TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 11, 2011

Mr. Robert G. Adams
U.S. Army Corps of Engineers
3110 FM 2271
Belton, Texas 76513

Re: Edwards Aquifer, Comal County

Name of Project: Crane's Mill Park – Canyon Lake, located at the west end of FM 2673, Canyon Lake, Texas

Type of Plan: Contributing Zone Plan (CZP); 30 Texas Administrative Code (TAC) Chapter 213 Subchapter B Edwards Aquifer

Edwards Aquifer Protection Program San Antonio File No. 2966.00, Investigation No. 901251 Regulated Entity No. RN106090350

Dear Mr. Adams:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the contributing zone plan (CZP) application for the above-referenced project submitted to the San Antonio Regional Office by Matkin Hoover Engineering on behalf of the U.S. Army Corps of Engineers on February 18, 2011. Final review of the CZP was completed after additional material was received on March 30 and April 8, 2011. As presented to the TCEQ, the temporary and permanent best management practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas licensed professional engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer protection plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

Project Description

Proposed park improvements will be constructed on an existing 142 acre site. The project will include the demolition and reconstruction of the entrance gate and the addition of paved roadway. About 2.8 acres of impervious cover will be added to an existing 6.7 acres yielding 9.5 acres (6.7 percent). According to a permit issued by Comal County on January 26, 2011, the park site is acceptable for the use of on-site sewage facilities.

Permanent Pollution Abatement Measures

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, vegetated filter strips, designed using the TCEQ technical guidance document, Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 2,513 pounds of TSS annually generated from the 2.8 acres of impervious cover. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of natural vegetated filter strips. The natural vegetated filter strips will extend along the entire length of the contributing areas. The slope shall not exceed 10 percent. And the minimum dimension (in the direction of flow) shall be 50 feet.

Special Conditions

1. Permanent pollution abatement measures shall be operational prior to the use of the areas where new impervious cover is constructed.

Standard Conditions

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.

2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.

3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to the Commencement of Construction:

4. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved Contributing Zone Plan and this notice of approval shall be maintained at the project location until all regulated activities are completed.

5. Any modification to the activities described in the referenced CZP application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.

6. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the name of the approved plan and file number for the regulated activity, the date on which the regulated activity will commence, and the name of the prime contractor with the name and telephone number of the contact person.

7. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved Storm Water Pollution Prevention Plan (SWPPP) must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and

the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

During Construction:

8. During the course of regulated activities related to this project, the applicant or his agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity.

9. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been significantly reduced. Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

10. Intentional discharges of sediment laden storm water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.

11. The following records shall be maintained and made available to the executive director upon request: the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

12. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.

13. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 5, above.

After Completion of Construction:

14. Owners of permanent BMPs and measures must insure that the BMPs and measures are constructed and function as designed. A Texas licensed professional engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the San Antonio Regional Office within 30 days of site completion.

15. The applicant shall be responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director

through the San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

16. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Contributing Zone Plan. If the new owner intends to commence any new regulated activity on the site, a new Contributing Zone Plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.

17. A Contributing Zone Plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Contributing Zone Plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.

18. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

If you have any questions or require additional information, please contact Alan G. Jones of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4074.

Sincerely,

Mark R. Vickery, P.G., Executive Director
Texas Commission on Environmental Quality

MRV/AGJ/eg

Enclosure: *Change in Responsibility for Maintenance of Permanent BMPs*, Form TCEQ-10263

cc: Mr. Garrett Keller, Matkin Hoover Engineering
Mr. Tom Hornseth, P.E., Comal County
TCEQ Central Records, Building F, MC212

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 11, 2011

Mr. Robert G. Adams
U.S. Army Corps of Engineers
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the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

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through the San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

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If you have any questions or require additional information, please contact Alan G. Jones of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4074.

Sincerely,

Mark R. Vickery, P.G., Executive Director
Texas Commission on Environmental Quality

MRV/AGJ/eg

Enclosure: *Change in Responsibility for Maintenance of Permanent BMPs*, Form TCEQ-10263

cc: Mr. Garrett Keller, Matkin Hoover Engineering
Mr. Tom Hornseth, P.E., Comal County
TCEQ Central Records, Building F, MC212

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 22, 2010

Mr. Thomas H. Hornseth, P.E.
Comal County Engineer
195 David Jonas Drive
New Braunfels TX 78132-3710

Re: Edwards Aquifer, Comal County
PROJECT NAME: Cranes Mill Park Canyon Lake, located on the west end of FN 2673, Canyon Lake, Texas
PLAN TYPE: Application for Contributing Zone Water Pollution Abatement Plan (WPAP) 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program
EAPP File No.: 2966.00

Dear Mr. Hornseth:

The referenced application is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval.

Please forward your comments to this office by March 21, 2010.

The Texas Commission on Environmental Quality appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact the San Antonio Region Office at (210) 490-3096.

Sincerely

Todd Jones
Water Section Work Leader
San Antonio Regional Office

TJ/eg

MATKINHOOVER
ENGINEERING
& SURVEYING

CONTRIBUTING ZONE PLAN

CRANE'S MILL PARK

CANYON LAKE

COMAL COUNTY

U.S. ARMY CORPS OF ENGINEERS

8 Spencer Road, Suite 100 • P.O. Box 54 • Boerne, Texas 78006 • Office: 830.249.0600 • Fax: 830.249.0099 • www.matkinhoover.com

Table of Contents

Contributing Zone Plan Application
for Regulated Activities
on the Contributing Zone to the Edwards Aquifer
and Relating to 30 TAC §213.24(1), Effective June 1, 1999

RECEIVED
FEB 24 2011
COUNTY ENGINEER

Regulated Entity Name: Crane's Mill Park – Canyon Lake
County: Comal Stream Basin: Guadalupe

1. _X_ Regulated activities on this site will disturb at least 5 acres.
__ Regulated activities on this site will disturb less than 5 acres and are part of a larger common plan of development or sale with the potential to disturb cumulatively five or more acres.

