor does it authorize any injury to private property, invasion of private rights nor impairment of senior water rights, nor does it exempt the applicant from obtaining consent from appropriate federal, state or local government.
2. The work shall at all times be subject to supervision and inspection by representatives of the Division of Water Resources.
3. No changes in the work, maps, plans, profiles and specifications as approved shall be made except with the written consent of the Chief Engineer.
4. Any work authorized by this approval will be maintained in a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
5. The clearing of trees, brush, drift and other debris, in order to maintain the work substantially in accordance with the approved plans is hereby authorized, except that the removal of plantings made specifically for habitat or environmental mitigation is not authorized by this approval.
6. Any excess material deposited in the stream channel incident to the construction and maintenance of the project authorized by this approval shall be removed and the channel restored to a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
7. All areas disturbed by construction or other exposed soil areas shall be seeded and maintained with a mixture of grass or other vegetation appropriate to the soils, climate and project in order to minimize erosion and protect the project integrity.
8. If the work is not completed on or before the 1st day of January, 2005, this approval, if not specifically extended, shall cease and be null and void. If, upon the expiration or revocation of the approval, the work has not been completed, the applicant shall, at his own expense and to such extent and in such time and manner as the Chief Engineer may require, remove all or any portion of the uncompleted work and restore the watercourse to a satisfactory condition. No claim shall be made against the State of Kansas on account of any such removal or alteration.
9. Within thirty (30) days after the completion of the work authorized in this approval, the applicant shall file with the Division a statement that the work has been performed in accordance with this approval and the approved maps, plans, profiles and specifications.
10. The Chief Engineer reserves the right to require such changes in the maps, plans, profiles and specifications as may be considered necessary. The Chief Engineer further reserves the right to modify, suspend or revoke this approval at any time, should the applicant fail to comply with any of the conditions of this approval or regulations of the Division without sufficient cause or should such action be deemed necessary in the interest of public safety and welfare.
11. That the clearing of timber and vegetation is restricted to the absolute minimum required to accomplish the work and not interfere with the beneficial use of the project.
12. No deleterious or toxic materials shall be introduced into the watercourse or reservoir by runoff, leaching or disposal during or in connection with the work authorized by this permit.
13. Any excess material deposited in the floodplain in areas not shown on the approved plans is prohibited without prior written approval of the Chief Engineer.
14. At least one permanent project bench mark shall be set conveniently located for use after construction. The bench mark shall be placed where it shall not be destroyed or submerged. A three or four foot length of pipe or steel driven flush with the ground in an area which is unlikely to be disturbed may be used. Wood or plastic stakes, nails, or marks in trees shall not be considered as permanent benchmarks. The bench mark shall be referenced to the national geodetic vertical datum of 1929 to a tolerance of plus or minus one half foot.

THE STATE



OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE  
Jamiè Cloyer Adams, Secretary of Agriculture

DIVISION OF WATER RESOURCES  
David L. Pope, Chief Engineer

**APPROVAL OF APPLICATION**

**NO. LSG-0234-C**

K.S.A. 24-126

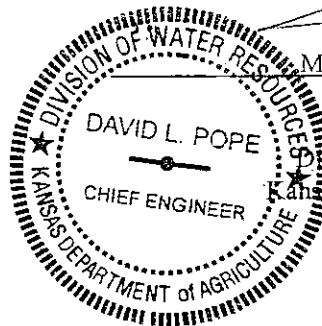
COPY FOR  
INVESTIGATION  
GROUP

The Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, by virtue of the powers and duties imposed by K.S.A. 24-126, hereby issues this approval to Socora Village Company, giving his consent to placement of fill in, along, and across a tributary to Cadillac Lake at a location in the NE 1/4 and in the N 1/2 of the SE 1/4, all in the NE 1/4 of Section 6, Township 27 South, Range 1 West, Sedgwick County, Kansas.

All work authorized by this approval shall be performed in accordance with the maps, plans, profiles and specifications filed with the application and approved by the Chief Engineer, and in accordance with plans for any changes or modifications subsequently approved by the Chief Engineer subject to the provisions of the aforementioned statute, its regulations and the attached approval conditions.

Witness my hand this 22<sup>nd</sup> day of November, 2002.

Matt A. Scherer III, P.E. for  
David L. Pope, P.E.  
Chief Engineer  
Division of Water Resources  
Kansas Department of Agriculture



State of Kansas )  
                                  )SS  
County of Shawnee )

The foregoing instrument was acknowledged before me this 22<sup>nd</sup> day of November, 2002, by Matt A. Scherer III, as authorized agent for David L. Pope, Chief Engineer, Division of Water Resources, Kansas Department of Agriculture.



**RECORD THIS INSTRUMENT IN THE OFFICE OF THE REGISTER OF DEEDS  
OF THE COUNTY WHEREIN THE WORK IS LOCATED**

PERMIT CONDITIONS

1. This permit grants no water rights nor other property rights, nor does it authorize any injury to private property, invasion of private rights nor impairment of senior water rights, nor does it exempt you from obtaining consent from appropriate federal, state or local government.
2. The work shall at all times be subject to supervision and inspection by representatives of the Division of Water Resources.
3. No changes in the work, maps, plans, profiles and specifications as approved shall be made except with the written consent of the Chief Engineer.
4. Any work authorized by this permit will be maintained in a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
5. The clearing of trees, brush, drift and other debris in order to maintain the work substantially in accordance with the approved plans is hereby authorized, except that the removal of plantings made specifically for habitat or environmental mitigation is not authorized by this permit.
6. Any excess material deposited in the stream channel incident to the construction and maintenance of the project authorized by this permit shall be removed and the channel restored to a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
7. All areas disturbed by construction and all other exposed soil areas shall be seeded and maintained with a mixture of grass or other vegetation appropriate to the soils, climate and project in order to minimize erosion and protect the project integrity.
8. If the work is not completed on or before the 1st day of January, 2005, this permit, if not specifically extended, shall cease and be null and void. If, upon the expiration or revocation of this permit, the work has not been completed, the permittee shall, at his own expense and to such extent and in such time and manner as the Chief Engineer may require, remove all or any portion of the uncompleted work and restore the watercourse to a satisfactory condition. No claim shall be made against the State of Kansas on account of any such removal or alteration.
9. Within thirty (30) days after the completion of the work authorized by this permit, the permittee shall file with the Division a statement that the work has been completed in accordance with this permit and the approved maps, plans, profiles and specifications.
10. The Chief Engineer reserves the right to require such changes in the maps, plans, profiles, specifications and conditions as may be considered necessary. The Chief Engineer further reserves the right to modify, suspend or revoke this permit at any time should the permittee fail to comply with any of the conditions of this permit or regulations of the Division without sufficient cause or should such action be deemed necessary in the interest of public safety and welfare.
11. That the clearing of timber and vegetation is restricted to the absolute minimum required to accomplish the work and not interfere with the beneficial use of the project.
12. No deleterious or toxic materials shall be introduced into the watercourse or reservoir by runoff, leaching or disposal during or in connection with the work authorized by this permit.
13. At least one permanent project bench mark shall be set conveniently located for use after construction. The bench mark shall be placed where it shall not be destroyed or submerged. A three or four foot length of pipe or steel driven flush with the ground in an area which is unlikely to be disturbed may be used. Wood or plastic stakes, nails, or marks in trees shall not be considered as permanent benchmarks. The bench mark shall be referenced to the national geodetic vertical datum of 1929 to a tolerance of plus or minus one half foot.
14. Prior to the beginning of construction, the applicant must request and receive written approval from the Chief Engineer for the plan for the pump system to be used to evacuate water from detention storage below elevation 1346.2. The pump system plan must include, at a minimum, the pumping rate of the pump or pumps to be used to evacuate the storage below 1346.2, the design calculations which determine the time required to evacuate 95% of the detention volume, and a plan sheet showing the pump or pumps and the point of discharge.

Pump

COPY FOR INFORMATION ONLY

**APPROVAL CONDITIONS**

Wetland \*

15. The applicant will work with the Kansas Department of Wildlife and Parks to maximize the amount of emergent wetland onsite as outlined in the applicant's letter to the Chief Engineer of the Division of Water Resources, dated November 18, 2002.
16. Prior to the beginning of construction, the applicant must request and receive written approval from the Chief Engineer for the plan for the pump system to be used to evacuate water from detention storage below elevation 1346.2. The pump system plan must include, at a minimum, the pumping rate of the pump or pumps to be used to evacuate the storage below 1346.2, the design calculations which determine the time required to evacuate 95% of the detention volume, and a plan sheet showing the pump or pumps and the point of discharge.

RECEIVED  
DIVISION OF WATER RESOURCES  
NOV 20 2002

**Nagle, David**

---

**From:** Chris Hase [chrish@wp.state.ks.us]  
**Sent:** Friday, November 22, 2002 10:56 AM  
**To:** Nagle, David  
**Subject:** Fw: ECA #02414

----- Original Message -----

**From:** Chris Hase  
**To:** Matt Scherer  
**Sent:** Wednesday, November 20, 2002 4:25 PM  
**Subject:** ECA #02414

Matt:

This is a follow up regarding our telephone conversation today about ECA Notice No. 02414. As we had discussed, we recommended mitigating the wetland loss at a 1.5 to 1 ratio based on U.S. Fish and Wildlife Service recommendations. Mr. Sherman and Remsberg told us that they did not have any other properties to use for mitigation. Because of a lack of space onsite, this project will fall short of the recommended ratio at less than one to one. Our preference would be to achieve the full 1.5 to 1 mitigation ratio. However, Mr. Sherman and Remsberg are willing to work with us on the mitigation and try to maximize the amount of emergent wetland around the detention structure. Provided Mr. Sherman and Remsberg are willing to work with the Department and maximize the amount of emergent vegetation onsite to the extent possible, then we would not have any further objections to issuing the permit for the project. Let us know if you have any questions.

Thanks,  
Chris

Chris Hase, Environmental Services Section  
Kansas Department of Wildlife & Parks  
512 SE 25th Ave  
Pratt, KS 67124  
620.672.5911



KANSAS

STATE

HISTORICAL

SOCIETY

6425 S.W. 6th Avenue

Topeka, Kansas

66615-1099

PHONE#(913)272-8681

FAX#(913)272-8682

TTY#(913)272-8683

KANSAS HISTORY CENTER

Administration

Center for Historical Research

Cultural Resources

Education / Outreach

Historic Sites

Kansas Museum of History

Library & Archives

HISTORIC SITES

Adair Cabin

Constitution Hall

Cottonwood Ranch

First Territorial Capitol

Fort Hays

Goodnow House

Griener Place

Hollenberg Station

Kaw Mission

Marais des Cygnes Massacre

Mine Creek Battlefield

Native American Heritage Museum

Pawnee Indian Village

Pawnee Rock

Shawnee Mission

CULTURAL RESOURCES DIVISION

Archeology Office

913-272-8681 ext. 230

MEMORANDUM

To: Applicant(s)

From: Kansas State Historical Society

Re: Division of Water Resources Permits/Approvals

Your application for a permit from the Kansas Department of Agriculture, Division of Water Resources, has been reviewed by staff of the Kansas State Historical Society to determine if your project will affect any recorded historic or prehistoric archeological site. No known sites are located within the project area, but digging, grading, or other types of earth disturbing activities can reveal the presence of buried sites that were previously unknown. If your project includes earth moving, your construction contractor should be aware of this possibility. Sites discovered during construction should not be further disturbed. The Division of Water Resources (913-296-2933) and the Kansas State Historical Society should be notified of the discovery as soon as possible.

Human burials may sometimes be uncovered. The Kansas Unmarked Burial Sites Preservation Act requires the finder to report these discoveries to the appropriate law enforcement officials. The law enforcement officials in turn notify the county coroner who determines if the burial is archeological or a forensic case. The State Archeologist (913-296-4779) is to be notified of human burials that are not investigated by law enforcement officials. Human burials, and artifacts associated with them, should not be further disturbed after their discovery. The law provides substantial penalties for intentionally disturbing human burials and grave goods, whether located on public or private property. If you find a bone, get expert help to identify it. The county coroner, a medical doctor, or state archeologist can help.

WHAT TO LOOK FOR

Archeological sites from the historic and prehistoric periods may be buried. Prehistoric sites can be recognized by the presence of discolored earth, bones, stone tools (for example, arrowheads, knives, scrapers), stone flakes, burned stones, and pieces of pottery. Stone flakes are the most commonly found artifact.

Historic period sites can be recognized by the presence of stones, bricks, or concrete foundation walls, or concentrations of these materials. Many of the items used in historic times are essentially unchanged in form from those used today. Bottles, cups, "tin" cans, buckets, hand tools, and other items can be easily recognized.

**Nagle, David**

From: Paul Liechti [pliechti@ku.edu]  
Sent: Friday, October 25, 2002 4:35 PM  
To: Nagle, David  
Subject: RE: Notice No.: 02414

David,

We have no objections to the floodplain fill and channel change referenced in the Notice listed below. Standard DWR Permit Conditions should suffice with special attention given to erosion control during and after construction.

Regards -- Paul

Paul M. Liechti, Asst. Director  
Kansas Biological Survey  
2021 Constant Ave.  
Lawrence, KS 66047-3729  
phone: 785-864-7727  
FAX: 785-864-5093

-----Original Message-----

From: Nagle, David [mailto:DNAGLE@KDA.STATE.KS.US]  
Sent: Monday, October 07, 2002 9:21 AM  
To: Falk, Bruce; CORE; Daljit Jawa (E-mail); DebSimon (E-mail); Jennifer Epperson (E-mail); k. haynes@KCC. state. ks. us (E-mail); Pliechti@falcon.cc.ukans.edu (E-mail); Raslin@Oznet. Ksu. Edu (E-mail); SCC (E-mail); ssattert@KDHE. state. ks. us (E-mail)  
Subject: Notice No.: 02414

<ftp://ag-struct.kda.state.ks.us/index.html>

|                                 |                  |
|---------------------------------|------------------|
| Notice No.: 02414               | Date             |
| of                              |                  |
| Notice: 10/7/2002               |                  |
| WS No.: LSG-0234-C & CSG-0211-L | Expiration Date: |
| 11/7/2002                       |                  |
| Proj. No.: Westlink             |                  |

|   |                            |
|---|----------------------------|
| APPLICANT                                   | DESIGNER                   |
| Name: Socora Village Company Consult., P.A. | Name: Prof. Engr.          |
| Larry Chambers, President                   | Brent                      |
| Remsberg, P.E.                              |                            |
| Address: P.O. Box 2907<br>Topeka            | Address: 303 S<br>Wichita, |
| Wichita KS 67201                            |                            |
| KS  |                            |
| 67202                                       |                            |
| Telephone: 316-263-3201<br>316-262-2691     | Telephone:                 |

PROJECT LOCATION: (See attached 7 1/2 minute quadrangle map: Wichita West, Kansas).

In, along, and across a tributary to Cadillac Lake at a location in the NE 1/4 and in the N 1/2 of the SE 1/4, all in the NE 1/4 of Section 6,

Township  
27 South, Range 1 West, Sedgwick County, Kansas.

STATUTE: K.S.A. 82a-301 to 305a and K.S.A. 24-126

PROJECT ACTIVITY: Floodplain Fill and Channel Change

Prior Agency Comments (Attached): Yes ( ) No (X)



*Kansas Corporation Commission*

Bill Graves, Governor John Wine, Chair Cynthia L. Claus, Commissioner Brian J. Moline, Commissioner

October 10, 2002

David E. Nagle  
Division of Water Resources  
901 South Kansas Ave, 2<sup>nd</sup> Floor  
Topeka KS 66612-1283

Re: DWR Application No. 02414  
Permit for floodplain fill & channel modifications  
NE & N2SE of NE/4 Sec. 06-27S-01W  
Sedgwick County, Kansas

Dear Mr. Nagle:

A review of Conservation Division files failed to indicate any environmental concerns within the acreage described above.

In the event unexpected circumstances are encountered during construction, such as the discovery of abandoned oil, gas or exploratory holes or lead lines, the applicant should contact, Doug Louis at (316) 337-6231, so appropriate regulatory response can be made.

If you have any questions or concerns, please call me at (316) 337-6243.

Sincerely,

A handwritten signature in black ink that reads "Kathleen K. Haynes".

Kathleen K. Haynes  
Department of Environmental Protection and Remediation

Cc: D Louis

WATER RESOURCES  
RECEIVED

OCT 11 2002

KS DEPT OF AGRICULTURE



303 S. TOPEKA • WICHITA, KANSAS 67202  
316-262-2691 • FAX 316-262-3003  
www.pec1.com • designers@pec1.com

Project WABST ALUM

Date 10/2/13

Item STORM WATER DRAINAGE PUMP

By J

"GOAL" → DRAINAGE POND: MAIZE RD CRP TO STATIC POOL (3') IN ≤ 4 DAYS

DRAINAGE

18,120 CY

8,500

7,550

$$34,170 \text{ CY} \times \frac{2.1 \text{ CF}}{\text{CY}} \times 7.48 \frac{\text{GAL}}{\text{CF}} = 6,900,973 \text{ GALLONS}$$

ASSUMING 9 AC. FT FROM MA TRACT IS EVENLY ADDED TO SYSTEM:

$$9 \text{ AC. FT} \times \frac{43,560 \text{ SF}}{\text{AC}} \times \frac{7.48 \text{ GAL}}{\text{CF}} = 2,932,460 \text{ GALLONS}$$

$$\Sigma = 9,833,432 \text{ GALLONS}$$

ASSUME 2,000 GAL/MIN SURFACE PUMP

$$9,833,432 \text{ GAL} \div 2,000 \text{ GPM} = 87 \text{ hr DRAWDOWN}$$

OR 3.4 DAYS\*  
∴ OK

\* ADEQUATE BUFFER TO INCLUDE "Start Delay" on Pump Controls

TOTAL DYNAMIC HEAD

$$TDH = \Delta Z + h_f + h_m$$

$\Delta Z$  = STATIC POOL - DISCHARGE E. OF MAIZE RD

$$\Delta Z = 155.8 - 158.2 = 2.4'$$

OR  $\Delta Z$  = POND BOTTOM - MAIZE DISCHARGE [W/ THE EVENT POND NEEDS EXCESSIVE DRAINAGE]

$$\Delta Z = 147.8 - 158.2 = 10.4'$$

LE FROM SE/CORNER CRP TO E. SIDE MAIZE ROAD = 800'

SAFELY ALLOWABLE VELOCITY = 3 FPS  $\phi$ , DIP = 16"  $h_f @ 200 \text{ GPM} = \frac{.199}{100} \times \frac{16}{12}$

$$h_f = (800 \times \frac{.199}{100}) = 1.59 \text{ FT} \quad V_{ACTUAL} = 3.19 \text{ FPS} / 12" \phi \text{ DIP} = \frac{h_f}{17"} = 6.9' \quad V = 5.67 \text{ FPS}$$