2. Customer (Applicant):

Contact Person:	Robert G. Adams		
Entity:	U.S. Army Corps of Engineers		
Mailing Address:	3110 FM 2271		
City, State:	Belton, Texas	Zip:	76513
Telephone:	254-939-1829	FAX:	254-939-8061

Agent/Representative (If any):

Contact Person:	GARRETT KELLER		
Entity:	MATKIN HOOVER ENGINEERING		
Mailing Address:	8 SPENCER ROAD, SUITE 100		
City, State:	BOERNE, TX	Zip:	78006
Telephone:	830-249-0600	FAX:	830-249-0099

3. __ This project is inside the city limits of _____.
__ This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
_X_ This project is not located within any city's limits or ETJ.

4. The location of the project site is described below. Sufficient detail and clarity has been provided so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.
Crane's Mill Park – Canyon Lake – Comal County
West end of FM 2673
* See Attachment "A"

5. _X_ **ATTACHMENT A - Road Map.** A road map showing directions to and the location of the project site is found as at the end of this form. Location Map included in Attachment.

6. _X_ **ATTACHMENT B - USGS Quadrangle Map.** A copy of the USGS Quadrangle Map (Scale: 1" = 2000') is found at the end of this form. The map(s) clearly shows:
_X_ Project site boundaries.
_X_ USGS Quadrangle Name(s).

7. _X_ **ATTACHMENT C - Project Narrative.** A detailed narrative description of the proposed project is found at the end of this form.

__ City thoroughfare or roads to be dedicated to a municipality.
__ Street or road providing access to private driveways.

16. Type of pavement or road surface to be used:
__ Concrete
__ Asphaltic concrete pavement
__ Other: _____

17. Length of Right of Way (R.O.W.): _____ feet.
Width of R.O.W.: _____ feet.
L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.

18. Length of pavement area: _____ feet.
Width of pavement area: _____ feet.
L x W = _____ Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.
Pavement area _____ acres ÷ R.O.W. area _____ acres x 100 = _____% impervious cover.

19. __ A rest stop will be included in this project.
__ A rest stop will **not** be included in this project.

20. __ Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

STORMWATER TO BE GENERATED BY THE PROPOSED PROJECT

21. _X_ **ATTACHMENT E - Volume and Character of Stormwater.** A description of the volume and character (quality) of the stormwater runoff which is expected to occur from the proposed project is found at the end of this form. The estimates of stormwater runoff quality and quantity are based on area and type of impervious cover. The runoff coefficient of the site for both pre-construction and post-construction conditions is included.

WASTEWATER TO BE GENERATED BY THE PROPOSED PROJECT

22. Wastewater will be disposed of by:

_X_ On-Site Sewage Facility (OSSF/Septic Tank):
ATTACHMENT F - Suitability Letter from Authorized Agent. An on-site sewage facility will be used to treat and dispose of the wastewater from this site. The appropriate licensing authority's written approval is provided at the end of this form. It states that the land is suitable for the use of private sewage facilities and will meet or exceed the requirements for on-site sewage facilities as specified under 30 TAC Chapter 285 relating to On-site Sewage Facilities, or it identifies those areas that are not suitable for the use of private sewage facilities. The system will be designed by a licensed professional engineer or a registered sanitarian and installed by a licensed installer in compliance with 30 TAC §285.

__ Sewage Collection System (Sewer Lines):
Wastewater is to be disposed of by conveyance to the (name) treatment plant for treatment and disposal. The treatment facility is: _____
__ existing.

27. ___ The containment area must be constructed of and in a material impervious to the substance(s) being stored. The proposed containment structure will be constructed of _____.

28. **ATTACHMENT H - AST Containment Structure Drawings.** A scaled drawing of the containment structure is found at the end of this form that shows the following:

___ Interior dimensions (length, width, depth and wall and floor thickness).
___ Internal drainage to a point convenient for the collection of any spillage.
___ Tanks clearly labeled
___ Piping clearly labeled
___ Dispenser clearly labeled

29. Any spills must be directed to a point convenient for collection and recovery. Spills from storage tank facilities must be removed from the controlled drainage area for disposal within 24 hours of the spill.

___ In the event of a spill, any spillage will be removed from the containment structure within 24 hours of the spill and disposed of properly.
___ In the event of a spill, any spillage will be drained from the containment structure through a drain and valve within 24 hours of the spill and disposed of properly. The drain and valve system are shown in detail on the scaled drawing.

SITE PLAN

Items 30 through 41 must be included on the Site Plan.

30. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = 200 '. * See Construction Plans

31. 100-year floodplain boundaries

X Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
___ No part of the project site is located within the 100-year floodplain.

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s):
Crane's Mill Park is located within the flood pool of Canyon Lake. Any land below the 948msl is part of the flood pool and subject to flooding.
FEMA 100 year Flood Plain map – Map # 48091C0095F – dated 2 September 2009

32. ___ The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Lots, recreation centers, buildings, roads, etc. are shown on the site plan.
X The layout of the development is shown with existing contours at appropriate, but not greater than ten-foot contour intervals. Finished topographic contours will not differ from the existing topographic configuration and are not shown. Lots, recreation centers, buildings, roads, etc. are shown on the site plan.

33. ___ A drainage plan showing all paths of drainage from the site to surface streams.

and the property owner must notify the appropriate regional office of these changes.

__ This site will be used for low density single-family residential development and has 20% or less impervious cover.
__ This site will be used for low density single-family residential development but has more than 20% impervious cover.
_X_ This site will not be used for low density single-family residential development.

46. N/A The executive director may waive the requirement for other permanent BMPs for multi-family residential developments, schools, or small business sites where 20% or less impervious cover is used at the site. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

__ **ATTACHMENT I - 20% or Less Impervious Cover Waiver.** This site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is found at the end of this form.
__ This site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.
X This site will not be used for multi-family residential developments, schools, or small business sites.

47. **ATTACHMENT J - BMPs for Upgradient Stormwater.**

X__ A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is provided as **ATTACHMENT J** at the end of this form.
__ If no surface water, groundwater or stormwater originates upgradient from the site and flows across the site, an explanation is provided as **ATTACHMENT J** at the end of this form.
__ If permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, an explanation is provided as **ATTACHMENT J** at the end of this form.

48. **ATTACHMENT K - BMPs for On-site Stormwater.**

_X_ A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is provided as **ATTACHMENT K** at the end of this form.
__ If permanent BMPs or measures are not required to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff, an explanation is provided as **ATTACHMENT K** at the end of this form.

49. __ **ATTACHMENT L - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams is provided at the end of this form.

needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

57. __ Any modification of this Contributing Zone Plan may require TCEQ review and Executive Director approval prior to construction, and may require submission of a revised application, with appropriate fees.

58. X The site description, controls, maintenance, and inspection requirements for the storm water pollution prevention plan (SWPPP) developed under the EPA NPDES general permits for stormwater discharges have been submitted to fulfill paragraphs 30 TAC §213.24(1-5) of the technical report. All requirements of 30 TAC §213.24(1-5) have been met by the SWPPP document.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **CONTRIBUTING ZONE PLAN APPLICATION** is hereby submitted for TCEQ review and Executive Director approval. The application was prepared by:

Robert G. Adams
Print Name of Customer/Agent

ADAMS.ROBERT.G.1231001499 Digitally signed by ADAMS.ROBERT.G.1231001499 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499 Date: 2011.01.12 11:17:41 -06'00'

Signature of Customer/Agent

3 FEB 2011
Date

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

57. ___ Any modification of this Contributing Zone Plan may require TCEQ review and Executive Director approval prior to construction, and may require submission of a revised application, with appropriate fees.

58. _X_ The site description, controls, maintenance, and inspection requirements for the storm water pollution prevention plan (SWPPP) developed under the EPA NPDES general permits for stormwater discharges have been submitted to fulfill paragraphs 30 TAC §213.24(1-5) of the technical report. All requirements of 30 TAC §213.24(1-5) have been met by the SWPPP document.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **CONTRIBUTING ZONE PLAN APPLICATION** is hereby submitted for TCEQ review and Executive Director approval. The application was prepared by:

CHARLES L. BURGER – CH. OPS. FT. Worth District USACE
Print Name of Customer/Agent