MINOR LOSSES

SWING CHECK VALVE, 16" = 100'  $16" / 12" \text{ CASE} = 80'$   
4-90° ELBOWS, 16"  $4 \times 40' = 160'$   $16" / 4-90", 12" = 4 \times 35' = 140' = 220' = 1.9$

$$\text{EQUIVALENT LENGTH} = 260' @ \frac{.199}{100} = .5' = h_m$$

$$TDH_1 = \Delta Z_1 + h_m + h_f = 2.4' + 1.59' + .5' = 4.5'$$

$$TDH_1 = 2.4' + 6.9' + 1.9' = 11.2' \quad \text{USE}$$

$$TDH_2 = \Delta Z_2 + h_m + h_f = 10.4' + 1.59' + .5' = 12.49'$$

$$TDH_2 = 10.4' + 6.9' + 1.9' = 19.2' \quad \text{USE}$$

6" DIA

12" DIA

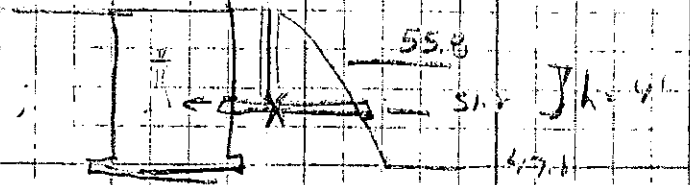


303 S. TOPEKA • WICHITA, KANSAS 67202  
316-262-2691 • FAX 316-262-3003  
www.pec1.com • designers@pec1.com

Project TRNGR N/A  
Item DEMONSTRATION PUMP

Date 10/2/03  
By J

INLET SUPPLY (CONC)



Assume 24" D.I.P.

$$V = C_d A_o \sqrt{2gh}$$

$C_d$  = coefficient of discharge = "SHORT TAKE" = .61 @  $h = 1'$

$$A_o = \pi (12)^2 = 3.14 \text{ ft}^2 \quad g = 32.2$$

$$V = (.61)(3.14) \sqrt{2(32.2)(1)}$$
$$V = 15 \text{ FPS} = 6,898 \text{ GPM} > 2,000 \text{ GPM}$$

OK

$$V = (.61)(3.14 \text{ ft}^2) \sqrt{2(32.2)(4)}$$

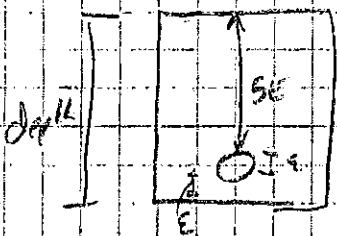
$$V = 30 \text{ FPS} \quad 30 \text{ FPS} \times 448.8 \text{ GPM/FPS} = 13,797 \text{ GPM} > 2,000 \text{ GPM OK}$$

Velocity of 24" D.I.P @ 2,000 GPM = 1.42 FPS OK

SUMP DESIGN

E = Suction Pipe Diameter = 16" (ref. CASCADE MODEL 10)

SEE DISTANCE FROM BOWL OF TV CONE INVERT =  $5(16") = 80" = 6.7'$



$$\text{MINIMUM DEPTH} = 5E + 9 + E \quad 7E = 7(16") = 112" = 9.3'$$
$$\text{MINIMUM} = 8'$$

Minimum Sump Depth (Model 10) = 21" say 24"

$$E \text{ 24" INLET} = \text{STATIC} - 4' = 55.8 - 4 = 51.8'$$

- 2' (above Sump Bowl, Q)

49.8' Sump Bowl Elev.

- 1' MIN. BELOW BOWL

48.8' USE POINT BOTTOM FOR MINIMUM BOWL



303 S. TOPEKA - WICHITA, KANSAS 67202  
316-262-2691 - FAX 316-262-3003  
www.pecl.com - designers@pecl.com

Project TRIGGERS WLD  
Item Dewatering Pump

Date 10/2/03  
By [Signature]

SYSTEM CURVE

$L = 800'$   $\phi = 12''$

$h_{m} = 220'$  EQUIVALENT  $ZL = 1,020'$

$\Delta E = 2.4'$

| Q            | 1600 | 2000 | 2300 |
|--------------|------|------|------|
| $h_{s, 100}$ | 5.58 | 8.62 | 11.3 |
| $h_p$        | 5.69 | 8.3  | 11.6 |
| $\Delta E$   | 2.4  | 2.4  | 2.4  |
| TON          | 8.1  | 11.2 | 14   |



**CASCADE PUMP COMPANY**  
10107 South Norwalk Boulevard • PO Box 2767  
Santa Fe Springs, California 90670-0767

CURVE NUMBER  
**MF1006A5**

DATE  
08-91

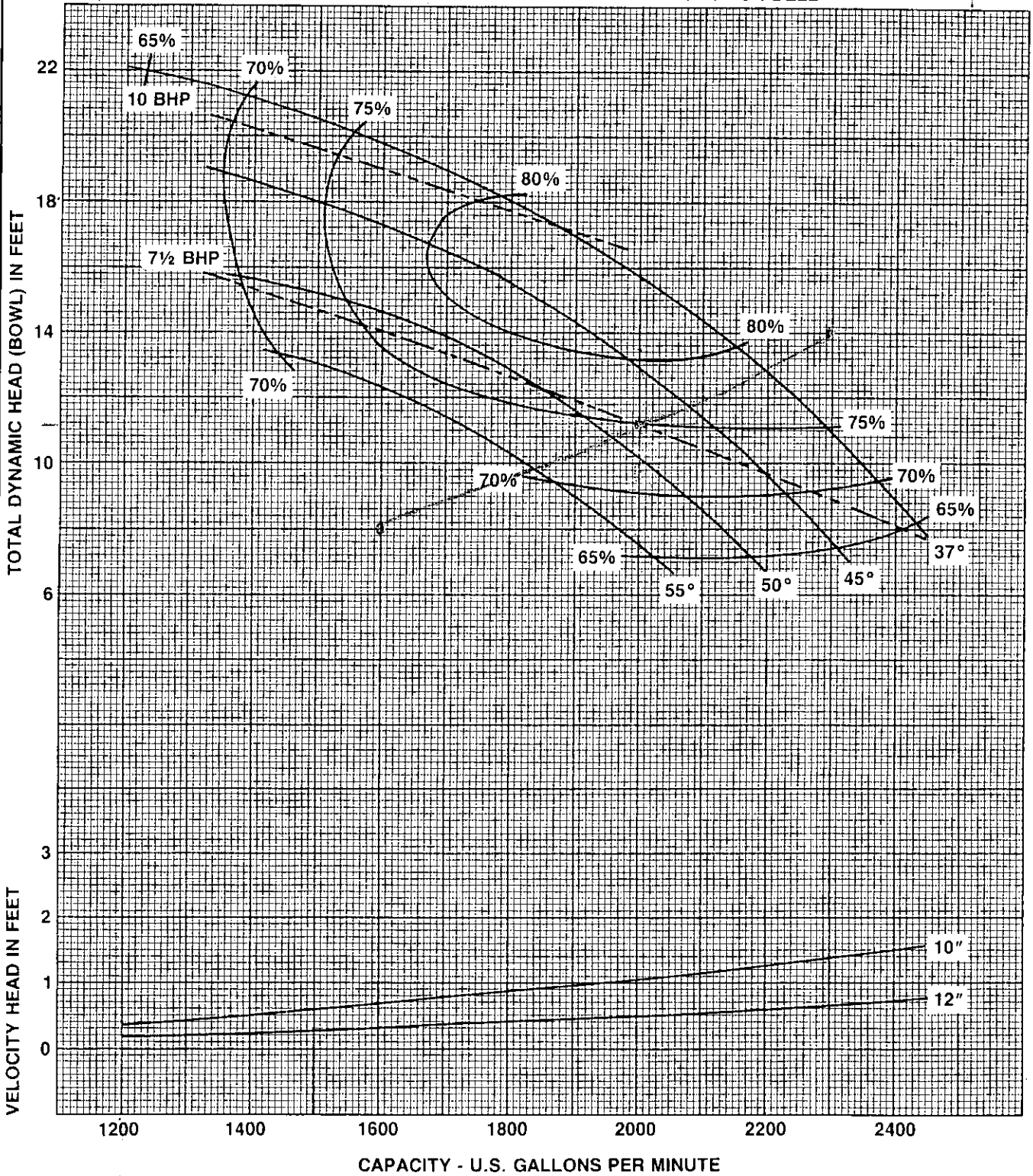
SUPERCEDES  
**NEW ISSUE**

**10**

**MF**

**1175  
RPM**

21" INCHES MINIMUM SUBMERGENCE ABOVE SUCTION BELL



**CASCADE MIXED FLOW PUMP**

CURVE CHARACTERISTICS BASED ON PUMP PERFORMANCE WITH SPECIFIED AMOUNT OF CLEAR, NON-AERATED, FRESH COLD WATER.

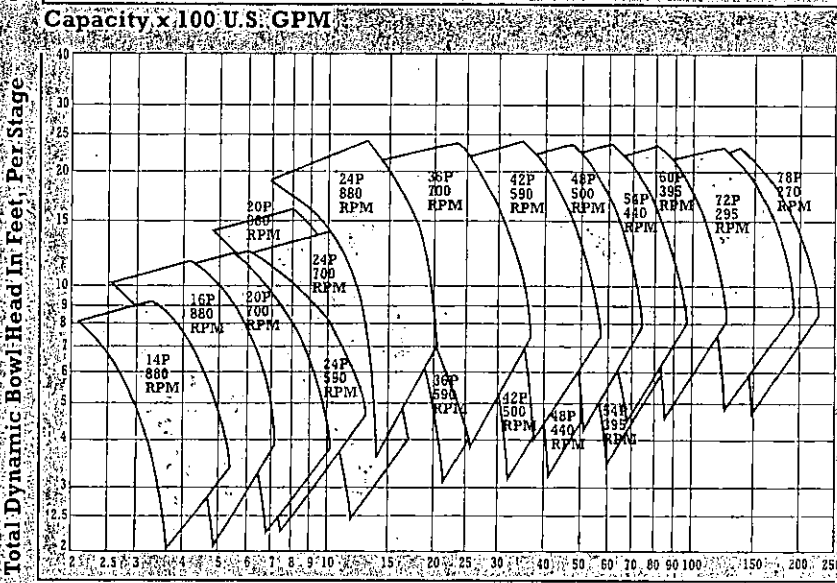
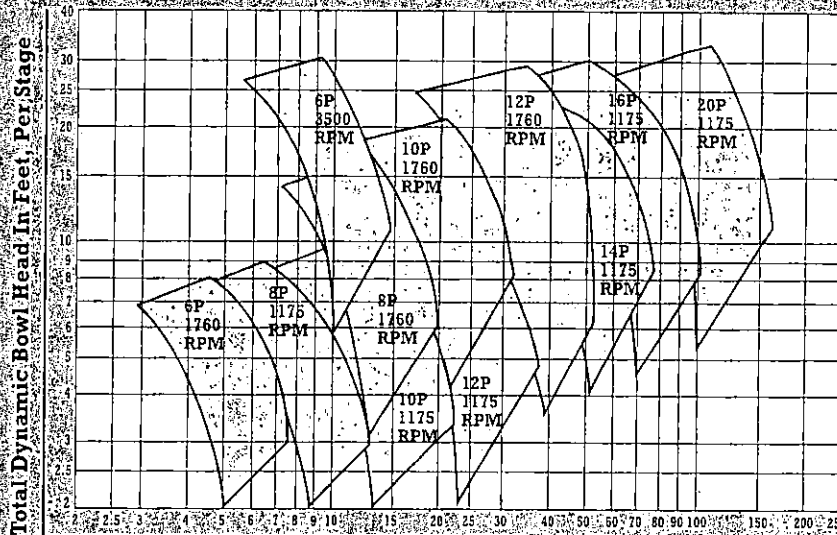
THIS PERFORMANCE CURVE IS FOR ESTIMATING ONLY. CURVE SHOWS SINGLE STAGE PERFORMANCE. FOR MULTIPLE, VARIABLE AND OTHER SPEED APPLICATIONS, CONSULT FACTORY.

# PERFORMANCE

Below are predicted performance curve families showing pump sizes and full load speeds for 60 Hz operation of standard NEMA induction motors most commonly used for given pump sizes. The curves presented here are indicative of available

performance for the identified model numbers. Other pump designs are available which will cover ranges not shown. For more specific performance characteristics including multiple variable and other speed applications refer to catalog

curves or consult your Cascade representative or the factory. Performance is based on pumping clear water (specific gravity 1.0) below 85°F (30°C)



# ENGINEERING DATA

## Standard Construction

| Model  | 6         | 8           | 10              | 12              | 14              | 16              | 20              | 24              | 36              | 42              | 48              | 54              | 60              |
|--|-----------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Maximum Sphere Size                                | 1 1/2"    | 2"          | 2 1/2"          | 3"              | 3 3/8"          | 3 3/4"          | 4 1/2"          | 5"              | 6"              | 9"              | 10 1/2"         | 11 1/4"         | 12"             |
| Propeller Diameter (Nominal)                       | 5 1/2"    | 6 9/16"     | 8"              | 10"             | 11 1/2"         | 14 1/2"         | 17 1/2"         | 20"             | 26"             | 31"             | 36"             | 41"             | 48"             |
| Propeller Eye - Above Bell                         | 3 1/8"    | 5 3/8"      | 6 1/8"          | 7 1/8"          | 9 1/8"          | 10 1/2"         | 12 1/2"         | 14 1/4"         | 18 3/8"         | 21 5/8"         | 25 7/8"         | 28 1/8"         | 34 1/8"         |
| Shaft Diameter - Standard                          | 3/4"      | 1"          | 1 1/8"          | 1 1/4"          | 1 3/8"          | 1 7/8"          | 2 1/8"          | 2 3/8"          | 2 3/4"          | 3 1/8"          | 3 3/4"          | 4 1/8"          | 5 1/8"          |
| Shaft Diameter - Range                             | 3/4" - 1" | 1" - 1 1/8" | 1 1/8" - 1 1/4" | 1 1/4" - 1 3/8" | 1 3/8" - 1 7/8" | 1 7/8" - 2 1/8" | 2 1/8" - 2 3/8" | 2 3/8" - 2 3/4" | 2 3/4" - 3 1/8" | 3 1/8" - 3 3/4" | 3 3/4" - 4 1/8" | 4 1/8" - 4 3/4" | 4 3/4" - 5 1/8" |
| Suction Bell Diameter (E)                          | 10"       | 14"         | 16"             | 18"             | 23"             | 27"             | 32"             | 38"             | 47"             | 55"             | 67"             | 64"             | 90"             |
| Minimum Submergence                                |           |             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Required (Q)*                                      | 20"       | 23"         | 27"             | 31"             | 34"             | 42"             | 50"             | 56"             | 66"             | 60"             | 70"             | 78"             | 96"             |
| Thrust Constant 'K'                                | 8.1       | 19.2        | 24.7            | 34.0            | 57.5            | 69.0            | 99.2            | 136.0           | 229.0           | 326.0           | 439.0           | 573.0           | 783.0           |
| WR <sup>2</sup> Each Stage - Lbs. Ft. <sup>2</sup> |           |             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| (Dry/Wet)  | 03/03     | 15/17       | 29/31           | 60/66           | 2.0/2.2         | 3.0/3.3         | 8.0/8.8         | 19/20.9         | 72/79.2         | 170/187         | 367/404         | 700/770         | 1560/1716       |

Maximum Bowl Working Pressure (All Models) - 75 PSIG  
 \*Q is the submergence normally required to avoid damaging vortexes  
 It may be necessary to increase Q to satisfy the required NPSH of the pump.



K A N S A S



RODERICK L. BREMBY, SECRETARY

DEPARTMENT OF HEALTH AND ENVIRONMENT

KATHLEEN SEBELIUS, GOVERNOR

Re: Construction Stormwater Permit  
Kansas Water Pollution Control General Permit No. S-MCST-0110-1

Dear Permittee:

Enclosed is the authorization to discharge stormwater runoff under the construction stormwater general permit at the construction site described therein. While copies of the authorization to discharge may be made, please retain the original authorization to discharge for your records.

**Please review the construction stormwater general permit carefully since the authorization to discharge obligates the facility to meet the permit requirements.**

The construction stormwater general permit, application forms, instructions and other forms are available on the KDHE Stormwater Website at [www.kdhe.state.ks.us/stormwater](http://www.kdhe.state.ks.us/stormwater). Hard copies are also available upon request.

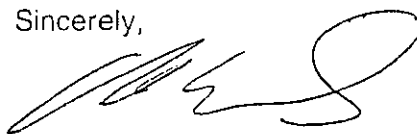
The general permit fee of \$60 is an annual permit fee due each year for the duration of the project. In accordance with K.A.R. 28-16-56d(b)(5) the general permit fee must be paid annually to maintain coverage under the construction stormwater general NPDES permit. The annual general permit fee is due each year on the anniversary of the effective date of the authorization to discharge until a Notice of Termination (NOT) has been authorized by KDHE. Annual fee payments should be accompanied by a copy of the authorization to discharge for the associated project. Checks for annual fees should be made payable to KDHE.

Please remember to submit an NOT, and a copy of the authorization to discharge, when the soil disturbing activities have been completed and final stabilization has been achieved. To stop paying the annual general permit fee under the construction stormwater general permit, KDHE must authorize the Notice of Termination (NOT) to terminate permit coverage when final stabilization has been completed. After KDHE has authorized the NOT, permit coverage is terminated and the annual general permit fee is no longer required.

The enclosed authorization to discharge does not relieve the permittee of the responsibility to obtain coverage under the construction stormwater general permit for future construction activities that are subject to stormwater permitting requirements.

We appreciate your efforts to comply with the stormwater pollution prevention program, and thereby to help us protect the water quality of the State of Kansas. If you have any questions about the enclosed authorization to discharge, or coverage under the general permit, please contact me at [abrooks@kdhe.state.ks.us](mailto:abrooks@kdhe.state.ks.us) or (785) 296-5549.

Sincerely,



Alan W. Brooks, P.E.  
Industrial Programs Section  
Bureau of Water

Enclosures

pc: Stormwater Correspondence File

c:\stormwater\new noi letter.wpd



See Attached Sheet for Instructions

NOTICE OF INTENT (NOI)
For Stormwater Runoff from Construction Activities
Authorized by a Kansas Water Pollution Control General Permit
Under the National Pollutant Discharge Elimination System

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form requests authorization for coverage under the Kansas Water Pollution Control general permit, or KDHE authorized successors, issued for stormwater runoff from construction activities in the State of Kansas.

I. OWNER OR OPERATOR ADDRESS & RECORD LOCATION INFORMATION

Owner or Operator's Name: SLAWSON COMPANIES
Company Name: SAME
Owner or Operator's Phone: (316) 263-3201
Mailing Address: 727 N. WACO, SUITE 400
City: WICHITA State: KS Zip Code: 67203
Will permit records be located on site? [X] Y; [ ] N
Owner's Contact Name: GEORGE SHERMAN
Company Name: SLAWSON COMPANIES
Contact Phone: (316) 263-3201
Mailing Address: 727 N. WACO, SUITE 400
City: WICHITA State: KS Zip Code: 67203

II. SITE INFORMATION

A. LOCATION

Project Name: EVERGREEN LOT 21, BLOCK 9
Street Address: N/A
City: WICHITA State: KS Zip Code:
On-Site Contact Name: R. PATRICK AYARS
Company Name: KEY CONSTRUCTION
Contact Phone: (316) 263-9515
Mailing Address: 721 W. 2ND
Physical Location: NORTH OF CENTRAL PARK, W OF MAIZE City: WICHITA State: KS Zip Code: 67203
N 1/2 SE NE 6 27 South, 1 E; [X] W; County: SEDGWICK

For Official Use Only:

Table with 2 columns: Received (RECEIVED SEP 18 2003 BUREAU OF WATER) and Authorized (Paid \$60, Date 9-18-03, Initials dp, Check No 124671, Reviewer signature, Date 9/19/03). Bottom row contains KS Permit No. S-AR94-0135 and Federal Permit No. KS R101173.