Charles L. Burger — 3 FEB 11
Signature of Customer/Agent — Date

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

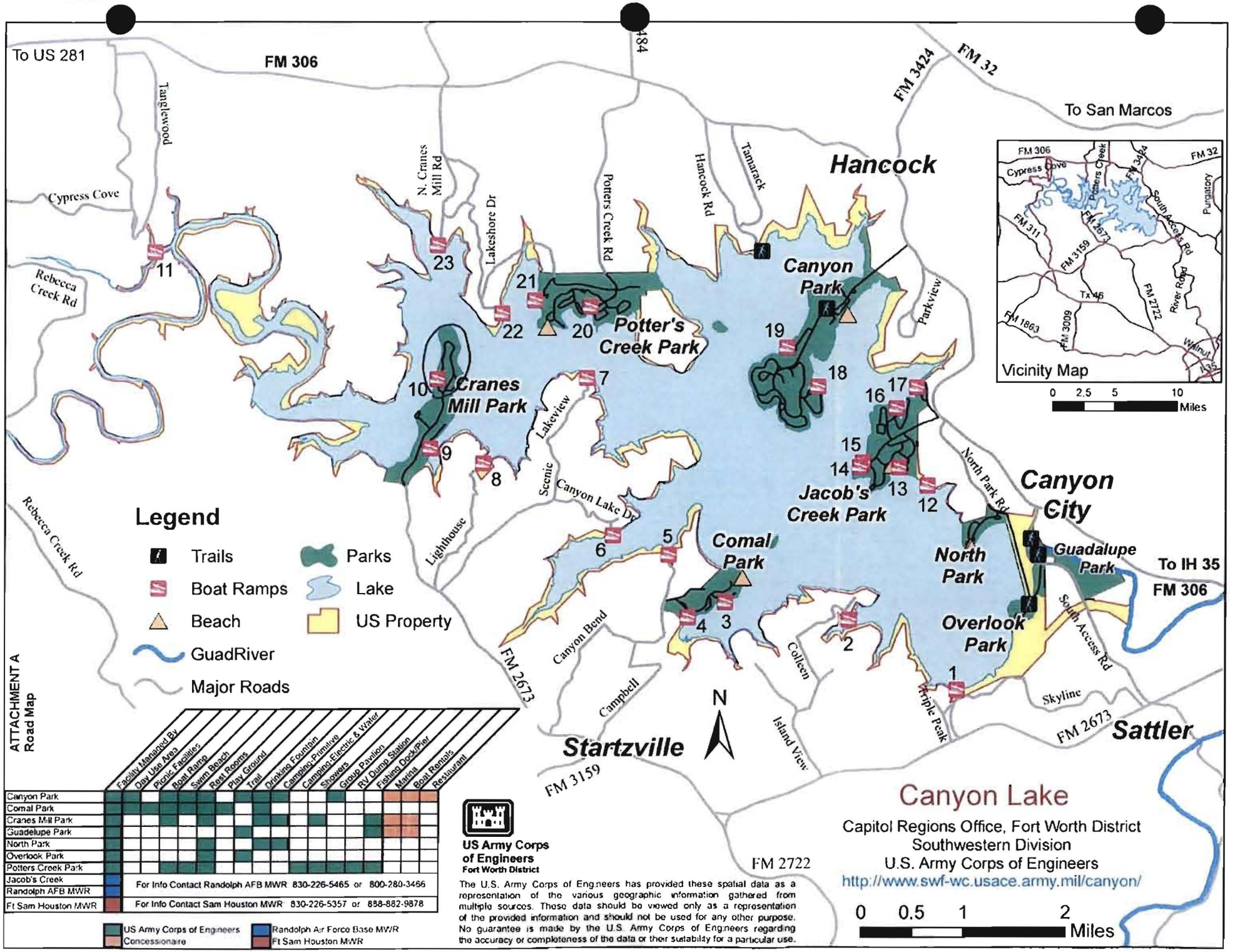
Attachment A

Road and Location Maps

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN


To US 281
FM 306
Tanglewood
Cypress Cove
Rebecca Creek Rd
N. Cranes Mill Rd
Lakeshore Dr
Potters Creek Rd
Hancock Rd
Tamarack
FM 3424
FM 32
To San Marcos
Hancock
Canyon Park
Parkview
Potter's Creek Park
Cranes Mill Park
Lakeview
Scenic
Canyon Lake Dr
Lighthouse
Jacob's Creek Park
North Park Rd
Canyon City
Comal Park
North Park
Guadalupe Park
To IH 35
FM 306
Overlook Park
South Access Rd
Canyon Bend
Colleen
Triple Peak
Skyline
FM 2673
Sattler
Campbell
Island View
Startzville
FM 3159
FM 2722
11
23
21
22
20
19
18
17
16
15
14
13
12
10
9
8
7
6
5
4
3
2
1
N
Vicinity Map
FM 306
Cypress Cove
Potters Creek
FM 3424
FM 32
Purgatory
South Access Rd
FM 311
FM 2673
FM 3159
Tx 46
FM 2722
River Road
FM 1863
FM 3009
Walnut
I-35
0 2.5 5 10
Miles
Legend
Trails
Boat Ramps
Beach
GuadRiver
Major Roads
Parks
Lake
US Property
ATTACHMENT A
Road Map
Facility Managed By
Day Use Area
Picnic Facilities
Boat Ramp
Swim Beach
Rest Rooms
Play Ground
Trail
Drinking Fountain
Camping-Primitive
Camping-Electric & Water
Showers
Group Pavilion
RV Dump Station
Fishing Dock/Pier
Marina
Boat Rentals
Restaurant
Canyon Park
Comal Park
Cranes Mill Park
Guadelupe Park
North Park
Overlook Park
Potters Creek Park
Jacob's Creek
Randolph AFB MWR
Ft Sam Houston MWR
For Info Contact Randolph AFB MWR 830-226-5465 or 800-280-3466
For Info Contact Sam Houston MWR 830-226-5357 or 888-882-9878
US Army Corps of Engineers
Concessionaire
Randolph Air Force Base MWR
Ft Sam Houston MWR
US Army Corps of Engineers
Fort Worth District
The U.S. Army Corps of Engineers has provided these spatial data as a representation of the various geographic information gathered from multiple sources. These data should be viewed only as a representation of the provided information and should not be used for any other purpose. No guarantee is made by the U.S. Army Corps of Engineers regarding the accuracy or completeness of the data or their suitability for a particular use.
Canyon Lake
Capitol Regions Office, Fort Worth District
Southwestern Division
U.S. Army Corps of Engineers
http://www.swf-wc.usace.army.mil/canyon/
0 0.5 1 2
Miles

Cranes Mill Park Construction Zone

Canyon Reservoir

Comal County Texas

Owner: US Army Corps of Engineers Acreage: 97.6

A tract of land situated in the County of Comal, State of Texas, and being more particularly described in the following parcel, all bearings being referred to Texas State Plane Coordinate System NAD 1983, South Central Zone:

Being part of the Stephen A. Barney Survey (A-34) and part of the Isaac H. Turner Survey (A-619), and part of US Army Corps of Engineers Tract 500-1 being more particularly described as follows:

FROM US Army Corps of Engineers monument 500-1-2 located on the US Army Corps of Engineers property boundary North 29° 46'24" East, 3269.311 feet to a point of beginning for Cranes Mill Park Construction Zone called Point 1,

Thence North 55° 29'8" West 119.179 feet to Point 2

Thence North 48° 9'12" West, 784.41 feet to Point 3;