To receive a hard copy of the general permit information packet check yes: [ ] Y; [ ] N

## Evergreen Lot 21, Block 9

### Site Development Pollution Prevention Plan

The intent of this Storm Water Prevention Plan is to minimize any water quality impacts, in the form of sediment pollution, to the adjoining property and the basin downstream of the Cadillac Lake Basin (Westlink Tributary of the Cowskin Watershed). The construction activities anticipated on the project site will include the construction of detention/retention ponds, the placement of fill for building pads and parking lots, the installation of storm water sewer systems, sanitary sewer lateral extensions, waterline extensions, various private utility service extensions, the pavement of access ways and parking lots, the installation of landscape improvements, and building construction.

This Storm Water Pollution Plan will be implemented to:

Abate erosion as soon as possible after disturbance.  
Prevent sediment from leaving the construction area.  
Establish permanent vegetation on all unpaved areas disturbed by construction.

#### Site Description

The site is located west of Maize Road and north of Central Park Street within Evergreen Addition to Wichita, Sedgwick County, Kansas and on unplatted property immediately adjacent to the north. (See Attachment A).

Attachment A illustrates the permanent improvements proposed. During construction of these improvements, soil will be disturbed as a result of pond excavation, placement of fills, trenching for utility installations, footing excavation, soil preparation for landscaping improvements and other related activities.

#### Sequence of Major Activity

Construction of the project will proceed in phases. Phase 1 will include the development of approximately 90% of Lot 21, Block 9 Evergreen and the construction of the proposed detention/retention ponds on the property adjacent to the north. The development of the out parcel on Lot 21 and the development of the adjacent property to the north may occur simultaneously, but this is not anticipated as part of this plan. Should the construction become concurrent, an amendment to the plan will be prepared.

The order of activity will be as follows: (Items in *Italics* refer directly to BMP installations)

- 1) *Install construction entrance at the existing concrete drive onto Maize Road north of Central Park.*

- 2) *Install inlet protection at existing curb inlets on Central Park and the west side of Maize Road.*
- 3) *Install perimeter silt barrier.*
- 4) *Construct silt pond.*
- 5) *Clear and grub*
  - a) *Remove and stockpile top soil from propose pond area for use in restoration of wetland plants along pond berms*
  - b) *Remove trees to be "bagged" and stored for replanting as part of Landscape Plan.*
- 6) *Excavate ponds and place fill for building pad and parking lots.*
  - a) *Construct linear silt abatement "ditch" at top of pond slope in lieu of silt fence barrier. This effort to be employed as a condition of providing detention/retention capacity of pond area. Measures that would hinder the detention storage of storm water will not be permitted as a condition of DWR drainage permit. Retained storm water to be pumped from pond and full retention capacity restored within 4 days of storm event. Discharge from pond to be routed through open channel to silt pit prior to discharge off site.*
  - b) *Concurrently construct staging area and place gravel surface*
  - c) *Concurrently construct or install sanitary sewer and water line site improvements.*
  - d) *As progress permits, construct storm sewer improvements. All locations where storm sewer discharges into proposed ponds, stone rip rap to be placed prior to installation of outfall structure.*
  - e) *Concurrent SWPP improvements will include the installation of inlet protection devices at all inlets where surface water can enter the system.*
  - f) *Construct internal haul road from staging area to building pad and 24 foot wide gravel surface around building pad.*
- 7) *Place top soil on pond berms*
  - a) *This area will **NOT** be temporarily seeded due to intent of restoring native vegetation from seeds contained within topsoil material, as a condition of DWR drainage permit.*
- 8) *Immediately prior to placing permanent seeding, place top soil and shape pond side slopes.*

Due to complexity of concurrent parking lot and building construction, it is not possible to detail specific milestones and major activity. Erosion control measures required to adhere to the goal of the SWPP plan (Prevent sediment from leaving the construction area) will be installed and maintained until erosion abatement of disturbed areas is no longer required. Inspection reports will be regularly documented on the form provided as Attachment B. Additions and modifications to the plan in effect during this period will be documented on the overall plan shown as Attachment C.

## CONTROLS

Erosion and Sediment Controls - Stabilization Practices  
Temporary Stabilization

Top soil stock piles and disturbed portions of the site where construction activity temporarily ceases for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be Rye (grain) applied at the rate of 5 lb./1000 SF.

Inlet protection will be installed on all storm water sewer inlets immediately after the structures have been backfilled. Various inlet protection methods are included.

Linear sediment barrier will be required where storm water drains offsite or into a water body. General silt fence locations have been shown on the enclosed plan.

See "KDOT Temporary Erosion-Control Manual" for additional examples of inlet protection and sediment barrier details.

#### Permanent Stabilization

Disturbed portions of the site where construction activities permanently ceases shall be stabilized with permanent seed no later than 14 days after the last construction activity. Prior to seeding a 12-24-12 fertilizer shall be applied to all areas to be stabilized at a rate of 850 lb./acre. The permanent seed shall be fescue applied at 8 lb./1000 SF.

#### Waste Disposal Waste Materials

All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all local Wichita and State of Kansas solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as necessary and trash will be hauled to an appropriate trash facility. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and the individual, who manages the day-to-day operations, will be responsible for seeing that these practices are followed.

#### Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, who manages site operations, will be responsible for seeing that these practices are followed.

#### Sanitary Waste

All sanitary waste will be collected from portable units as required by local regulation.

### Off-site Vehicle Tracking

A stabilized construction entrance will be provided to help reduce vehicle tracking of sediments. The paved street adjacent to the site entrance will be swept regularly to remove any excess mud, dirt or rock tracked from the site.

### TIMING OF CONTROLS/MEASURES

As indicated in the Sequence of Major Activities, the stabilized construction entrance will be constructed prior to clearing or grading of any other portions of the site. Storm sewer inlet protection will be installed immediately after the structures have been back-filled. Areas where construction activity temporarily ceases for more than 21 days will be stabilized with temporary seed and mulch within 14 days of last disturbance. Once construction activity ceases permanently in an area, that area will be stabilized with permanent seed and mulch. After the entire site is stabilized, the accumulated sediment will be removed from the silt fence and the silt fence and the storm sewer inlet protection will be removed.

### MAINTENANCE/INSPECTION PROCEDURES

#### Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls.

1. All control measures will be inspected at least once each week and following any storm event of 0.5 inches of rain or greater.
2. All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of discovery.
3. Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.
4. Silt fence will be inspected for depth of sediment, tears, to see if fabric is securely attached to the fence posts, and to see that the fence posts are securely in the ground.
5. Temporary and permanent seeding and planting will be inspected for bare spots, washouts and unhealthy growth.
6. Written reports of monthly inspections will be kept with this plan. Reports need to include: the inspector's name and signature, date of inspection, observations on sediment control measures, actions taken or necessary to correct deficiencies, and a listing of areas where construction activities have permanently or temporarily stopped.

#### Non-Storm Water Discharge

It is expected that the following non-storm water discharges will occur from the site during the construction period:

1. Water from water line flushing.
2. Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
3. Uncontaminated groundwater (from dewatering excavation).

## INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

|                          |                  |                   |           |                   |
|--------------------------|------------------|-------------------|-----------|-------------------|
| Concrete                 | Detergents       | Paint             | Tar       | Fertilizers       |
| Petroleum based products |                  | Cleaning solvents | Wood      | Geotextile fabric |
| Rebar                    | Wire mesh fabric | Joint sealant     | Aggregate |                   |

### SPILL PREVENTION

#### Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials to storm water runoff.

#### Good Housekeeping

The following good housekeeping practices will be followed during the construction project.

1. An effort will be made to store only enough product required to do the job.
2. All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
3. Products will be kept in their original container with the original manufacturer's label.
4. Substances will not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product will be used up before disposing of the container.
6. Manufacturer's recommendations for proper use and disposal will be followed.
7. The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.
8. Dump trucks hauling excavated material from the site will be loaded to prevent spilling material while in transport.

#### Hazardous Products

These practices are used to reduce the risk associated with hazardous materials.

1. Products will be kept in original containers unless they are not resealable.
2. Original labels and material safety data will be retained; they contain important product information.
3. If surplus product must be disposed of, manufacturer's or local and State recommended methods for proper disposal will be followed.

#### Product Specific Practices

The following product specific practices will be followed onsite:

#### Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

#### Fertilizers

Fertilizers used will be applied using the minimum amounts recommended by the City of Wichita administrative regulation No. AR78 or by the manufacturer. Once

applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

#### Paints

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or State and local regulations.

#### Concrete Trucks

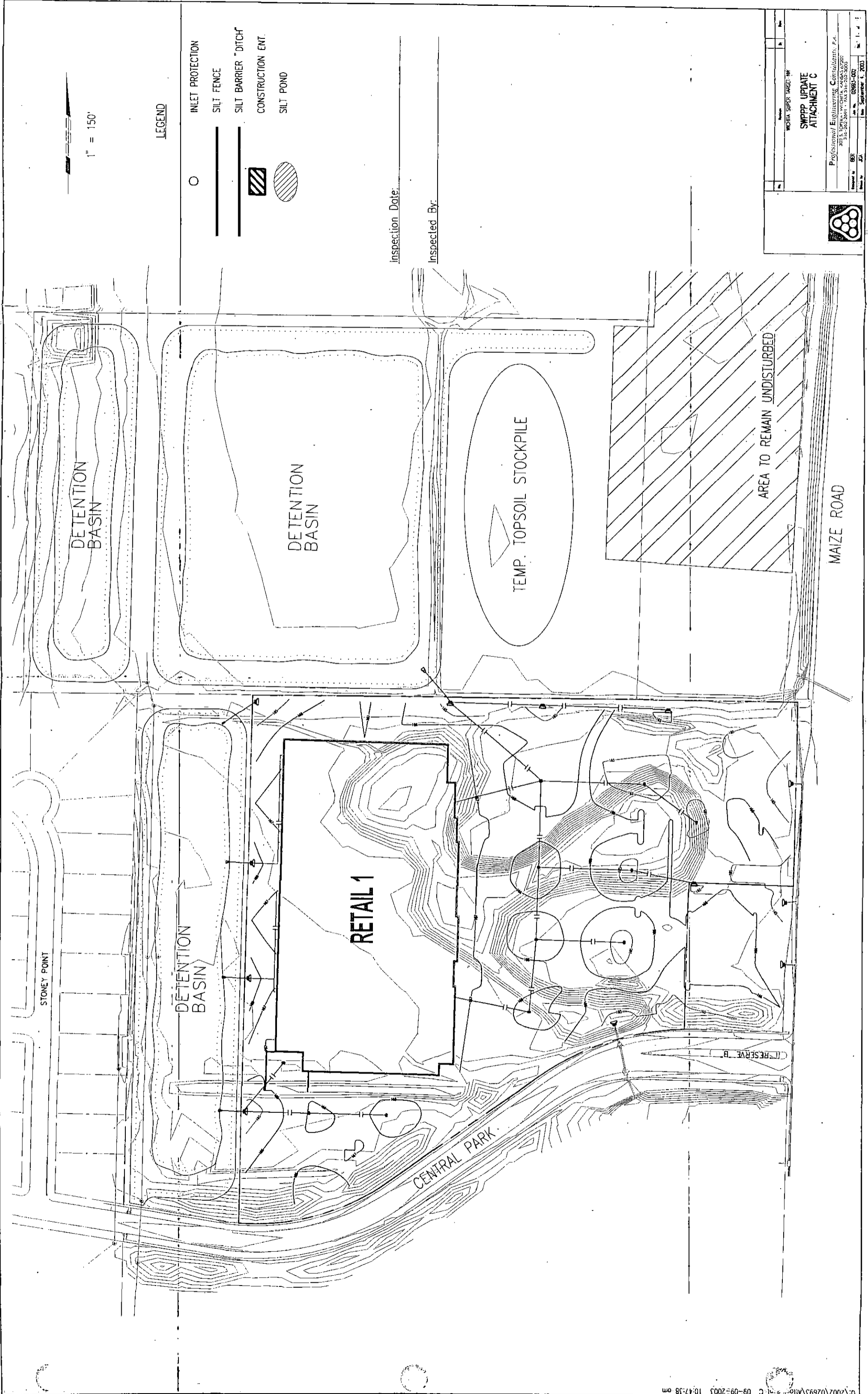
Concrete trucks will be allowed to washout on site provided an appropriate place to do so is established. The washout area will be located in a vacant area, designated by the developer. It should consist of a large (~15' X 20') area for the trucks to washout in, surrounded by 2' high soil berms to prevent any washout water from entering the streets, storm water sewer or nearby water bodies. Instead of berms, a 2' deep pit would be acceptable, as long as the washout water is contained. When the washout pit needs to be moved or is no longer needed, the concrete sediment is to be excavated and hauled to an appropriate waste disposal site and the pit area is to be graded to final grade and seeded appropriately.

#### Spill Control Practices

In addition to the good housekeeping and materials management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup.

1. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and location of the information and cleanup supplies.
2. Material and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
3. All spills will be cleaned up immediately after discovery.
4. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
5. Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size of spill.
6. The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
7. The site superintendent responsible for day-to-day site operations will be the spill prevention and cleanup coordinator. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.





Inspection Date: \_\_\_\_\_  
 Inspected By: \_\_\_\_\_

MOHA SUPER TARGET INC

**SWPPP UPDATE ATTACHMENT C**

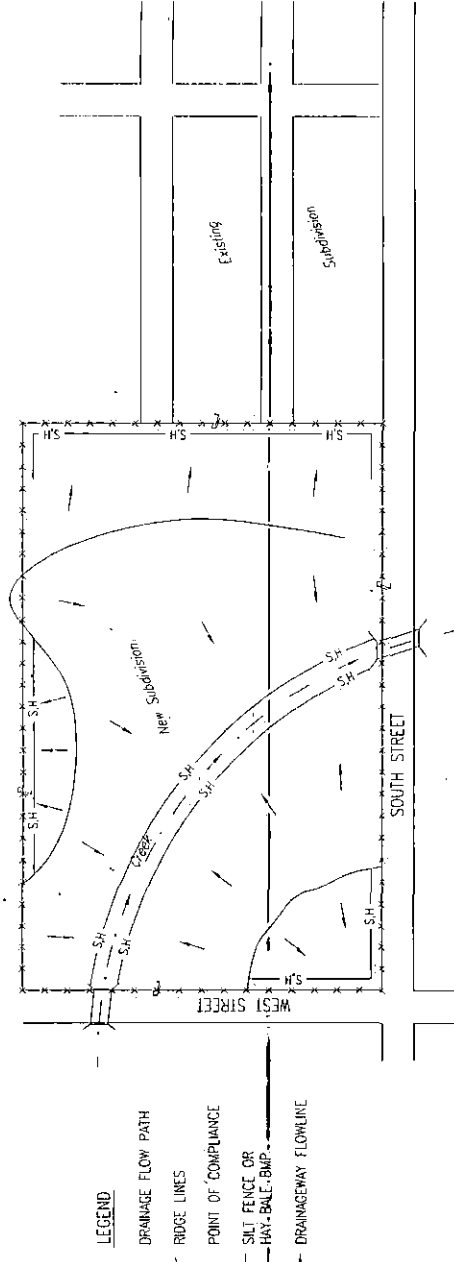
Professional Engineering Consultants, P.A.  
 2011 LINDSEY DRIVE  
 SUITE 200  
 CHARLOTTE, NC 28203  
 Phone: 704.366.2881 FAX: 704.366.3002

Project No: 02693-002  
 Date: September 1, 2003

Sheet No: 1 of 1

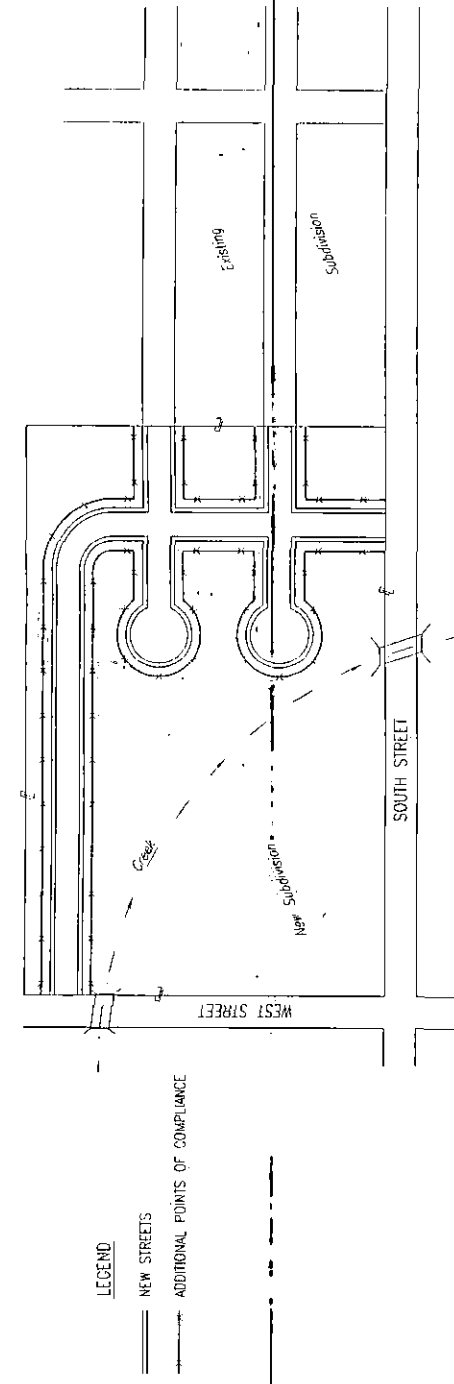


PHASE 1 - INITIAL EARTHWORK AND UTILITIES (EXCEPT STORM SEWER)