Thence North 2° 43'13" West, 163.563 feet to Point 4;

Thence North 29° 39'23" East, 266.272 feet to Point 5;

Thence North 42° 32'25" East, 453.975 feet to Point 6;

Thence North 69° 48'42" East, 284.492 feet to Point 7;

Thence North 20° 15'16" East, 254.03 feet to Point 8;

Thence North 8° 51'50" East, 606.283 feet to Point 9;

Thence North 24° 14'2" East, 341.253 feet to Point 10;

Thence North 6° 55'2" East, 517.232 feet to Point 11;

Thence North 9° 26'14" East, 826.289 feet to Point 12;

Thence North 0° 24'22" West, 666.569 feet to Point 13;

Thence North 32° 50'58" West, 274.007 feet to Point 14;

Thence North 2° 19'52" West, 235.167 feet to Point 15;

Thence North 40° 4'1" East, 275.68 feet to Point 16;

Thence North 68° 26'5" East, 221.729 feet to Point 17;

Thence South 71° 57'34" East, 216.854 feet to Point 18;

Thence South 48° 6'57" East, 186.722 feet to Point 19;

Thence South 15° 27'19" East, 233.843 feet to Point 20;

Thence South 9° 10'58" East, 330.322 feet to Point 21;

Thence South 17° 57'47" East, 373.051 feet to Point 22;

Thence South 12° 52'52" West, 344.33 feet to Point 23;

Thence South 6° 5'40" West, 361.691 feet to Point 24;

Thence South 2° 29'0" East, 551.984 feet to Point 25;

Thence South 13° 9-'49" West, 379.195 feet to Point 26;

Thence South 24° 32'25" West, 504.295 feet to Point 27;

Thence South 13° 1'36" West, 1277.633.949 feet to Point 28;

Thence South 27° 31'4" West, 421.05 feet to Point 29;

Thence South 33° 13'15" West, 348.801 feet to Point 30;

Thence North 77° 28'0" West, 28.295 feet to Point 31;

Thence South 44° 16'51" West, 342.906 feet to the point of beginning called Point 1, containing 97.6 acres, more or less.

Cranes Mill -Canyon Lake

Cranes Mill Park Construction Zone
Approx. 97.6 Acres

Murray McCarley
Capital Regional Office
GIS Specialist
30 Nov 2010

Attachment B

USGS Quadrangle Map

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

See back pocket of binder

Attachment C

Project Narrative

PROJECT NARRATIVE

CRANE'S MILL PARK

CANYON LAKE, TEXAS

GK 2-18-11

Cranes' Mill Park is located on a peninsula on the south shore of Canyon Lake at the end of FM 2673 in Comal County. Approximately 97 acres of the park's 142 acres is developed for recreational use to some degree. The proposed modernization project is approximately 97.48 acres. Soil disturbance within the limits of the project area is approximately 10 acres.

The site geology is composed of: Comfort-Rock outcrop complex composed of 70% Comfort soils and 15% Rock outcrop. Surface Comfort soils are dark brown extremely stony clay to 6" depth that is covered with stones and cobbles as large as 4 feet over 45% of the surface with sub-soils that are dark reddish brown extremely stony clay to a depth of 13" all underlain by fracture limestone. This soil is normally well drained and surface run is medium, resulting in a slight water erosion hazard. Rock outcrops are prevalent along the center of the peninsula.

Existing vegetation on the site is composed on native/introduced forbs and grasses, shrubs and trees.

Depending upon location with the project area, storm water runoff flows north, east and west towards Canyon Lake. Runoff is conveyed as overland flow. These sites are located within Comal County and are located within the 100 year flood plain.

Proposed construction plans call for the following:

Construction of approximately 8500 feet of asphalt paved roads. These roads will vary in width from 14 feet for one way roads to 24 feet for two way roads. A number of the roads will replace existing 'volunteer' dirt roads.

Construction of 2 restrooms. These restrooms will replace vault toilets that were severely damaged/destroyed by flooding in 2002 and closed since. The new

restrooms will be waterborne and connected to an existing authorized OSSF located outside the 100 year flood plain.

Replace existing entrance complex and gate attendant sites. Existing complex and sites will be demolished and replaced with facilities above the 100 year flood plain elevation of 948msl.

Replace existing dump station. Existing dump station and holding tank will be replaced with new facility located at a higher elevation. Effluent will go to existing OSSF facility within park.

Replace existing camping sites. New sites will include impact zones of decomposed granite to reduce destruction of ground covering vegetation, soil compaction and erosion.

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

Factors Affecting Surface Water Quality

The construction activities associated with the Crane's Mill Park Modernization Project could result in additional total suspended solids (TSS) loading during the construction phase. This potential increased loading will be mitigated by the use of silt fencing that will be placed down gradient of construction work and the preservation of existing ground covering vegetation both up and down gradient of construction areas. This vegetative cover of native grasses and forbs will serve as Vegetative Filter Strips (VPS).

This project will increase the site's impervious cover by approximately 2.8 acres to bring the site's overall imperious cover to 9.5 acres, resulting in additional runoff and associated pollutant loads. A significant percentage of the paved roads to be constructed within the project area will take the place of 'volunteer' dir trails. During wet weather, these trails erode and allow silt and sediment to flow towards the receiving waters, Canyon Lake. During dry weather, wind carries the soil in the form of dust. The paving of these trails will significantly reduce this. Permanent vegetative buffer zones in existence will provide adequate treatment for the TSS load. In addition, all areas of disturbed soil will be seeded with a mixture of native forbs and grasses as soon as soil disturbance is complete. Over seeding of oats/wheat will be done if construction activities are completed during cold weather.