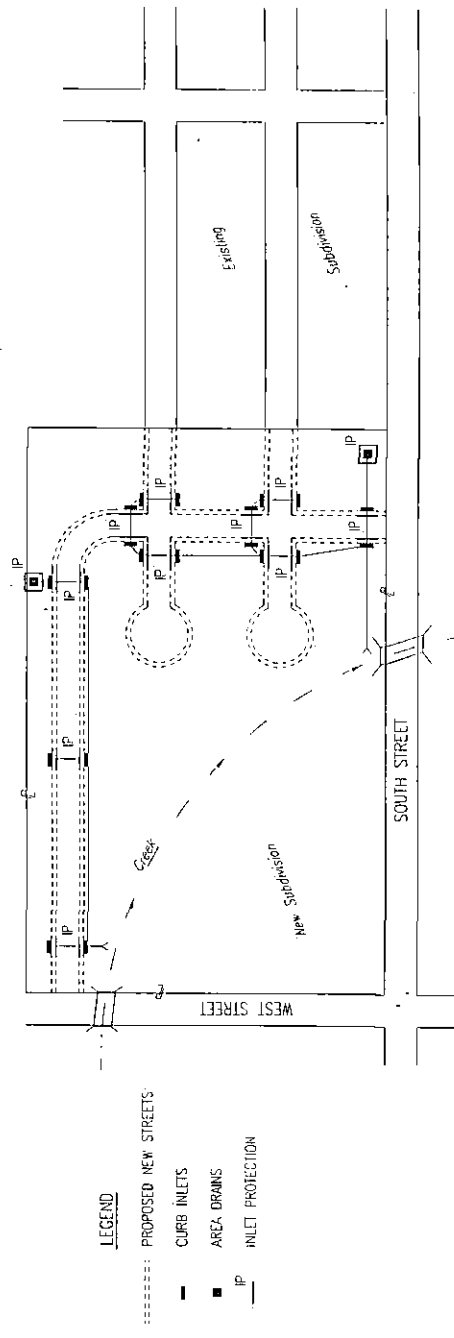
1. DURING THIS PHASE OF SUBDIVISION CONSTRUCTION, THE POINTS OF COMPLIANCE ARE THE PERIMETER BOUNDARIES AND ANY DRAINAGE WAYS OR STORM SEWERS DRAINING THROUGH OR FROM THE SITE. SHOULD LAWS BE CONSTRUCTED WITHIN THE SUBDIVISION THAT WILL DISCHARGE DURING STORMS, THEY ARE ALSO A POINT OF COMPLIANCE.
2. HAYBALES OR SILT FENCE MUST BE CONSTRUCTED ALONG THE PROPERTY LINE WHERE ON SITE WATER CAN DRAIN OFF THE PROPERTY. THESE BMP'S WILL ALSO BE INSTALLED ALONG ANY DRAINAGE DITCH OR LAKE THAT CAN DISCHARGE.
3. SHOULD SILT OR SEDIMENT ENTER THE DITCHES OR GUTTERLINES ON THE ADJACENT BOUNDARY STREETS, APPROPRIATE BMP'S WILL BE PLACED WITHIN THE SUBDIVISION TO PREVENT THIS.
4. ANY MUD TRACKED ONTO ADJACENT STREETS WILL BE REMOVED AT THE END OF EACH WORK DAY.
5. CONTRACTORS WORKING WITHIN THE SITE WILL NOT BE REQUIRED TO USE INDIVIDUAL BMP'S AS LONG AS THOSE SPECIFIED ABOVE ARE IN PLACE AND EFFECTIVE. CONTRACTORS WORKING ON THE BOUNDARY LINE STREETS OR ON ADJACENT PROPERTIES TO EXTEND UTILITIES ARE EXPECTED TO USE BMP'S AT THEIR WORK LOCATIONS, AS NEEDED.
6. UTILIZE STABILIZED CONSTRUCTION ENTRANCE AT ENTRANCE AND EXIT ONTO ANY EXISTING PUBLIC STREETS.
7. THE SUBDIVISION DEVELOPER (OWNER) SHALL INSTALL AND MAINTAIN THE ON-SITE BMP'S.

PHASE 3 - STREET CONSTRUCTION



1. DURING THIS PHASE OF SUBDIVISION CONSTRUCTION, NEW STREETS ARE INSTALLED ALL BMP'S INSTALLED DURING PHASE 1 AND 2 MUST STILL BE MAINTAINED. THE POINT OF COMPLIANCE NOW SHIFTS TO THE BACK OF CURB ALONG EACH STREET.
2. CURB OPENING INLET PROTECTION:
  - A. SUMP BASINS - INLET PROTECTION SHALL BE PROVIDED WHEN STREET SUBGRADE WORK IS COMPLETED.
  - B. NON-SUMP LOCATIONS - PROVIDE INLET PROTECTION AS SOON AS BASE COURSE ASPHALT IS INSTALLED, BEFORE THE SURFACE COURSE LIFT.
3. BMP'S WILL BE REQUIRED BACK OF CURB WHEREVER WATER CAN FLOW OVER THE CURB AND THE CURB HAS BEEN BACKFILLED TO WITHIN 3" OR LESS OF THE TOP OF CURB (SEE CURB BACKFILL DETAIL). FOR CURBS NOT YET ENTIRELY BACKFILLED (3" OR MORE BELOW TOP OF CURB), BMP'S WILL BE REQUIRED AT POINTS WHERE WATER BREAKS OVER CURB WHICH COULD RESULT IN THE PLACEMENT OF SEDIMENT IN THE GUTTER.
4. SEE DETAIL THIS SHEET ON BACK OF CURB PROTECTION.
5. THE BACK OF CURB PROTECTION SPECIFIED ON THIS PLAN MAY HAVE TO BE SUPPLEMENTED WITH HAYBALE OR SILT FENCE BMP'S AT LOCATIONS WHERE CONCENTRATED FLOW RESULTS IN SEDIMENT BEING CARRIED OVER THE EXCLUSION MATS.
6. THE STREET CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING BACK OF CURB BMP'S.
7. THE INDIVIDUAL LOT OWNERS WILL BE RESPONSIBLE FOR MAINTAINING THE BACK OF CURB BMP'S IN FRONT OF THEIR LOTS UNTIL SUCH TIME AS ADJACENT DISTURBED EARTH IS STABILIZED WITH GRASS OR SOD.

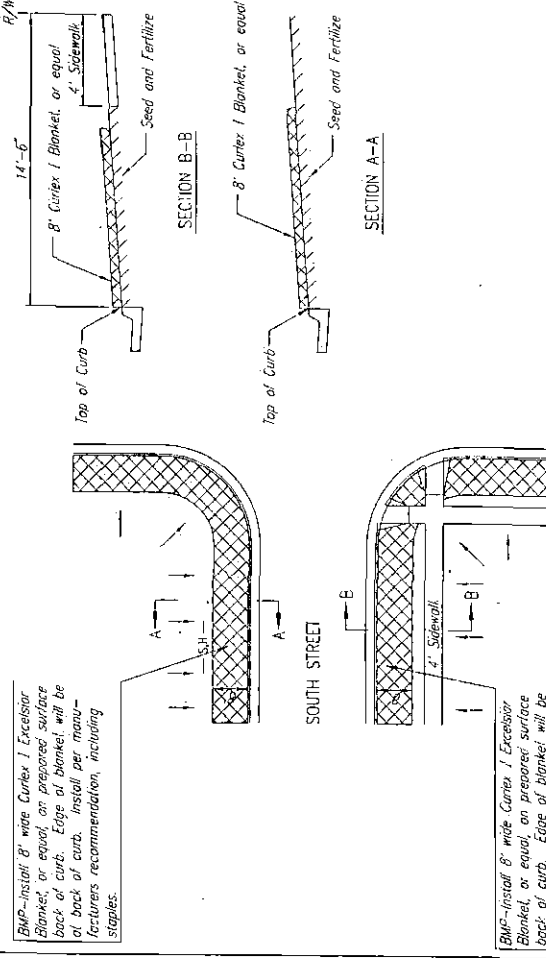
PHASE 2 - INSTALLATION OF STORM SEWER



1. DURING THIS PHASE OF SUBDIVISION DEVELOPMENT, ALL BMP'S REQUIRED IN PHASE 1 SHALL REMAIN IN PLACE AND BE MAINTAINED.
2. AS NEW STORM SEWERS, WITH INLETS, ARE INSTALLED, THE STORM SEWERS MUST NOW BE PROTECTED SO ALL NEW INLETS BECOME POINTS OF COMPLIANCE.
3. AREA DRAINS - AS SOON AS WATER CAN FLOW INTO THESE DRAINS, HAYBALE OR SILT FENCE PROTECTION WILL BE INSTALLED AROUND THEM.
4. CURB OPENING INLETS - AS SOON AS WATER CAN FLOW INTO THESE DRAINS, INLET PROTECTION BMP'S MUST BE INSTALLED. SEE PHASE 3 - STREET CONSTRUCTION.
5. THE STORM SEWER CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING THESE BMP'S. IF WATER CANNOT FLOW INTO CURB INLETS UNTIL STREET CONSTRUCTION IS COMPLETE, THEN STREET CONTRACTOR WILL INSTALL INLET PROTECTION.
6. THE SUBDIVISION DEVELOPER WILL MAINTAIN THESE BMP'S ONCE INSTALLED.
7. ONCE ALL DISTURBED GROUND DRAINING TO AN INLET HAS BEEN RESTABILIZED WITH GRASS OR SOD, THE SUBDIVISION DEVELOPER WILL BE RESPONSIBLE FOR PERMANENTLY REMOVING THE INLET PROTECTION.

GENERAL NOTES:

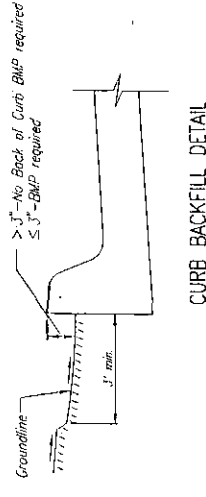
1. THE INTENT OF ALL SOIL EROSION BEST MANAGEMENT PRACTICES (B.M.P.'S) IS TO PREVENT ERODED SOIL FROM ENTERING DITCHES, STORM SEWERS, OR ANY OTHER DRAINAGE FEATURE.
2. THIS SHEET IS INTENDED TO PROVIDE GUIDELINES AS TO WHAT TYPE OF BMP'S WILL BE INSTALLED DURING THE CONSTRUCTION PROCESS. CONTRACTORS ARE EXPECTED TO BID PROJECTS ACCORDINGLY.
3. BMP'S SHALL BE MAINTAINED DURING THE CONSTRUCTION PROCESS TO REMAIN EFFECTIVE. MAINTENANCE SHALL BE AS INDICATED ON THE BMP DETAIL SHEETS.
4. PERSONS DESTROYING BMP'S SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING THEM OR INSTALLING SUITABLE REPLACEMENT FOR IMMEDIATELY.
5. THE DEVELOPMENT OF ANY SUBDIVISION THAT DISTURBS 5 ACRES OR MORE WILL REQUIRE A FEDERAL/STATE NPDES STORMWATER PERMIT. THE PREPARATION OF A STORMWATER POLLUTION PREVENTION PLAN IS REQUIRED. EROSION CONTROL BMP'S ARE REQUIRED. THE DETAILS SHOWN ON THIS SHEET ARE THE MINIMUM STANDARDS TO BE SHOWN ON POLLUTION PREVENTION PLAN.
6. FOR SUBDIVISIONS SMALLER THAN 5 ACRES, SOIL EROSION BMP'S ARE REQUIRED. ALSO, DEVELOPERS AND CONTRACTORS ARE ENCOURAGED TO DEVELOP POLLUTION PREVENTION PLANS FOR EACH PROJECT PRIOR TO CONSTRUCTION.
7. FAILURE TO USE AND MAINTAIN BMP'S IS A VIOLATION OF SECTION 16.32 OF THE CITY CODE AND WILL SUBJECT THE SUBDIVISION DEVELOPER AND CONTRACTORS TO THE PENALTIES PROVIDED THEREIN.
8. THE APPLICATION OF BMP'S SHOWN ON THIS SHEET IS FOR SITUATIONS NORMALLY ENCOUNTERED. FROM TIME TO TIME, SITUATIONS WILL ARISE THAT MAY REQUIRE A DIFFERENT BMP OTHER THAN THAT SHOWN. BMP'S, OTHER THAN THOSE SHOWN, MAY BE UTILIZED SO LONG AS THEY ARE EFFECTIVE AND MAINTAINED.
9. A STABILIZED EARTH SURFACE IS DEFINED AS ONE THAT IS HARD SURFACED WITH CONCRETE, ASPHALT, OR THE LIKE, OR ONE ON WHICH 70% OF THE GRASS HAS GERMINATED ON THE ENTIRE SURFACE.



BMP - Install 6" wide Curlex I Excelsior Blanket, or equal, on prepared surface back of curb. Edge of blanket will be at back of curb. Install per manufacturer's recommendation, including staples.

BMP - Install 6" wide Curlex I Excelsior Blanket, or equal, on prepared surface back of curb. Edge of blanket will be at back of curb. Install per manufacturer's recommendation, including staples.

BACK OF CURB PROTECTION DETAIL



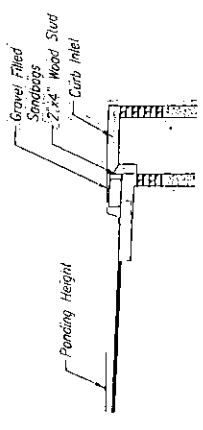
Groundline  
3" min.  
3" - No Back of Curb BMP required  
5" - BMP required

**CITY OF WICHITA**

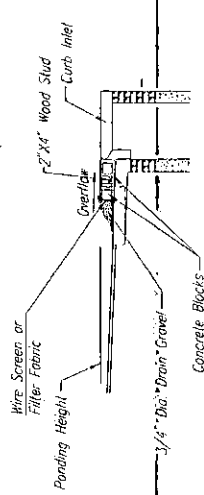
SOIL EROSION BMP'S  
SUBDIVISION  
DEVELOPMENT  
PROCESS

CHRISTOPHER M. CARRIER, P.E.  
STORM WATER ENGINEER

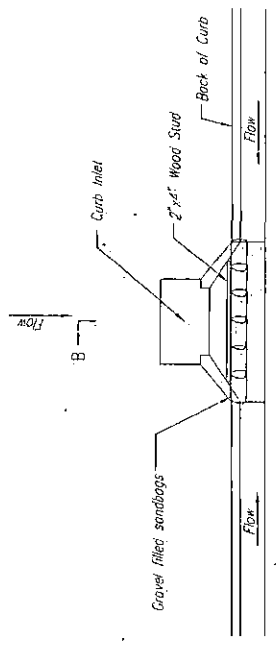
PROJECT NUMBER: \_\_\_\_\_  
DATE: MAY 2001  
SHEET: \_\_\_ OF \_\_\_



SECTION B-B

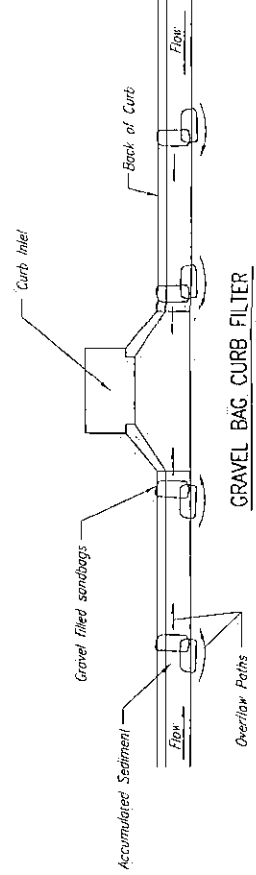


SECTION A-A



CURB INLET SANDBAG FILTERS  
(INLET PROTECTION)

NOTE: Other types of curb inlet protection may be approved by the City so long as equal protection is provided.



GRAVEL BAG CURB FILTER  
(INLET PROTECTION)

NOTE: Place two or more sets of bags in a manner that results in maximum support. The flow line lag must be lower than top of curb.

CURB SEDIMENT TRAPS

When inlets are located on streets having a grade (i.e., slope conditions do not exist), installing gravel (or sand) bags in the gutter flow line to create small sediment traps can be considered. Gravel bags are recommended over sand bags to allow for drainage.

If the spacing between bags becomes too large, little sediment may be trapped. Spacing of bags should be completed using the table or graph that illustrates placement distances based upon street slope. When installed in the gutter, bag tops must be lower than the sidewalk.

Spacing

Gravel bags are to be placed according to street grades using the following table or graph that appears below.

| GRADE (%) | SPACING (FEET) |
|-----------|----------------|
| 0.5       | 75             |
| 1.0       | 45             |
| 2.0       | 18             |
| 3.0       | 12             |
| 4.0       | 8              |
| 5.0       | 6              |

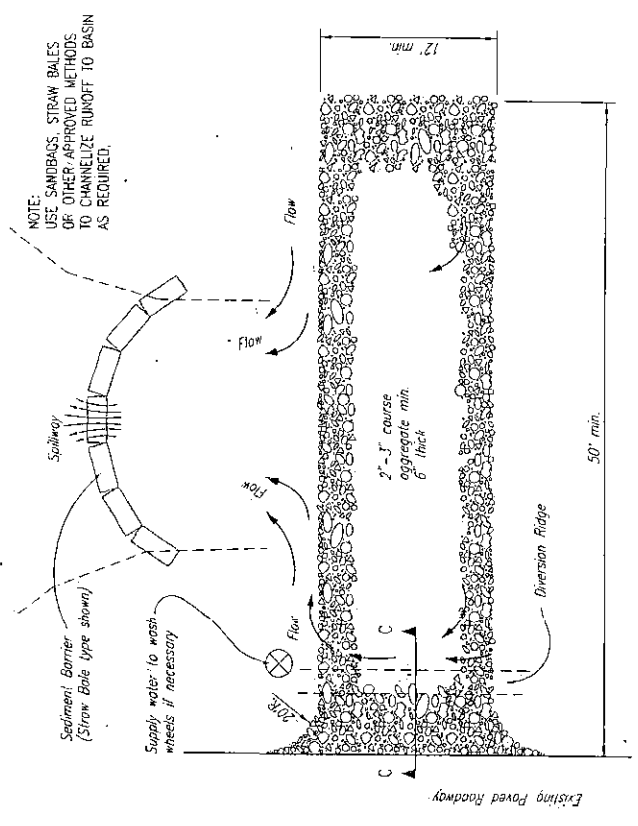
Maintenance

Collected sediment shall be removed after every runoff event. Bags that are destroyed by vehicular traffic or through natural deterioration are to be immediately replaced.

Overturn ridge required where grade exceeds 2%



SECTION C-C



STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN, AS SHOWN ABOVE.
4. DRIVE ENTRANCES ONTO RESIDENTIAL LOTS WILL NOT BE REQUIRED TO HAVE THE SEDIMENT BARRIER SHOWN, BUT WHEEL WASHING MAY BE REQUIRED IF STABILIZED ENTRANCE IS NOT SUFFICIENT TO KEEP MUD FROM BEING TRACKED ONTO ADJACENT STREET. ENTRANCE SHALL EXTEND FROM BACK OF CURB TO DWELLING.

A gravel inlet filter shall be installed at sump locations on residential streets. This type of protection is not to be used on arterial or collector streets at any time that it would pose an undue traffic hazard.

Instructions for Installing:

- STEP 1: Place concrete blocks around the inlet as shown on drawing. Insert 2x4 board as shown.
- STEP 2: Wrap 1/2" mesh wire screen around the concrete blocks.
- STEP 3: Place 1" to 1-1/2" diameter rock around the blocks and wire screen. Be sure the rock extends down from the top of the concrete block.
- STEP 4: To prevent damage to vehicles, signs warning drivers about the structures may be necessary. An alternative installation is the use of gravel bags supported by a 2"x4" board to prevent collapsing.

Use of rock with diameters smaller than 1" in the bag may result in clogging of pores and reduce the amount of water flowing into an inlet.

Maintenance:

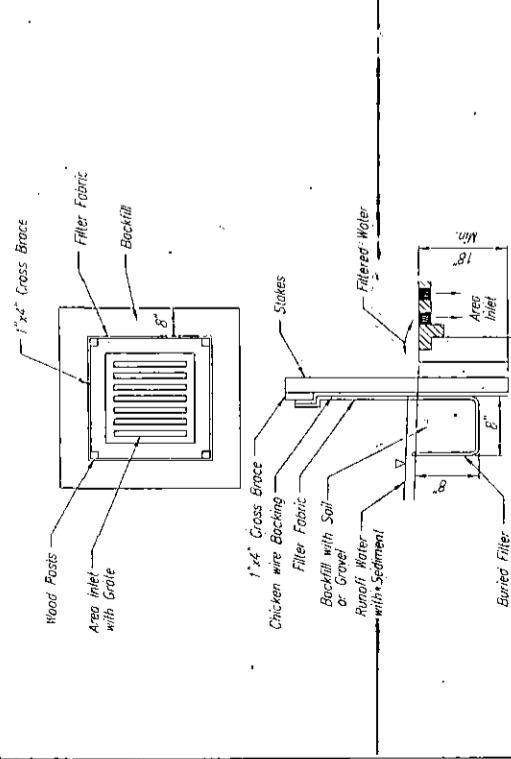
All curb inlet gravel filters shall be inspected and repaired after each runoff event. Sediment deposits are to be removed once material is within 6 cm (3 inches) of the top of any block. Periodically, the gravel shall be raked to increase infiltration and filtering of runoff waters. Accumulated sediment is to be removed immediately from roads and streets.

SOIL EROSION  
BMP DETAILS

CHRISTOPHER M. CARRIER, P.E.  
STORM WATER ENGINEER

PROJECT NUMBER: 06A 460  
DATE: MAY 2001

SHEET 1 OF 1



**SILT FENCE BARRIERS FOR AREA INLETS**  
(INLET PROTECTION)

**Material Specification:**  
Silt fence fabric should conform to the AASHTO M288 96 silt fence specification. The wire or polymeric mesh backing used to help support the silt fence fabric should conform to the AASHTO M288 96 silt fence specification.  
The posts used to support the silt fence fabric should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.  
The material used to frame the tops of the posts should be 1" by 4" boards.  
Silt fence fabric and support backing should be attached to the wooden posts and frame with staples, wire, zip ties, or nails.

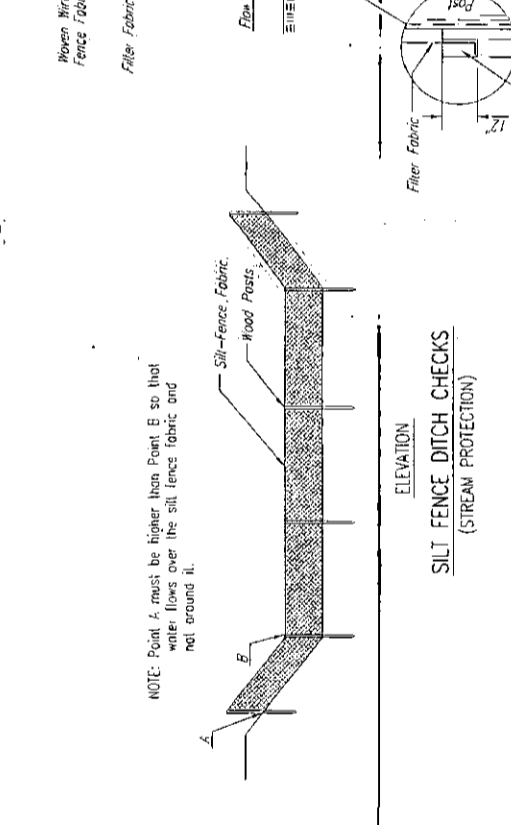
**Placement:**  
Place a silt fence drop inlet barrier in a location where it is unlikely that it will be overtopped. Water should flow through silt fence, not over it. Silt fence barriers for area inlets often fail when repeatedly overtopped.  
When used as a barrier for area inlets, silt fence fabric and posts must be supported by a wooden frame.  
When a silt fence barrier for area inlets is located near an inlet that has steep approach slopes, the storage capacity behind the barrier is drastically reduced. Timely removal of sediment must occur for a barrier to operate properly in this location.

**Proper installation method:**  
Excavate a trench around the perimeter of the area inlet that is at least 6" deep by 6" wide. Drive posts to a depth of at least 18" around the perimeter of the area inlet. The distance between posts should be 2' or less. If the distance between two adjacent corner posts is more than 4', add another post(s) between them.  
Connect the tops of all the posts with a wooden frame made of 1" by 4" boards. Use nails or screws for fastening.  
Attach the wire or polymeric-mesh backing to the outside of the post/frame structure with staples, wire, zip ties, or nails.  
Roll out a continuous length of silt fence fabric long enough to wrap around the perimeter of the area inlet. Add more length for overlapping the fabric joint. Place the edge of the fabric in the trench, starting at the outside edge of the trench. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil and compact. After filling the trench, approximately 24" to 36" of silt fence fabric should remain exposed.  
Attach the silt fence to the outside of the post/frame structure with staples, wire, zip ties, or nails. The joint should be overlapped to the next post.

**Note:** When a silt fence barrier for area inlet is placed in a shallow median ditch, make sure that the top of the barrier is not higher than the paved road. In this configuration, water may spread onto the roadway causing a hazardous condition.

**List of common placement/installation mistakes to avoid:**  
Water should flow through a silt fence barrier for area inlet-not over it. Place a silt fence barrier for area inlet in a location where it is unlikely to be overtopped. Silt fence barriers for area inlets often fail when repeatedly overtopped.  
Do not place posts on the outside of the silt fence barrier for area inlet. In this configuration, the force of the water is not resisted by the posts, but only by the slopes (wire, zip ties, nails, etc.). The silt fence will rip and fail.  
Do not install silt fence barrier for area inlets without framing the top of the posts.  
The corner posts around area inlets are stressed in two directions whereas a normal silt fence is only stressed in one direction. This added stress requires more support.

**Inspection and Maintenance:**  
Silt fence barrier for area inlets should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:  
Does water flow under the silt fence?  
Does the silt fence sag excessively?  
Has the silt fence torn or become detached from the posts?  
Does sediment need to be removed from behind the area inlet barrier?



**SILT FENCE DITCH CHECKS**  
(STREAM PROTECTION)

**Material Specification:**  
Silt fence fabric should conform to the AASHTO M288 96 silt fence specification. The posts used to support the silt fence fabric should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.  
Silt fence fabric should be attached to the wooden posts with staples, wire, zip ties, or nails.

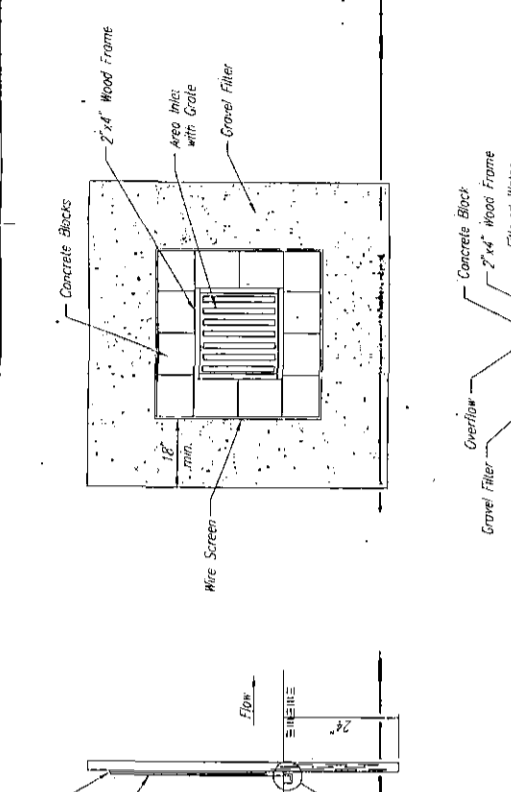
**Placement:**  
Place silt fence in ditches where it is unlikely that it will be overtopped. Ditch checks often fail when overtopped.  
Silt fence ditch checks should be placed perpendicular to the flowline of the ditch. The silt fence should extend far enough so that the ground level at the ends of the fence is higher than the top of the low point of the fence. This prevents water from flowing around the check.  
Checks should not be placed in ditches where high flows are expected. Rock checks should be used instead.  
Silt fence should be placed in ditches with slopes of 6% or less. For slopes steeper than 6%, rock checks should be used.

The following table provides check spacing for a given ditch grade:

| Ditch Grade (%) | Check Spacing (feet) |
|-----------------|----------------------|
| 0.5             | 200                  |
| 1.0             | 200                  |
| 2.0             | 100                  |
| 3.0             | 65                   |
| 4.0             | 50                   |
| 5.0             | 40                   |
| 6.0             | 30                   |

**Proper installation method:**  
Excavate a trench perpendicular to the ditch flowline that is at least 12" deep by 6" wide. The trench is a straight line along the entire length of the proposed ditch check. Place the soil on the upstream side of the trench for later use.  
Roll out a continuous length of silt fence fabric on the downstream side of the trench. Place the edge of the fabric in the trench, starting at the top upstream edge of the trench. Line the two sides of the trench with the fabric and compact. After filling the trench, approximately 24" to 36" of silt fence fabric should remain exposed.  
Lay the exposed silt fence on the upstream side of the trench-to clear an area for driving in the posts. Place posts no more than 4' apart.  
Attach the silt fence to the anchored post with staples, wire, zip ties, or nails.

**List of common placement/installation mistakes to avoid:**  
Water should flow through a silt fence ditch check-not over it. Place silt fence in ditches where it is unlikely that it will be overtopped. Silt fence installations quickly deteriorate when water overtops them.  
Do not place silt fence posts on the upstream side of the silt fence fabric. In this configuration, the force of the water is not resisted by the posts, but only by the staples (wire, zip ties, nails, etc.). The silt fence will rip and fail.  
Do not place silt fence ditch check directly in front of a culvert outlet. It will not stand up to the concentrated flow.  
Do not place silt fence ditch checks in ditches that will likely experience high flows.  
They will not stand up to concentrated flow.  
Follow prescribed ditch check spacing guidelines. If spacing guidelines are exceeded, erosion will occur between the ditch checks.  
Do not allow water to flow around the ditch check. Make sure that the ditch check is long enough so that the ground level at the ends of the fence is higher than the low point on the top of the fence.  
Do not place silt fence ditch checks in channels with shallow soils underlain by rock. If the check is not anchored sufficiently, it will wash out.



**CONCRETE BLOCK FILTER FOR AREA DRAIN**  
(INLET PROTECTION)

Gravel filters provide little filtering of large inflow waters. However, when installed correctly and maintained, they can effectively treat low runoff flows.  
Placement of gravel filters around area drains must be completed in a manner that will not cause local flooding.  
Gravel filters can be used if the immediate and adjacent area to the area drain consists of soil or pavement.  
Only gravel filters are to be installed on top of the pavement.

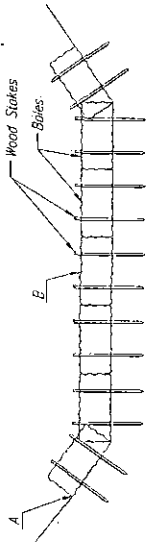
**Instructions for installation:**  
**STEP 1:** Place concrete blocks around the grate. The blocks can be stacked one or two high and should be supported by a 2" x 4" board.  
**STEP 2:** Wrap 1/2" mesh wire screen around the concrete blocks.  
**STEP 3:** Place 1" to 1-1/2" diameter rock around the blocks and wire screen. Be sure the rock extends down from the top of the concrete block.  
**STEP 4:** To prevent damage to vehicles, signs warning drivers about the structures may be necessary.

An alternative method is use of gravel bags that are supported to prevent collapsing.  
Use of rock having diameters smaller than 1" may result in clogging of pores and reduce the amount of water flowing into an inlet.

**Maintenance:**  
All gravel filters installed around area drains should be inspected and repaired after each runoff event. Sediment should be removed when material is within 3" of the top of any block. Periodically the gravel should be raked to increase infiltration and filtering of runoff splashes. Accumulated sediment is to be removed immediately from roads and streets after every runoff event.

**Inspection and Maintenance:**  
Silt fence ditch checks should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:  
Does water flow around the ditch check?  
Does water flow under the ditch check?  
Does the silt fence sag excessively?  
Has the silt fence torn or become detached from the posts?  
Does sediment need to be removed from behind the ditch check?

NOTE: Point A must be higher than Point B so that water flows over the bales and not around them.



STRAW BALE DITCH CHECKS

**Material Specification:**

Bale ditch checks may be constructed of wheat straw, oat straw, prairie hay, or bromegrass hay that is free of weeds declared noxious by the Kansas State Board of Agriculture. The stakes used to anchor the bales should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.  
Optional: The downstream scour apron should be constructed of a double-welded steel erosion-control blanket at least 6' wide.  
Optional: The metal landscape staples used to anchor the erosion-control blanket should be at least 6' long.

**Placement:**

Bale ditch checks should be placed perpendicular to the flowline of the ditch. The ditch check should extend far enough so that the ground level at the ends of the check is higher than the top of the lowest center bale. This prevents water from flowing around the check.  
Checks should not be placed in ditches where high flows are expected. Rock checks should be used instead.  
Bales should be placed in ditches with slopes of 6% or less. For slopes steeper than 6%, rock checks should be used.  
The following table provides check spacing for a given ditch grade:

| Ditch grade (%) | Check Spacing (feet) |
|-----------------|----------------------|
| 0.5             | 200                  |
| 1.0             | 200                  |
| 2.0             | 100                  |
| 3.0             | 65                   |
| 4.0             | 50                   |
| 5.0             | 40                   |
| 6.0             | 30                   |

**Proper installation method:**

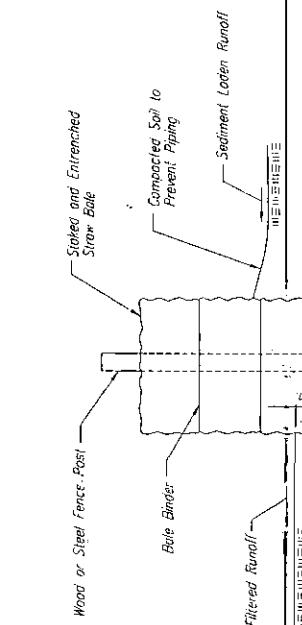
Excavate a trench perpendicular to the ditch flowline that is 4" deep and a bale's width wide. Extend the trench in a straight line along the entire length of the proposed ditch check. Place the soil on the upstream side of the trench—it will be used later.  
Optional: On the downstream side of the trench, roll out a length of erosion-control blanket (scour apron) equal to the length of the trench. Place the upstream edge of the erosion-control blanket along the bottom upstream edge of the trench. The erosion control blanket should be anchored in the trench with one row of 6" landscape stakes placed on 18" centers. The remainder of the erosion-control blanket (the portion that is not lying in the trench) will serve as the downstream scour apron. This section of the blanket should be anchored to the ground with 6" landscape stakes placed around the perimeter of the blanket on 18" centers. The remainder of the blanket should be anchored using two evenly spaced rows of 6" landscape stakes on 18" centers placed perpendicular to the flowline of the ditch.  
Place the bales in the trench, making sure that they are butted tightly. Two stakes should be driven through each bale along the centerline of the ditch check, approximately 6" to 8" in from the bale ends. Stakes should be driven at least 12" into the ground.  
Once all the bales have been installed and anchored, place the excavated soil against the upstream side of the check and compact it. The compacted soil should be no more than 3" to 4" deep and extend upstream no more than 24".

**List of common placement/installation mistakes to avoid:**

- Do not place a bale ditch check directly in front of a culvert outlet. It will not stand up to the concentrated flow.
- Do not place bale ditch checks in ditches that will likely experience high flows. They will not stand up to concentrated flow.
- Follow prescribed ditch-check spacing guidelines. If spacing guidelines are exceeded, erosion will occur between the ditch checks.
- Do not allow water to flow around the ditch check. Make sure that the ditch check is long enough so that the ground level at the ends of the check is higher than the top of the lowest center bale.
- Do not place bale ditch checks in channels with shallow soils underneath by rock. If the check is not anchored sufficiently, it will wash out.
- Bale ditch checks must be dug into the ground. Bales of ground level do not work because they allow water to flow under the check.

**Inspection and Maintenance:**

- Bale ditch checks should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:
  - Does water flow around the ditch check?
  - Does water flow under the ditch check?
  - Does water flow through spaces between abutting bales?
  - Are any bales and/or scour aprons (optional) dislodged?
  - Are bales decomposing due to age and/or water damage?
  - Does sediment need to be removed from behind the ditch check?



STRAW BALE BARRIERS

**Material Specification:**

Bale slope barriers may be constructed of wheat straw, oat straw, prairie hay, or bromegrass hay that is free of weeds declared noxious by the Kansas State Board of Agriculture. The stakes used to anchor the bales should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.

**Placement:**

A slope barrier should be used at the toe of a slope when a ditch does not exist. The slope barrier should be placed on nearly level ground 5' to 10' away from the toe of a slope. The barrier is placed away from the toe of the slope to provide adequate storage for settling out sediment.  
When practicable, bale slope barriers should be placed along contours to avoid a concentration of flow.  
Bale slope barriers can also be placed along right-of-way fence lines to keep sediment from crossing onto adjacent property. When placed in this manner, the slope barrier will not likely follow contours.

**Proper installation method:**

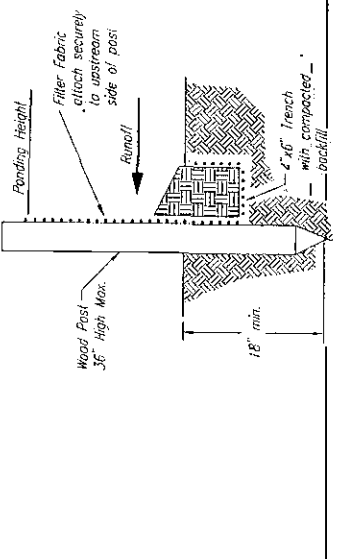
Excavate a trench the length of the planned slope barrier that is 4" deep and a bale's width wide. Make sure that the trench is excavated along a single contour. When practicable, slope barriers should be placed along contours to avoid a concentration of flow. Place the soil on the upslope side of the trench for later use.  
Place the bales in the trench, making sure that they are butted tightly. Two stakes should be driven through each bale along the centerline of the ditch check, approximately 6" to 8" in from the bale ends. Stakes should be driven at least 12" into the ground.  
Once all the bales have been installed and anchored, place the excavated soil against the upslope side of the check and compact it. The compacted soil should be no more than 3" to 4" deep.

**List of common placement/installation mistakes to avoid:**

- When practical, do not place bale slope barriers across contours. Slope barriers should be placed along contours to avoid a concentration of flow. Concentrated flow over a slope eventually undermines the bales and the barrier fails.
- Do not place bale slope barriers in areas with shallow soils underneath by rock. If the barrier is not anchored sufficiently, it will wash out.
- Bale slope barriers must be dug into the ground. Bales at ground level do not work because they allow water to flow under the barrier.

**Inspection and Maintenance:**

- Bale slope barriers should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:
  - Are there any points along the slope barrier where water is concentrating?
  - Does water flow under the slope barrier?
  - Does water flow through spaces between abutting bales?
  - Are any bales dislodged?
  - Are bales decomposing due to age and/or water damage?
  - Does sediment need to be removed from behind the slope barrier?