Attachment E

Volume and Character of Stormwater

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

Volume and Character of Stormwater

GK 2-18-11

Cranes' Mill Park is located on a peninsula on the south shore of Canyon Lake at the end of FM 2673 in Comal County. Approximately 97 acres of the park's 142 acres is developed for recreational use to some degree. The proposed modernization project is approximately 142 acres. Soil disturbance within the limits of the project area is approximately 10 acres.

The site geology is composed of: Comfort-Rock outcrop complex composed of 70% Comfort soils and 15% Rock outcrop. Surface Comfort soils are dark brown extremely stony clay to 6" depth that is covered with stones and cobbles as large as 4 feet over 45% of the surface with sub-soils that are dark reddish brown extremely stony clay to a depth of 13" all underlain by fracture limestone. This soil is normally well drained and surface run is medium, resulting in a slight water erosion hazard. Rock outcrops are prevalent along the center of the peninsula.

Existing vegetation on the site is composed on native/introduced forbs and grasses, shrubs and trees.

Depending upon location with the project area, storm water runoff flows north, east and west towards Canyon lake. Runoff is conveyed as overland flow. This site is located within Comal County and is located within the 100 year flood plain.

Impervious Cover Impact

The Crane's Mill Park Modernization Project will be constructed in a block of Corps of engineers property of approximately 142 acres. Existing site impervious coverage is approximately 6.7 acres. The proposed construction will add approximately 2.8 acres of impervious cover (IC). Overall site IC will increase from 6.7 acres (4.7% of total area) to 9.5 acres (6.7% of total area), for an increase of approximately 2.0%

Attachment F

Suitability Letter from Authorized Agent

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

Comal County

OFFICE OF COMAL COUNTY ENGINEER

PERMIT OF AUTHORIZATION TO CONSTRUCT AN ON-SITE SEWAGE FACILITY
PERMIT VALID FOR ONE YEAR FROM DATE ISSUED

Permit Number: 92943

Issued this date: January 26, 2011

This Permit is hereby given to: US Army Corp of Engineers

To start construction of a private, on-site sewage facility located at:

17600 Cranes Mill Road - 142 acres, Canyon Lake, TX 78133
Cranes Mill Park Subdivision

APPROVED MIMNIMUM SIZES AS PER ATTACHED DESIGN

Type of System: Septic Tank Treatment with Std Trenches/Beds Discharge

This permit gives permission for the construction of the above referenced on-site facility to commence. Installation must be completed by an installer holding a valid registration card from the Texas Natural Resource Conservation Commission (TNRCC). Installation and inspection must comply with current TNRCC and Comal County requirements.

Call (830) 608-2090 to schedule inspections.

* * * COMAL COUNTY OFFICE OF ENVIRONMENTAL HEALTH * * *

APPLICATION FOR PERMIT FOR AUTHORIZATION TO CONSTRUCT AN ON-SITE SEWAGE FACILITY AND LICENSE TO OPERATE

DATE:_____ PERMIT#:_____

OWNER NAME: U.S. Army Corp. of Engineers Ft. Worth District AGENT NAME: _____

MAILING ADDRESS: 3110 FM 2271 MAILING ADDRESS: _____

CITY, STATE, ZIP: Belton Tx 76513 CITY, STATE, ZIP: _____

PHONE #: 254 939 1829 PHONE #: _____

ALL CORRESPONDENCE SHOULD BE SENT TO: OWNER: _____ AGENT:_____ BOTH:_____

LEGAL DESCRIPTION OF PROPERTY:

SUBDIVISION NAME: Canyon Lake, Crane's Mill Park

UNIT: _____ LOT: _____ BLOCK: _____ ACREAGE/LEGAL: 1.42 ac

STREET NAME/ADDRESS: 17600 Cranes Mill Rd CITY: Canyon Lake ZIP: 78133

IS PROPERTY LOCATED OVER THE EDWARDS RECHARGE ZONE? YES ____ NO ✓ IF YES, THE PLANNING MATERIALS MUST BE COMPLETED BY A REGISTERED SANITARIAN (R.S.) OR PROFESSIONAL ENGINEER (P.E).

IS THERE AN EXISTING TCEQ APPROVED WPAP FOR THE PROPERTY? YES____ NO_____IF YES, THE R.S. OR P.E. SHALL CERTIFY THAT THE OSSF DESIGN COMPLIES WITH ALL PROVISIONS OF THE EXISTING WPAP.

IF THERE IS NO EXISTING WPAP, DOES THE PROPOSED DEVELOPMENT ACTIVITY REQUIRE A TCEQ APPROVED WPAP? YES____NO ____ IF YES, THE R.S. OR P.E. SHALL CERTIFY THAT THE OSSF DESIGN WILL COMPLY WITH ALL PROVISIONS OF THE PROPOSED WPAP. A PERMIT TO CONSTRUCT WILL NOT BE ISSUED FOR THE PROPOSED OSSF UNTIL THE PROPOSED WPAP HAS BEEN APPROVED BY THE APPROPRIATE REGIONAL OFFICE.