SILT FENCE BARRIERS

**SILT FENCE BARRIERS**

**Material Specification:**

Silt fence fabric should conform to the ASHRO M286 96 silt fence specification. The posts used to support the silt fence fabric should be a hardwood material with the following minimum dimensions: 2" square (nominal) by 4' long.  
Silt fence fabric should be attached to the wooden posts with staples, wire, zip ties, or nails.

**Placement:**

A slope barrier should be used at the toe of a slope when a ditch does not exist. The slope barrier should be placed on nearly level ground 5' to 10' away from the toe of a slope. The barrier is placed away from the toe of the slope to provide adequate storage for settling out sediment.  
When practicable, silt fence slope barriers should be placed along contours to avoid a concentration of flow.  
Silt fence slope barriers can also be placed along right-of-way fence lines to keep sediment from crossing onto adjacent property. When placed in this manner, the slope barrier will not likely follow contours.

**Proper installation method:**

Excavate a trench the length of the planned slope barrier that is 5" deep by 2" wide. Make sure that the trench is excavated along a single contour. When practicable, slope barriers should be placed along contours to avoid a concentration of flow. Place the soil on the upslope side of the trench for later use.  
Roll out a continuous length of silt fence fabric on the downslope side of the trench. Place the edge of the fabric in the trench starting at the top upslope edge. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil and compact. After filling the trench, approximately 24" to 36" of silt fence fabric should remain exposed.  
Lay the exposed silt fence upslope of the trench to clear an area for driving in the posts. Place posts no more than 4' apart.  
Attach the silt fence to the anchored post with staples, wire, zip ties, or nails.

**List of common placement/installation mistakes to avoid:**

- When practical, do not place silt fence slope barriers across contours. Slope barriers should be placed along contours to avoid a concentration of flow. When the flow concentrates, it overtopps the barrier and the silt fence slope barrier quickly deteriorates.
- Do not place silt fence posts on the upslope side of the silt fence fabric. In this configuration, the force of the water is not restricted by the posts, but only by the staples (wire, zip ties, nails, etc.). The silt fence will run and fail.
- Do not place silt fence slope barriers in areas with shallow soils underneath by rock. If the barrier is not sufficiently anchored, it will wash out.
- Silt fence slope barriers must be dug into the ground—silt fence at ground level does not work because water will flow underneath.

**Inspection and Maintenance:**

- Silt fence slope barriers should be inspected every 7 days and within 24 hours of a rainfall of 1/2" or more. The following is a list of questions that should be addressed during each inspection:
  - Are there any points along the slope barrier where water is concentrating?
  - Does water flow under the slope barrier?
  - Do silt fences sag excessively?
  - Has the silt fence torn or become detached from the posts?
  - Does sediment need to be removed from behind the slope barrier?

**CITY OF WICHITA**

SOIL EROSION BMP DETAILS

CHRISTOPHER M. CARRIER, P.E.  
STORM WATER ENGINEER

PROJECT NUMBER: \_\_\_\_\_  
DATE: \_\_\_\_\_  
SHEET: \_\_\_\_\_ OF \_\_\_\_\_

## SWPP Plan Inspection Report

| BMP                           | General Condition (1) | Remarks |
|-------------------------------|-----------------------|---------|
| Inlet Protection (Area)       |                       |         |
| Inlet Protection (Curb)       |                       |         |
| Back-of-Curb Protection       |                       |         |
| Silt Barrier – Site Perimeter |                       |         |
| Silt Barrier – Pond Perimeter |                       |         |
| Construction Entrance(s)      |                       |         |
| Other                         |                       |         |

### I. Condition Descriptions

- A. Good - Condition of BMP is functional and not in need of repair.
- B. Fair - BMP is operable, showing signs of deterioration, but not requiring repair.
- C. Poor – BMP can be made operable with immediate attention.
- D. Failed – BMP requires replacement
- E. Obsolete – BMP no longer required.
- F. N/A – BMP not being employed



## CONTRACTOR'S CERTIFICATION FORM

For Stormwater Discharges Associated with Construction Activity  
Authorized by a Kansas Water Pollution Control General Permit  
Under the National Pollutant Discharge Elimination System

This form is to be completed by the Contractor responsible for implementation of the day to day activities necessary to complete the requirements of the Stormwater Pollution Prevention Plan. This completed form must be included in, or kept with the Stormwater Pollution Prevention Plan for the site identified below.

I certify under penalty of law that I understand the terms and conditions of the Kansas Water Pollution Control general permit that authorizes the stormwater discharges associated with construction activity from the construction site identified below, and the Stormwater Pollution Prevention Plan prepared for the project.

Name of Project: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ County: \_\_\_\_\_ State: KS Zip Code: \_\_\_\_\_

Kansas Water Pollution Control General Permit No. S-MCST-0110-1

Kansas Permit No. \_\_\_\_\_ Federal Permit No. \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_

Company Phone Number: \_\_\_\_\_

Project Responsibilities: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name (typed or printed): \_\_\_\_\_



## CONTRACTOR'S CERTIFICATION FORM

For Stormwater Discharges Associated with Construction Activity  
Authorized by a Kansas Water Pollution Control General Permit  
Under the National Pollutant Discharge Elimination System

This form is to be completed by the Contractor responsible for implementation of the day to day activities necessary to complete the requirements of the Stormwater Pollution Prevention Plan. This completed form must be included in, or kept with the Stormwater Pollution Prevention Plan for the site identified below.

I certify under penalty of law that I understand the terms and conditions of the Kansas Water Pollution Control general permit that authorizes the stormwater discharges associated with construction activity from the construction site identified below, and the Stormwater Pollution Prevention Plan prepared for the project.

Name of Project: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ County: \_\_\_\_\_ State: KS Zip Code: \_\_\_\_\_

Kansas Water Pollution Control General Permit No. S-MCST-0110-1

Kansas Permit No. \_\_\_\_\_ Federal Permit No. \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_  
\_\_\_\_\_

Company Phone Number: \_\_\_\_\_

Project Responsibilities: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name (typed or printed): \_\_\_\_\_

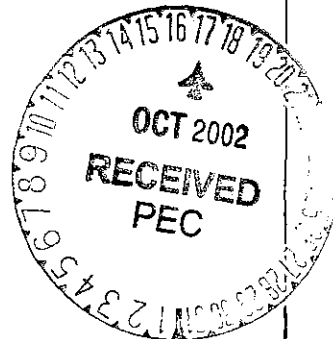


DEPARTMENT OF THE ARMY  
KANSAS CITY DISTRICT, CORPS OF ENGINEERS  
STATE REGULATORY PROGRAM OFFICE - KANSAS  
2710 N.E. SHADY CREEK ACCESS ROAD  
EL DORADO, KANSAS 67042

REPLY TO  
ATTENTION OF:

October 16, 2002

Kansas State Regulatory Office  
(200300057)  
(Sedgwick, KS, NPR)



Mr. Brent Remsberg, P.E.  
Professional Engineering Consult., P.A.  
303 South Topeka  
Wichita, Kansas 67202

Dear Mr. Remsberg:

This letter concerns your application to the Kansas Department of Agriculture, Notice No. 02414, for placement of floodplain fill in isolated wetlands adjacent to Cadillac Lake. The project is located in Section 6, Township 27 south, Range 1 west, Sedgwick County, Kansas.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-330.

The enclosed Jurisdictional Determination (JD) form describes the extent of waters of the United States on the project site. Also, the enclosed Notification of Administrative Appeal Options and Process and Request for Appeal form (FORM) describes your options in Section E of the FORM.

We have reviewed the information furnished and have determined that the proposed activity will not involve the discharge of dredged or fill material in waters of the United States. Therefore, Department of the Army permit authorization is not required. Other Federal, state and/or local permits may be required, however, and you should verify this yourself.

Ms. Shannon J. Warner, Regulatory Specialist, reviewed the information furnished and made this determination. If you have any questions concerning this matter, please feel free to contact Ms. Warner at 316-322-8247 (FAX 316-322-8259).

Enclosure

Copies Furnished:

Environmental Protection Agency,  
Water Resources Protection Branch wo/enclosure

Kansas Department of Wildlife  
and Parks wo/enclosure

Kansas Department of Agriculture wo/enclosure



# MEMO

**Professional Engineering Consultants, P.A.**

303 S. TOPEKA - WICHITA, KANSAS 67202 • 316-262-2691 • FAX 316-262-3003

www.pec1.com • designers@pec1.com

TO: City of Wichita  
455 N. Main  
Wichita, KS 67202

ATTENTION: Mr. Chris Carrier, P.E.

FROM: Philip Frazier, P.E.

REFERENCE: Drainage Calculations

DATE: November 21, 2003

PROJECT NO.: 32-02693-002

PROJECT: Super Target West Site Plan

COPIES TO: File thru BER

Please advise immediately of any misconceptions or omissions you believe to be contained herein.

This memo responds to a request from the City of Wichita to provide a hydrologic analysis to demonstrate that development associated with the referenced project will not increase the peak 100-year discharge leaving the site.

Only the development of the 20.6-acre site was considered in the analysis. Hydrologic computations were performed to determine 100-year peak discharges for both "existing" and "developed" conditions using the Rational Method.

Please note that, under these circumstances, the analysis indicates that the minimum detention storage that must be provided is 3.7 acre-feet. Since the detention storage to be provided with the development is 12.1 acre-feet, we believe that the planned detention storage depicted on the project site plan is more than adequate to assure the "post-developed" 100-year discharges will not be increased above the "pre-developed" magnitudes.

If you have any questions regarding the attached computations, or need additional information, please contact me at 316-262-2691.

1. Actual Detention Below Ground °

Pond A ° Use 163 as lowest adjacent ground elevation at N. End.

$$\text{Vol} = \frac{1.52 \text{ Ac}}{(90)(735)} \frac{15.2'}{(163-142.8)} / 27 \approx 23.09 \text{ Ac-Ft}$$

Pond B ° 162 as lowest adjacent ground

$$\text{Vol} \approx \frac{1.523 \text{ Ac}}{(116)(572)} \frac{14.2'}{(162-142.8)} \approx 21.63 \text{ Ac-Ft}$$

Pond C ° 160 as lowest adjacent ground

$$\text{Vol} \approx \frac{1.72 \text{ Ac}}{(172)(436)} \frac{12.2'}{(160-142.8)} \approx 20.98 \text{ Ac-Ft}$$

(\*) Total Excavated Sto. Below Adj. Ground  $\approx$  65.69 Ac-Ft.

Total Area Filled In = 27.4 Ac-Ft

°° Compensating Volume is Okay ° (Add. 38 Ac-Ft)

2. Groundwater El. is Okay

3. Park Runoff OK - See P.E.C. Report.



# LETTER OF TRANSMITTAL

**Professional Engineering Consultants, PA**  
303 S. TOPEKA - WICHITA, KANSAS 67202 - 316-262-2691 - FAX 316-262-3003  
www.pec1.com - designers@pec1.com

RECEIVED DEC 1 - 2003

TO: City of Wichita  
Public Works

PROJECT NO.: 32-02693-002  
PROJECT: Super Target West Site Plan

ATTENTION: Chris Carrier, P.E.

DATE: November 26, 2003

WE ARE SENDING YOU:  Attached  Under separate cover via \_\_\_\_\_ the following items:  
 Shop drawings  Prints  Plans  Samples  Specifications  
 Copy of letter  Change order  \_\_\_\_\_

| COPIES | DATE     | NO. | DESCRIPTION  |
|--------|----------|-----|--|
| 1      | 11/21/03 |     | Memo Addressing Drainage Issues for the Referenced Project |
|        |          |     |  |
|        |          |     |  |
|        |          |     |  |
|        |          |     |  |
|        |          |     |  |
|        |          |     |  |

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- As requested
- For review and comment
- FOR BIDS DUE \_\_\_\_\_
- Approved as submitted
- Approved as noted
- Returned for corrections
- \_\_\_\_\_
- Resubmit \_\_\_\_\_ copies for approval
- Submit \_\_\_\_\_ copies for distribution
- \_\_\_\_\_ corrected prints
- PRINTS RETURNED AFTER LOAN TO US

REMARKS:

COPY TO: \_\_\_\_\_

SIGNED Philip Frazier, P.E.

If enclosures are not as noted, kindly notify us at once.

Computations



303 S. TOPEKA • WICHITA, KANSAS 67202  
316-262-2691 • FAX 316-262-3003  
www.pec1.com • designers@pec1.com

Project New Market Square - Target W. Date 11/21/03  
Item Hydrology Computations By PDF

### 1. Consider 20.6-Acre Site (Undeveloped)

Consider 100-Year Storm

Use the Rational Method.

Estimate the Time of Concentration for a Very Flat,  
Rural Basin from the SCS Lag Equation:

$$L = \frac{L^{0.8} (S+1)^{0.7}}{1900 \sqrt{Y}}$$

$$L = 800' (\pm)$$

$$S = \frac{1000}{80} - 10 = 2.5$$

$$Y = 0.3\%$$

$$L = 0.49 \text{ Say } 0.5 \text{ hour, } T_c = 50 \text{ minutes}$$

$$Q = C i A$$

$$= (0.4) (4.5) (20.6) = 34 \text{ cfs (Existing Cond.)}$$

### 2. Make Adjustments for Developed Conditions

Reduce  $T_c$  to 30 minutes

Increase  $C$  to 0.8

$$Q = (0.8) (5.52) (20.6) = 90 \text{ cfs}$$



303 S. TOPEKA • WICHITA, KANSAS 67202  
316-262-2691 • FAX 316-262-3003  
www.pec1.com • designers@pec1.com

Project \_\_\_\_\_ Date \_\_\_\_\_  
Item \_\_\_\_\_ By \_\_\_\_\_

3. Use HEC-1 to produce a hydrograph analysis that considers the 20.6 acre basin only.

The purpose of the Analysis is to determine the minimum detention storage required to assure that peak 100-year discharges for developed conditions will not exceed those computed for existing conditions.

The analysis indicates that 3.7 ac-ft of storage (minimum) must be provided in the basin to offset the increase in peak discharges (90 cfs reduced to 34 cfs) caused by the introduction of impervious areas and reduction in Times of Concentration associated with the proposed development of the 20.6-acre basin.

See attached "Example" and HEC-1 hydrographs for a graphical display of the theory, and of the results of the analysis.

Output from the HEC-1 program is also included as a reference.

# Hydrographs

# ENGINEERING GUIDE - 1

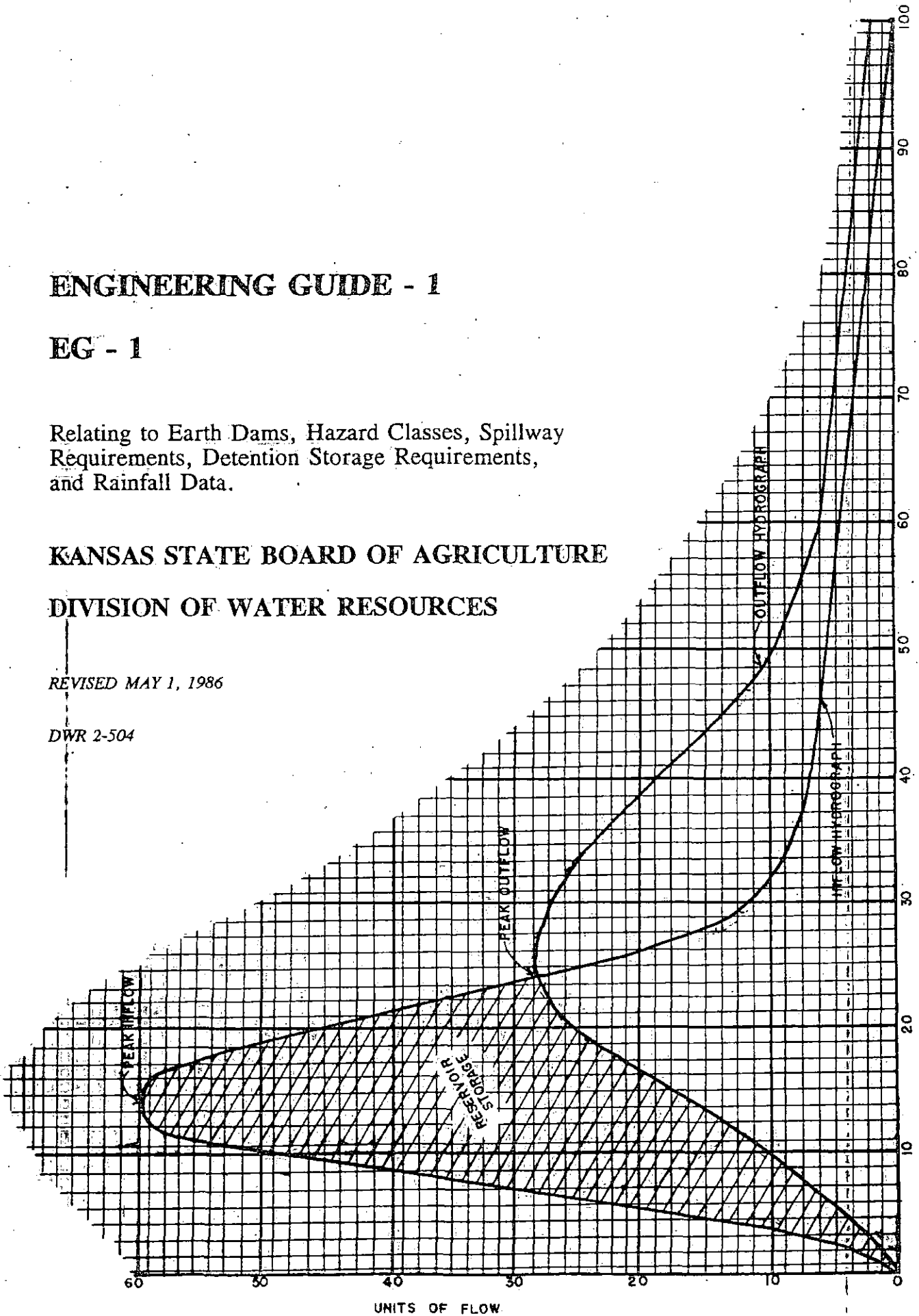
## EG - 1

Relating to Earth Dams, Hazard Classes, Spillway Requirements, Detention Storage Requirements, and Rainfall Data.