****

E OF DEVELOPMENT: - CHECK ONE

_____SINGLE FAMILY RESIDENTIAL - TYPE OF CONSTRUCTION _____ (HOUSE/MOBILE, RV, ETC)

_____ # OF BEDROOMS _____TOTAL SQR. FT. OF LIVING AREA _____GALLONS PER DAY

✓ COMMERCIAL TYPE OF BUSINESS/INSTITUTION: Camp Ground Restroom
71 RV Campsites
150 day visitor NUMBER OF OCCUPANTS 4056 GALLONS PER DAY
4 employees

SITES GENERATING MORE THAN 5000 GALLONS PER DAY ARE REQUIRED TO OBTAIN PERMITTING THROUGH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY.

SOURCE OF WATER: PUBLIC ✓ PRIVATE WELL_____

****

PLANNING MATERIALS & SITE EVALUATION AS REQUIRED COMPLETED BY: _____

SYSTEM DESCRIPTION: Conventional tanks + field w/ lift stations

SIZE OF SEPTIC SYSTEM REQUIRED BASED ON PLANNING MATERIALS & SITE EVALUATION:

TANK SIZE(S) 1500, 2000, 3000 GALLONS ABSORPTION/APPLICATION AREA 23,520 SQR. FT.

ARE WATER SAVING DEVICES BEING UTILIZED WITHIN THE RESIDENCE? ✓ YES _____NO

****

I CERTIFY THAT THE COMPLETED APPLICATION AND ALL ADDITIONAL INFORMATION SUBMITTED DOES NOT CONTAIN ANY FALSE INFORMATION AND DOES NOT CONCEAL ANY MATERIAL FACTS. AUTHORIZATION IS HEREBY GIVEN TO THE PERMITTING AUTHORITY AN IGNATED AGENTS TO ENTER UPON THE ABOVE DESCRIBED PROPERTY FOR THE PURPOSE OF SITE/SOIL EVALUATION AND INSPECTIC RIVATE SEWAGE FACILITIES. I ALSO UNDERSTAND THAT A PERMIT OF AUTHORIZATION TO CONSTRUCT WILL NOT BE ISSUED UNTIL THE FLOOD PLAIN ADMINISTRATOR HAS APPROVED AND RELEASED THE DEVELOPMENT PERMIT FOR THIS PROPERTY.

_____
SIGNATURE OF OWNER

195 DAVID JONAS DRIVE, NEW BRAUNFELS, TEXAS 78132-3760 * (830) 608-2094 FAX (830) 608-2078

COMAL COUNTY FLOODPLAIN
DEVELOPMENT PERMIT APPLICATION

Date: _____ **Permit #:** _____

OWNER'S INFORMATION

Name:	Address:	Phone #:
U.S. Army Corp of Engineers - Ft. Worth District	3110 FM 2271 Belton TX 76513	254 939 - 1829

BUILDER'S INFORMATION

Name:	Address:	Phone #:

PROJECT LOCATION

Legal Description: 142 ac

Address: 17600 Cranes Mill Rd Canyon Lake **Ferguson Map Page:** 520 **Section:** F8

PROJECT DESCRIPTION

Description of Work: (i.e., new home, commercial, manufactured home, septic replacement, fill, excavation, etc.):

Estimated Cost of Construction: $ _____

PLEASE PROVIDE THE FOLLOWING DOCUMENTS TO IDENTIFY THE PROPERTY AND STRUCTURES:
Recorded Document showing ownership of property; sketch or drawing of property lines that is to scale showing where structures will be within the property lines. If proposed development is in a designated SFHA additional information will be requested.

READ THE FOLLOWING ACKNOWLEDGMENT AND CERTIFICATION BEFORE SIGNING THIS APPLICATION

By signing this application, I acknowledge the following: The flood insurance rate maps and other data used by Comal County in evaluating flood hazards for the proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best scientific and engineering data available. Greater floods can and do occur, and flood heights may be increased by man-made or natural causes. The issuance of an exemption certificate does not imply that development outside the identified areas of special flood hazards will be free from flooding or flood damage. Issuance of an exemption certificate or permit shall not create liability on the part of Comal County in the event flooding or flood damage does occur.

By signing this application, I certify that I have obtained all other necessary permits from those Federal, State, or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

_____ _____

Property Owner's Signature **Date**

COUNTY OF COMAL COUNTY ENGINEER'S OFFICE

Staff will complete shaded items

Date Received *Initials*

Permit Number

OSSF/FLOODPLAIN DEVELOPMENT APPLICATION CHECKLIST

Instructions:

Place a check mark next to all items that apply. For items that do not apply, place "N/A". This OSSF/Floodplain Development Application Checklist **must** accompany completed application.

OSSF Permit

✓ Completed Application for Permit for Authorization to Construct an On-Site Sewage Facility and License to Operate

✓ Site/Soil Evaluation Completed by a Certified Site Evaluator or a Professional Engineer original

___ Planning Materials of the OSSF as Required by the TCEQ Rules for OSSF Chapter 285. Planning Materials shall consist of a scaled design and all system specifications.

___ Required Permit Fee

N/A Surface Application/Aerobic Treatment System

N/A Recorded Certification of OSSF Requiring Maintenance/Affidavit to the Public

N/A Signed Maintenance Contract with Effective Date as Issuance of License to Operate

Floodplain Development Permit

___ Property in Incorporated City

___ Completed Application

___ Boundary Map Indicating Location of Proposed Improvements

___ Copy of Recorded Deed

___ Required Permit Fee

I affirm that I have provided all information required for my OSSF/Floodplain Development Application and that this application constitutes a completed OSSF/Floodplain Development Application.