KANSAS STATE BOARD OF AGRICULTURE  
DIVISION OF WATER RESOURCES

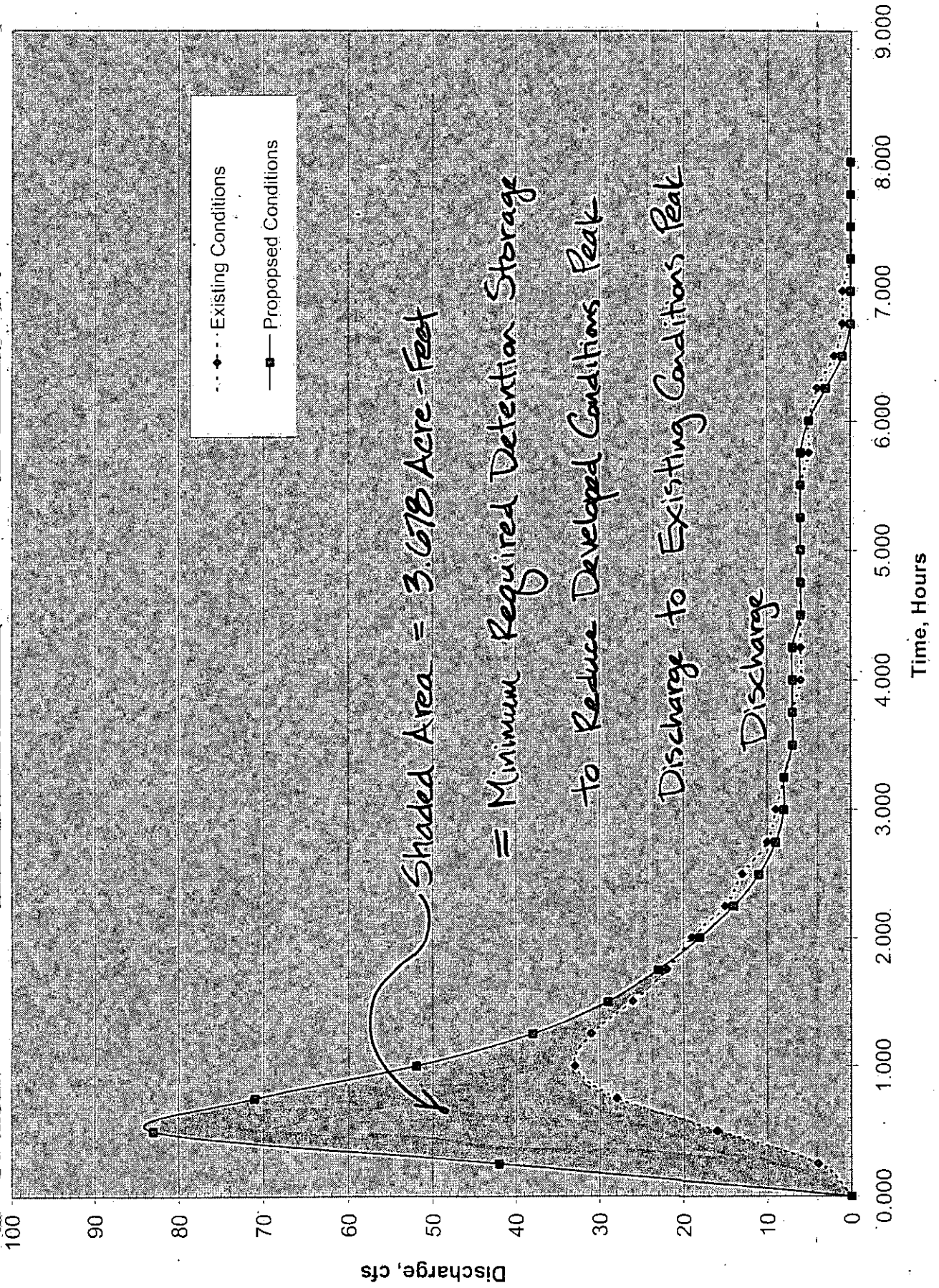
REVISED MAY 1, 1986

DWR 2-504



EXAMPLE

Hydrographs for 100-Year, 6-Hour Storm



HEC-1

ANALYSIS

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 02 AUG 88 *
* RUN DATE 11/21/2003 TIME 09:18:40 *
*****
    
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*****
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****
    
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X X XXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXX XXXX XXX
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMEBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

HEC-1 INPUT

PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1         ID
2         ID
3         ID
*** LIST ***
*** FREE ***

*DIAGRAM
4         IT      15 01JAN03   1200      0 02JAN03   2000
5         IN      15 01JAN03   1200
6         IO      0          5
7         JR      PREC    5.90
*
*
*
8         KK      A
*
*
*
9         BA      0.0322
10        PB      1.00
11        PC      0.000  0.315  0.469  0.564  0.629  0.680  0.722  0.756  0.782  0.804
12        PC      0.821  0.837  0.852  0.868  0.881  0.893  0.912  0.925  0.934  0.945
13        PC      0.961  0.973  0.982  0.997  1.000  1.000  1.000  1.000  1.000  1.000
14        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
15        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
16        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
17        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
18        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
19        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
20        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
21        LS      0          80          0
22        UD      0.500
*
*
*
23        KK      B
*
*
*
24        BA      0.0322
25        PB      1.00
26        PC      0.000  0.315  0.469  0.564  0.629  0.680  0.722  0.756  0.782  0.804
27        PC      0.821  0.837  0.852  0.868  0.881  0.893  0.912  0.925  0.934  0.945
28        PC      0.961  0.973  0.982  0.997  1.000  1.000  1.000  1.000  1.000  1.000
29        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
30        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
31        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
32        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
33        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
34        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
35        PC      1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
36        LS      0          80          95
37        UD      0.300
*
*
*
*
*

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HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

HEC-1 INPUT

PAGE 2

| LINE | ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10 |
|------|---|
| 38   | ZZ  |

HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT  
LINE

(V) ROUTING

(--->) DIVERSION OR PUMP FLOW

NO:

(.) CONNECTOR

(<---) RETURN OF DIVERTED OR PUMPED FLOW

8

A

23

.

B

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   FEBRUARY 1981                   *
*   REVISED 02 AUG 88               *
* RUN DATE 11/21/2003 TIME 09:18:40 *
*****
    
```

```

*****
* U.S. ARMY CORPS OF ENGINEERS     *
* THE HYDROLOGIC ENGINEERING CENTER *
*   609 SECOND STREET               *
*   DAVIS, CALIFORNIA 95616         *
*   (916) 551-1748                 *
*****
    
```

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6 IO      OUTPUT CONTROL VARIABLES
          IPRNT      0  PRINT CONTROL
          IPLOT      5  PLOT CONTROL
          QSCAL      0.  HYDROGRAPH PLOT SCALE

IT        HYDROGRAPH TIME DATA
          NMIN      15  MINUTES IN COMPUTATION INTERVAL
          IDATE     1JAN 3  STARTING DATE
          ITIME     1200  STARTING TIME
          NQ        129  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE    2JAN 3  ENDING DATE
          NDTIME    2000  ENDING TIME
          ICENT     19  CENTURY MARK

          COMPUTATION INTERVAL      .25 HOURS
          TOTAL TIME BASE           32.00 HOURS
    
```

```

ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH  INCHES
LENGTH, ELEVATION  FEET
FLOW               CUBIC FEET PER SECOND
STORAGE VOLUME     ACRE-FEET
SURFACE AREA       ACRES
TEMPERATURE        DEGREES FAHRENHEIT
    
```

```

JP        MULTI-PLAN OPTION
          NPLAN      1  NUMBER OF PLANS
    
```

```

JR        MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          5.90
    
```

\*\*\*\*\*

```

*****
*          *
*          *
*          *
*          *
*****
    
```

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5 IN      TIME DATA FOR INPUT TIME SERIES
          JXMIN     15  TIME INTERVAL IN MINUTES
          JXDATE    1JAN 3  STARTING DATE
          JXTIME    1200  STARTING TIME
    
```

SUBBASIN RUNOFF DATA

```

9 BA      SUBBASIN CHARACTERISTICS
          TAREA     .03  SUBBASIN AREA
    
```

PRECIPITATION DATA

```

10 PB     STORM      1.00  BASIN TOTAL PRECIPITATION
    
```

```

11 PI     INCREMENTAL PRECIPITATION PATTERN
          .31      .15      .09      .06      .05      .04      .03      .03      .02      .02
          .02      .01      .02      .01      .01      .02      .01      .01      .01      .02
          .01      .01      .01      .00
    
```

HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

21 LS SCS LOSS RATE  
 STRTL .50 INITIAL ABSTRACTION  
 CRVNR 80.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

22 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .50 LAG

\*\*\*

WARNING \*\*\* TIME INTERVAL IS GREATER THAN .29\*LAG

UNIT HYDROGRAPH  
 12 END-OF-PERIOD ORDINATES

8. 23. 23. 14. 7. 4. 2. 1. 1. 0.  
 0. 0.

\*\*\*\*\*  
 HYDROGRAPH AT STATION A  
 \*\*\*\*\*

| DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP | Q | * | DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP | Q |
|----|-----|------|-----|------|------|--------|------|---|---|----|-----|------|-----|------|------|--------|------|---|
| 1  | JAN | 1200 | 1   | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 0415 | 66  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1215 | 2   | .31  | .31  | .00    | 0.   | * | * | 2  | JAN | 0430 | 67  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1230 | 3   | .15  | .15  | .00    | 0.   | * | * | 2  | JAN | 0445 | 68  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1245 | 4   | .09  | .09  | .00    | 0.   | * | * | 2  | JAN | 0500 | 69  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1300 | 5   | .06  | .06  | .00    | 0.   | * | * | 2  | JAN | 0515 | 70  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1315 | 6   | .05  | .05  | .01    | 0.   | * | * | 2  | JAN | 0530 | 71  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1330 | 7   | .04  | .04  | .01    | 0.   | * | * | 2  | JAN | 0545 | 72  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1345 | 8   | .03  | .03  | .01    | 0.   | * | * | 2  | JAN | 0600 | 73  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1400 | 9   | .03  | .02  | .00    | 0.   | * | * | 2  | JAN | 0615 | 74  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1415 | 10  | .02  | .02  | .00    | 0.   | * | * | 2  | JAN | 0630 | 75  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1430 | 11  | .02  | .01  | .00    | 0.   | * | * | 2  | JAN | 0645 | 76  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1445 | 12  | .02  | .01  | .00    | 0.   | * | * | 2  | JAN | 0700 | 77  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1500 | 13  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0715 | 78  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1515 | 14  | .02  | .01  | .00    | 0.   | * | * | 2  | JAN | 0730 | 79  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1530 | 15  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0745 | 80  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1545 | 16  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0800 | 81  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1600 | 17  | .02  | .01  | .00    | 0.   | * | * | 2  | JAN | 0815 | 82  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1615 | 18  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0830 | 83  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1630 | 19  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0845 | 84  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1645 | 20  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0900 | 85  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1700 | 21  | .02  | .01  | .00    | 0.   | * | * | 2  | JAN | 0915 | 86  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1715 | 22  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0930 | 87  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1730 | 23  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 0945 | 88  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1745 | 24  | .01  | .01  | .00    | 0.   | * | * | 2  | JAN | 1000 | 89  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1800 | 25  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1015 | 90  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1815 | 26  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1030 | 91  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1830 | 27  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1045 | 92  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1845 | 28  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1100 | 93  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1900 | 29  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1115 | 94  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1915 | 30  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1130 | 95  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1930 | 31  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1145 | 96  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 1945 | 32  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1200 | 97  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2000 | 33  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1215 | 98  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2015 | 34  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1230 | 99  | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2030 | 35  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1245 | 100 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2045 | 36  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1300 | 101 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2100 | 37  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1315 | 102 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2115 | 38  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1330 | 103 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2130 | 39  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1345 | 104 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2145 | 40  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1400 | 105 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2200 | 41  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1415 | 106 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2215 | 42  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1430 | 107 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2230 | 43  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1445 | 108 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2245 | 44  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1500 | 109 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2300 | 45  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1515 | 110 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2315 | 46  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1530 | 111 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2330 | 47  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1545 | 112 | .00  | .00  | .00    | 0.   | * |
| 1  | JAN | 2345 | 48  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1600 | 113 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0000 | 49  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1615 | 114 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0015 | 50  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1630 | 115 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0030 | 51  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1645 | 116 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0045 | 52  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1700 | 117 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0100 | 53  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1715 | 118 | .00  | .00  | .00    | 0.   | * |
| 2  | JAN | 0115 | 54  | .00  | .00  | .00    | 0.   | * | * | 2  | JAN | 1730 | 119 | .00  | .00  | .00    | 0.   | * |

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

|            |    |     |     |     |    |   |            |     |     |     |     |    |
|------------|----|-----|-----|-----|----|---|------------|-----|-----|-----|-----|----|
| 2 JAN 0130 | 55 | .00 | .00 | .00 | 0. | * | 2 JAN 1745 | 120 | .00 | .00 | .00 | 0. |
| 2 JAN 0145 | 56 | .00 | .00 | .00 | 0. | * | 2 JAN 1800 | 121 | .00 | .00 | .00 | 0. |
| 2 JAN 0200 | 57 | .00 | .00 | .00 | 0. | * | 2 JAN 1815 | 122 | .00 | .00 | .00 | 0. |
| 2 JAN 0215 | 58 | .00 | .00 | .00 | 0. | * | 2 JAN 1830 | 123 | .00 | .00 | .00 | 0. |
| 2 JAN 0230 | 59 | .00 | .00 | .00 | 0. | * | 2 JAN 1845 | 124 | .00 | .00 | .00 | 0. |
| 2 JAN 0245 | 60 | .00 | .00 | .00 | 0. | * | 2 JAN 1900 | 125 | .00 | .00 | .00 | 0. |
| 2 JAN 0300 | 61 | .00 | .00 | .00 | 0. | * | 2 JAN 1915 | 126 | .00 | .00 | .00 | 0. |
| 2 JAN 0315 | 62 | .00 | .00 | .00 | 0. | * | 2 JAN 1930 | 127 | .00 | .00 | .00 | 0. |
| 2 JAN 0330 | 63 | .00 | .00 | .00 | 0. | * | 2 JAN 1945 | 128 | .00 | .00 | .00 | 0. |
| 2 JAN 0345 | 64 | .00 | .00 | .00 | 0. | * | 2 JAN 2000 | 129 | .00 | .00 | .00 | 0. |
| 2 JAN 0400 | 65 | .00 | .00 | .00 | 0. | * |            |     |     |     |     |    |

TOTAL RAINFALL = 1.00, TOTAL LOSS = .92, TOTAL EXCESS = .08

| PEAK FLOW         | TIME |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|------|----------|----------------------|-------|-------|----------|
| (CFS)             | (HR) | (CFS)    | 6-HR                 | 24-HR | 72-HR | 32.00-HR |
| 0.                | 2.00 | 0.       | 0.                   | 0.    | 0.    | 0.       |
|                   |      | (INCHES) | .082                 | .083  | .083  | .083     |
|                   |      | (AC-FT)  | 0.                   | 0.    | 0.    | 0.       |
| CUMULATIVE AREA = |      |          | .03 SQ MI            |       |       |          |

WARNING \*\*\* TIME INTERVAL IS GREATER THAN .29\*LAG

HYDROGRAPH AT STATION A  
PLAN 1, RATIO = 5.90

| DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q |   | DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q |
|----|-----|------|-----|------|------|--------|--------|---|----|-----|------|-----|------|------|--------|--------|
| 1  | JAN | 1200 | 1   | .00  | .00  | .00    | 0.     | * | 2  | JAN | 0415 | 66  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1215 | 2   | 1.86 | 1.38 | .48    | 4.     | * | 2  | JAN | 0430 | 67  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1230 | 3   | .91  | .31  | .60    | 16.    | * | 2  | JAN | 0445 | 68  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1245 | 4   | .56  | .14  | .42    | 28.    | * | 2  | JAN | 0500 | 69  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1300 | 5   | .38  | .08  | .30    | 33.    | * | 2  | JAN | 0515 | 70  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1315 | 6   | .30  | .05  | .25    | 31.    | * | 2  | JAN | 0530 | 71  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1330 | 7   | .25  | .04  | .21    | 26.    | * | 2  | JAN | 0545 | 72  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1345 | 8   | .20  | .03  | .17    | 22.    | * | 2  | JAN | 0600 | 73  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1400 | 9   | .15  | .02  | .13    | 19.    | * | 2  | JAN | 0615 | 74  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1415 | 10  | .13  | .02  | .11    | 15.    | * | 2  | JAN | 0630 | 75  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1430 | 11  | .10  | .01  | .09    | 13.    | * | 2  | JAN | 0645 | 76  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1445 | 12  | .09  | .01  | .08    | 10.    | * | 2  | JAN | 0700 | 77  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1500 | 13  | .09  | .01  | .08    | 9.     | * | 2  | JAN | 0715 | 78  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1515 | 14  | .09  | .01  | .08    | 8.     | * | 2  | JAN | 0730 | 79  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1530 | 15  | .08  | .01  | .07    | 7.     | * | 2  | JAN | 0745 | 80  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1545 | 16  | .07  | .01  | .06    | 7.     | * | 2  | JAN | 0800 | 81  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1600 | 17  | .11  | .01  | .10    | 6.     | * | 2  | JAN | 0815 | 82  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1615 | 18  | .08  | .01  | .07    | 6.     | * | 2  | JAN | 0830 | 83  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1630 | 19  | .05  | .01  | .05    | 6.     | * | 2  | JAN | 0845 | 84  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1645 | 20  | .06  | .01  | .06    | 6.     | * | 2  | JAN | 0900 | 85  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1700 | 21  | .09  | .01  | .08    | 5.     | * | 2  | JAN | 0915 | 86  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1715 | 22  | .07  | .01  | .06    | 6.     | * | 2  | JAN | 0930 | 87  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1730 | 23  | .05  | .01  | .05    | 6.     | * | 2  | JAN | 0945 | 88  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1745 | 24  | .09  | .01  | .08    | 5.     | * | 2  | JAN | 1000 | 89  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1800 | 25  | .02  | .00  | .02    | 5.     | * | 2  | JAN | 1015 | 90  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1815 | 26  | .00  | .00  | .00    | 4.     | * | 2  | JAN | 1030 | 91  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1830 | 27  | .00  | .00  | .00    | 2.     | * | 2  | JAN | 1045 | 92  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1845 | 28  | .00  | .00  | .00    | 1.     | * | 2  | JAN | 1100 | 93  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1900 | 29  | .00  | .00  | .00    | 1.     | * | 2  | JAN | 1115 | 94  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1915 | 30  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1130 | 95  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1930 | 31  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1145 | 96  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1945 | 32  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1200 | 97  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2000 | 33  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1215 | 98  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2015 | 34  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1230 | 99  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2030 | 35  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1245 | 100 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2045 | 36  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1300 | 101 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2100 | 37  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1315 | 102 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2115 | 38  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1330 | 103 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2130 | 39  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1345 | 104 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2145 | 40  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1400 | 105 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2200 | 41  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1415 | 106 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2215 | 42  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1430 | 107 | .00  | .00  | .00    | 0.     |

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

|            |    |     |     |     |    |   |            |     |     |     |     |    |
|------------|----|-----|-----|-----|----|---|------------|-----|-----|-----|-----|----|
| 1 JAN 2230 | 43 | .00 | .00 | .00 | 0. | * | 2 JAN 1445 | 108 | .00 | .00 | .00 | 0. |
| 1 JAN 2245 | 44 | .00 | .00 | .00 | 0. | * | 2 JAN 1500 | 109 | .00 | .00 | .00 | 0. |
| 1 JAN 2300 | 45 | .00 | .00 | .00 | 0. | * | 2 JAN 1515 | 110 | .00 | .00 | .00 | 0. |
| 1 JAN 2315 | 46 | .00 | .00 | .00 | 0. | * | 2 JAN 1530 | 111 | .00 | .00 | .00 | 0. |
| 1 JAN 2330 | 47 | .00 | .00 | .00 | 0. | * | 2 JAN 1545 | 112 | .00 | .00 | .00 | 0. |
| 1 JAN 2345 | 48 | .00 | .00 | .00 | 0. | * | 2 JAN 1600 | 113 | .00 | .00 | .00 | 0. |
| 2 JAN 0000 | 49 | .00 | .00 | .00 | 0. | * | 2 JAN 1615 | 114 | .00 | .00 | .00 | 0. |
| 2 JAN 0015 | 50 | .00 | .00 | .00 | 0. | * | 2 JAN 1630 | 115 | .00 | .00 | .00 | 0. |
| 2 JAN 0030 | 51 | .00 | .00 | .00 | 0. | * | 2 JAN 1645 | 116 | .00 | .00 | .00 | 0. |
| 2 JAN 0045 | 52 | .00 | .00 | .00 | 0. | * | 2 JAN 1700 | 117 | .00 | .00 | .00 | 0. |
| 2 JAN 0100 | 53 | .00 | .00 | .00 | 0. | * | 2 JAN 1715 | 118 | .00 | .00 | .00 | 0. |
| 2 JAN 0115 | 54 | .00 | .00 | .00 | 0. | * | 2 JAN 1730 | 119 | .00 | .00 | .00 | 0. |
| 2 JAN 0130 | 55 | .00 | .00 | .00 | 0. | * | 2 JAN 1745 | 120 | .00 | .00 | .00 | 0. |
| 2 JAN 0145 | 56 | .00 | .00 | .00 | 0. | * | 2 JAN 1800 | 121 | .00 | .00 | .00 | 0. |
| 2 JAN 0200 | 57 | .00 | .00 | .00 | 0. | * | 2 JAN 1815 | 122 | .00 | .00 | .00 | 0. |
| 2 JAN 0215 | 58 | .00 | .00 | .00 | 0. | * | 2 JAN 1830 | 123 | .00 | .00 | .00 | 0. |
| 2 JAN 0230 | 59 | .00 | .00 | .00 | 0. | * | 2 JAN 1845 | 124 | .00 | .00 | .00 | 0. |
| 2 JAN 0245 | 60 | .00 | .00 | .00 | 0. | * | 2 JAN 1900 | 125 | .00 | .00 | .00 | 0. |
| 2 JAN 0300 | 61 | .00 | .00 | .00 | 0. | * | 2 JAN 1915 | 126 | .00 | .00 | .00 | 0. |
| 2 JAN 0315 | 62 | .00 | .00 | .00 | 0. | * | 2 JAN 1930 | 127 | .00 | .00 | .00 | 0. |
| 2 JAN 0330 | 63 | .00 | .00 | .00 | 0. | * | 2 JAN 1945 | 128 | .00 | .00 | .00 | 0. |
| 2 JAN 0345 | 64 | .00 | .00 | .00 | 0. | * | 2 JAN 2000 | 129 | .00 | .00 | .00 | 0. |
| 2 JAN 0400 | 65 | .00 | .00 | .00 | 0. | * |            |     |     |     |     |    |

TOTAL RAINFALL = 5.90, TOTAL LOSS = 2.21, TOTAL EXCESS = 3.69

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | MAXIMUM AVERAGE FLOW |       |       |          |       |
|--------------------|--------------|----------------------|-------|-------|----------|-------|
|                    |              | 6-HR                 | 24-HR | 72-HR | 32.00-HR |       |
| 33.                | 1.00         | 12.                  | 3.    | 2.    | 2.       |       |
|                    |              | (INCHES)             | 3.587 | 3.691 | 3.691    | 3.691 |
|                    |              | (AC-FT)              | 6.    | 6.    | 6.       | 6.    |

CUMULATIVE AREA = .03 SQ MI

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*           *
*         B *
*           *
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5 IN TIME DATA FOR INPUT TIME SERIES  
 JKMIN 15 TIME INTERVAL IN MINUTES  
 JXDATE 1JAN 3 STARTING DATE  
 JXTIME 1200 STARTING TIME

SUBBASIN RUNOFF DATA

24 BA SUBBASIN CHARACTERISTICS  
 TAREA .03 SUBBASIN AREA

PRECIPITATION DATA

25 PB STORM 1.00 BASIN TOTAL PRECIPITATION

26 PI INCREMENTAL PRECIPITATION PATTERN

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| .31 | .15 | .09 | .06 | .05 | .04 | .03 | .03 | .02 | .02 |
| .02 | .01 | .02 | .01 | .01 | .02 | .01 | .01 | .01 | .02 |
| .01 | .01 | .01 | .00 |     |     |     |     |     |     |

36 LS SCS LOSS RATE  
 STRTL .50 INITIAL ABSTRACTION  
 CRVNR 80.00 CURVE NUMBER  
 RTIMP 95.00 PERCENT IMPERVIOUS AREA

37 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .30 LAG

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WARNING \*\*\* TIME INTERVAL IS GREATER THAN .29\*LAG

HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

UNIT HYDROGRAPH  
8 END-OF-PERIOD ORDINATES

23. 35. 15. 6. 2. 1. 0. 0.

HYDROGRAPH AT STATION B

| DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q | * | DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q |
|----|-----|------|-----|------|------|--------|--------|---|----|-----|------|-----|------|------|--------|--------|
| 1  | JAN | 1200 | 1   | .00  | .00  | .00    | 0.     | * | 2  | JAN | 0415 | 66  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1215 | 2   | .31  | .02  | .30    | 7.     | * | 2  | JAN | 0430 | 67  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1230 | 3   | .15  | .01  | .15    | 14.    | * | 2  | JAN | 0445 | 68  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1245 | 4   | .09  | .00  | .09    | 12.    | * | 2  | JAN | 0500 | 69  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1300 | 5   | .06  | .00  | .06    | 9.     | * | 2  | JAN | 0515 | 70  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1315 | 6   | .05  | .00  | .05    | 6.     | * | 2  | JAN | 0530 | 71  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1330 | 7   | .04  | .00  | .04    | 5.     | * | 2  | JAN | 0545 | 72  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1345 | 8   | .03  | .00  | .03    | 4.     | * | 2  | JAN | 0600 | 73  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1400 | 9   | .03  | .00  | .02    | 3.     | * | 2  | JAN | 0615 | 74  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1415 | 10  | .02  | .00  | .02    | 2.     | * | 2  | JAN | 0630 | 75  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1430 | 11  | .02  | .00  | .02    | 2.     | * | 2  | JAN | 0645 | 76  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1445 | 12  | .02  | .00  | .02    | 2.     | * | 2  | JAN | 0700 | 77  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1500 | 13  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0715 | 78  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1515 | 14  | .02  | .00  | .02    | 1.     | * | 2  | JAN | 0730 | 79  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1530 | 15  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0745 | 80  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1545 | 16  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0800 | 81  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1600 | 17  | .02  | .00  | .02    | 1.     | * | 2  | JAN | 0815 | 82  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1615 | 18  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0830 | 83  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1630 | 19  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0845 | 84  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1645 | 20  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0900 | 85  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1700 | 21  | .02  | .00  | .02    | 1.     | * | 2  | JAN | 0915 | 86  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1715 | 22  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0930 | 87  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1730 | 23  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 0945 | 88  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1745 | 24  | .01  | .00  | .01    | 1.     | * | 2  | JAN | 1000 | 89  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1800 | 25  | .00  | .00  | .00    | 1.     | * | 2  | JAN | 1015 | 90  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1815 | 26  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1030 | 91  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1830 | 27  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1045 | 92  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1845 | 28  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1100 | 93  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1900 | 29  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1115 | 94  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1915 | 30  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1130 | 95  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1930 | 31  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1145 | 96  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1945 | 32  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1200 | 97  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2000 | 33  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1215 | 98  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2015 | 34  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1230 | 99  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2030 | 35  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1245 | 100 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2045 | 36  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1300 | 101 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2100 | 37  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1315 | 102 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2115 | 38  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1330 | 103 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2130 | 39  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1345 | 104 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2145 | 40  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1400 | 105 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2200 | 41  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1415 | 106 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2215 | 42  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1430 | 107 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2230 | 43  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1445 | 108 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2245 | 44  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1500 | 109 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2300 | 45  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1515 | 110 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2315 | 46  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1530 | 111 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2330 | 47  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1545 | 112 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2345 | 48  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1600 | 113 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0000 | 49  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1615 | 114 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0015 | 50  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1630 | 115 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0030 | 51  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1645 | 116 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0045 | 52  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1700 | 117 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0100 | 53  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1715 | 118 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0115 | 54  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1730 | 119 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0130 | 55  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1745 | 120 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0145 | 56  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1800 | 121 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0200 | 57  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1815 | 122 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0215 | 58  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1830 | 123 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0230 | 59  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1845 | 124 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0245 | 60  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1900 | 125 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0300 | 61  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1915 | 126 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0315 | 62  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1930 | 127 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0330 | 63  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 1945 | 128 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0345 | 64  | .00  | .00  | .00    | 0.     | * | 2  | JAN | 2000 | 129 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0400 | 65  | .00  | .00  | .00    | 0.     | * |    |     |      |     |      |      |        |        |

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

TOTAL RAINFALL = 1.00, TOTAL LOSS = .05, TOTAL EXCESS = .95

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | MAXIMUM AVERAGE FLOW |       |       |          |
|--------------------|--------------|----------------------|-------|-------|----------|
|                    |              | 6-HR                 | 24-HR | 72-HR | 32.00-HR |
| 14.                | .50          | 3.                   | 1.    | 1.    | 1.       |
|                    | (INCHES)     | .941                 | .954  | .954  | .954     |
|                    | (AC-FT)      | 2.                   | 2.    | 2.    | 2.       |

CUMULATIVE AREA = .03 SQ MI

WARNING \*\*\* TIME INTERVAL IS GREATER THAN .29\*LAG

HYDROGRAPH AT STATION B  
PLAN 1, RATIO = 5.90

| DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q | DA | MON | HRMN | ORD | RAIN | LOSS | EXCESS | COMP Q |
|----|-----|------|-----|------|------|--------|--------|----|-----|------|-----|------|------|--------|--------|
| 1  | JAN | 1200 | 1   | .00  | .00  | .00    | 0.     | 2  | JAN | 0415 | 66  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1215 | 2   | 1.86 | .07  | 1.79   | 42.    | 2  | JAN | 0430 | 67  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1230 | 3   | .91  | .02  | .89    | 83.    | 2  | JAN | 0445 | 68  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1245 | 4   | .56  | .01  | .55    | 71.    | 2  | JAN | 0500 | 69  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1300 | 5   | .38  | .00  | .38    | 52.    | 2  | JAN | 0515 | 70  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1315 | 6   | .30  | .00  | .30    | 38.    | 2  | JAN | 0530 | 71  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1330 | 7   | .25  | .00  | .25    | 29.    | 2  | JAN | 0545 | 72  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1345 | 8   | .20  | .00  | .20    | 23.    | 2  | JAN | 0600 | 73  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1400 | 9   | .15  | .00  | .15    | 18.    | 2  | JAN | 0615 | 74  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1415 | 10  | .13  | .00  | .13    | 14.    | 2  | JAN | 0630 | 75  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1430 | 11  | .10  | .00  | .10    | 11.    | 2  | JAN | 0645 | 76  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1445 | 12  | .09  | .00  | .09    | 9.     | 2  | JAN | 0700 | 77  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1500 | 13  | .09  | .00  | .09    | 8.     | 2  | JAN | 0715 | 78  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1515 | 14  | .09  | .00  | .09    | 8.     | 2  | JAN | 0730 | 79  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1530 | 15  | .08  | .00  | .08    | 7.     | 2  | JAN | 0745 | 80  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1545 | 16  | .07  | .00  | .07    | 7.     | 2  | JAN | 0800 | 81  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1600 | 17  | .11  | .00  | .11    | 7.     | 2  | JAN | 0815 | 82  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1615 | 18  | .08  | .00  | .08    | 8.     | 2  | JAN | 0830 | 83  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1630 | 19  | .05  | .00  | .05    | 6.     | 2  | JAN | 0845 | 84  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1645 | 20  | .06  | .00  | .06    | 5.     | 2  | JAN | 0900 | 85  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1700 | 21  | .09  | .00  | .09    | 6.     | 2  | JAN | 0915 | 86  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1715 | 22  | .07  | .00  | .07    | 7.     | 2  | JAN | 0930 | 87  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1730 | 23  | .05  | .00  | .05    | 6.     | 2  | JAN | 0945 | 88  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1745 | 24  | .09  | .00  | .09    | 6.     | 2  | JAN | 1000 | 89  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1800 | 25  | .02  | .00  | .02    | 5.     | 2  | JAN | 1015 | 90  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1815 | 26  | .00  | .00  | .00    | 3.     | 2  | JAN | 1030 | 91  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1830 | 27  | .00  | .00  | .00    | 1.     | 2  | JAN | 1045 | 92  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1845 | 28  | .00  | .00  | .00    | 0.     | 2  | JAN | 1100 | 93  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1900 | 29  | .00  | .00  | .00    | 0.     | 2  | JAN | 1115 | 94  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1915 | 30  | .00  | .00  | .00    | 0.     | 2  | JAN | 1130 | 95  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1930 | 31  | .00  | .00  | .00    | 0.     | 2  | JAN | 1145 | 96  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 1945 | 32  | .00  | .00  | .00    | 0.     | 2  | JAN | 1200 | 97  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2000 | 33  | .00  | .00  | .00    | 0.     | 2  | JAN | 1215 | 98  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2015 | 34  | .00  | .00  | .00    | 0.     | 2  | JAN | 1230 | 99  | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2030 | 35  | .00  | .00  | .00    | 0.     | 2  | JAN | 1245 | 100 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2045 | 36  | .00  | .00  | .00    | 0.     | 2  | JAN | 1300 | 101 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2100 | 37  | .00  | .00  | .00    | 0.     | 2  | JAN | 1315 | 102 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2115 | 38  | .00  | .00  | .00    | 0.     | 2  | JAN | 1330 | 103 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2130 | 39  | .00  | .00  | .00    | 0.     | 2  | JAN | 1345 | 104 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2145 | 40  | .00  | .00  | .00    | 0.     | 2  | JAN | 1400 | 105 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2200 | 41  | .00  | .00  | .00    | 0.     | 2  | JAN | 1415 | 106 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2215 | 42  | .00  | .00  | .00    | 0.     | 2  | JAN | 1430 | 107 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2230 | 43  | .00  | .00  | .00    | 0.     | 2  | JAN | 1445 | 108 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2245 | 44  | .00  | .00  | .00    | 0.     | 2  | JAN | 1500 | 109 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2300 | 45  | .00  | .00  | .00    | 0.     | 2  | JAN | 1515 | 110 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2315 | 46  | .00  | .00  | .00    | 0.     | 2  | JAN | 1530 | 111 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2330 | 47  | .00  | .00  | .00    | 0.     | 2  | JAN | 1545 | 112 | .00  | .00  | .00    | 0.     |
| 1  | JAN | 2345 | 48  | .00  | .00  | .00    | 0.     | 2  | JAN | 1600 | 113 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0000 | 49  | .00  | .00  | .00    | 0.     | 2  | JAN | 1615 | 114 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0015 | 50  | .00  | .00  | .00    | 0.     | 2  | JAN | 1630 | 115 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0030 | 51  | .00  | .00  | .00    | 0.     | 2  | JAN | 1645 | 116 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0045 | 52  | .00  | .00  | .00    | 0.     | 2  | JAN | 1700 | 117 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0100 | 53  | .00  | .00  | .00    | 0.     | 2  | JAN | 1715 | 118 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0115 | 54  | .00  | .00  | .00    | 0.     | 2  | JAN | 1730 | 119 | .00  | .00  | .00    | 0.     |
| 2  | JAN | 0130 | 55  | .00  | .00  | .00    | 0.     | 2  | JAN | 1745 | 120 | .00  | .00  | .00    | 0.     |

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

|            |    |     |     |     |    |   |            |     |     |     |     |    |
|------------|----|-----|-----|-----|----|---|------------|-----|-----|-----|-----|----|
| 2 JAN 0145 | 56 | .00 | .00 | .00 | 0. | * | 2 JAN 1800 | 121 | .00 | .00 | .00 | 0. |
| 2 JAN 0200 | 57 | .00 | .00 | .00 | 0. | * | 2 JAN 1815 | 122 | .00 | .00 | .00 | 0. |
| 2 JAN 0215 | 58 | .00 | .00 | .00 | 0. | * | 2 JAN 1830 | 123 | .00 | .00 | .00 | 0. |
| 2 JAN 0230 | 59 | .00 | .00 | .00 | 0. | * | 2 JAN 1845 | 124 | .00 | .00 | .00 | 0. |
| 2 JAN 0245 | 60 | .00 | .00 | .00 | 0. | * | 2 JAN 1900 | 125 | .00 | .00 | .00 | 0. |
| 2 JAN 0300 | 61 | .00 | .00 | .00 | 0. | * | 2 JAN 1915 | 126 | .00 | .00 | .00 | 0. |
| 2 JAN 0315 | 62 | .00 | .00 | .00 | 0. | * | 2 JAN 1930 | 127 | .00 | .00 | .00 | 0. |
| 2 JAN 0330 | 63 | .00 | .00 | .00 | 0. | * | 2 JAN 1945 | 128 | .00 | .00 | .00 | 0. |
| 2 JAN 0345 | 64 | .00 | .00 | .00 | 0. | * | 2 JAN 2000 | 129 | .00 | .00 | .00 | 0. |
| 2 JAN 0400 | 65 | .00 | .00 | .00 | 0. | * |            |     |     |     |     |    |

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TOTAL RAINFALL = 5.90, TOTAL LOSS = .11, TOTAL EXCESS = 5.79

| PEAK FLOW<br>+ (CFS) | TIME<br>(HR) | (CFS)    | MAXIMUM AVERAGE FLOW |       |       |          |
|----------------------|--------------|----------|----------------------|-------|-------|----------|
|                      |              |          | 6-HR                 | 24-HR | 72-HR | 32.00-HR |
| + 83.                | .50          | 20.      | 5.                   | 4.    | 4.    |          |
|                      |              | (INCHES) | 5.709                | 5.790 | 5.790 |          |
|                      |              | (AC-FT)  | 10.                  | 10.   | 10.   |          |
| CUMULATIVE AREA =    |              |          | .03 SQ MI            |       |       |          |

# HEC-1 Analysis to Develop Hydrographs for 100-Year, 6-Hour Storm (Existing and Proposed)

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES  
TIME TO PEAK IN HOURS

| OPERATION     | STATION | AREA | PLAN | RATIOS APPLIED TO PRECIPITATION |      |
|---------------|---------|------|------|---------------------------------|------|
|               |         |      |      | RATIO 1                         |      |
|               |         |      |      | 5.90                            |      |
| HYDROGRAPH AT |         |      |      |                                 |      |
| +             | A       | .03  | 1    | FLOW                            | 33.  |
|               |         |      |      | TIME                            | 1.00 |
| HYDROGRAPH AT |         |      |      |                                 |      |
| +             | B       | .03  | 1    | FLOW                            | 83.  |
|               |         |      |      | TIME                            | .50  |

\*\*\* NORMAL END OF HEC-1 \*\*\*