_____ _____

Signature of Applicant Date

___ COMPLETE APPLICATION

Check No. _____ Receipt No. _____

___ INCOMPLETE APPLICATION

(Missing Items Circled, Application Refused)

SOUTH TEXAS WASTEWATER TREATMENT

Authorized JET Distributor - Home and Commercial - Engineering Services
P O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-800-86-WASTE, www.stwastewater.com

2 November 2010

Brenda Ritzen, EH Coordinator
Office of Comal County Engineer
195 David Jonas Drive
New Braunfels, Texas 78132
830-608-2090

STATE OF TEXAS
OSCAR D. GRAHAM, P.E.
61171
REGISTERED
PROFESSIONAL ENGINEER
2 Nov 10

WASTEWATER TREATMENT SYSTEM DESIGN
CONVENTIONAL FIELD SYSTEM

US Army Corp. Of Engineers
c/o Matkin-Hoover Engineering and Surveying
Attn: Garrett Keller, EIT
8 Spencer Road, Suite 100
Boerne , Texas 78006
830-249-0600, Fax 830-249-0099

Permit No. 90202
SITE: Crane's Mill Park
17600 Crane's Mill Road
Canyon Lake, Texas
Comal County, Texas

Re.: Deficiency Letter Dated 1 November 2010

1. The decision to split the water usage by 35 percent collected in holding tank on camper to 65 percent allotted to the shower and restroom facility was simply an engineering estimate. It is expected that less usage of the camper facilities vs local restroom/shower facility is based on two facts. Without being connected to a sewer hook-up camper facilities are limited to the relative small capacity of camper holding tank. Also camper facility usage of water is most usually very conservative. I know of no source for this justification – only many years of engineering experience in making judgement calls. I stand by the estimates made.

2. The information gleaned from the permitting process taken from on-line data base indicate the following:
   Site evaluation determined that soil was Class III – Ra = 0.2
   Five beds were constructed each with an excavation size of 5300 sq ft each.
   This information is found summarized in the specifications of design.
   This field is more than adequate for design flow.

3. Tank size of 1250 gallons can accommodate a flow of up to 499 gpd
   Task size of 2000 gallons can handle a Q = 800 gpd (ref. § 285 table II)

4. Water and sewer pipe crossings are identified on the drawings indicating that the water or sewer pipe is to be sleeved in a pressure pipe.

5. Drawing of site shows the 100 year flood plain (948 elevation contour) just below the septic

fields. Except for the fields with associated tanks the entire facilities of this design are in the 100 year flood zone.

6. Corps approval is in process.

7. The gpd indicated in this design includes only those facilities specified in this design.

8. The pump tank buoyancy calculations are not for empty tanks. These calculations are for the highest buoyancy expected when pumps have emptied the tanks limited by cutoff float switch or pump intake level. We expect these tanks to have some water remaining at the lowest level.

9. Tank sizes and tank drawings and tank configurations are as identified in the specifications. Tank size and configurations are listed at the top of page 3 of design specs. The same a) through g) configurations are noted on the site drawings. These configurations and how they connect to sewer mains/forced mains are also depicted in additional insert drawings. See list of attachments; new versus existing are clearly identified. Existing attachments were excerpted from the approved design found on the internet.

If you have further need for clarification of our design please call.

RECEIVED
FEB 24 2011
COUNTY ENGINEER

STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED
ENGINEER

2 Nov 2010

South Texas Wastewater Treatment
Oscar D. Graham, PhD., Registered Professional Engineer
Registration Number 61171, State of Texas
PO Box 1284, Boerne, Texas

Oscar D Graham, PhD., PE

2 Nov 2010
Date

MATKIN-HOOVER ENGINEERING & SURVEYING

Transmittal

Date: 11/11/2010

Company:

Attention: COMAL COUNTY

Address:

Re: CRANES MILL PARK OSSF

☐ For Approval ☐ For Review ☐ Please Comment ☐ Please Reply ☐ For Your Information

ITEMS ATTACHED

Qty:	Description:
1	OSSF REPORT
1	11X17 PLANS
1	DEFICIENCY LETTER
1	DEFICIENCY RESPONSE LETTER

• Comments: PLEASE SEE RESUBMITTAL WITH ATTACHED RESPONSE LETTER.

Sent by: JOSH VALENTA

Job No. 2415.00

TBPE Firm Registration #F-4512

8 Spencer Road Suite 100 Post Office Box 54 Boerne, Texas 78006 Phone 830.249.0600 Fax 830.249.0099

SOUTH TEXAS WASTEWATER TREATMENT

Authorized JET Distributor - Home and Commercial - Engineering Services
P O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-800-86-WASTE; www.stwastewater.com

2 November 2010

Brenda Ritzen, EH Coordinator
Office of Comal County Engineer
195 David Jonas Drive
New Braunfels, Texas 78132
830-608-2090

WASTEWATER TREATMENT SYSTEM DESIGN
CONVENTIONAL FIELD SYSTEM

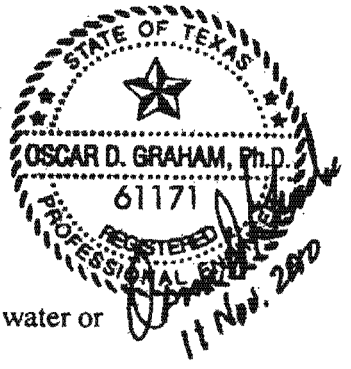
US Army Corp. Of Engineers
c/o Matkin-Hoover Engineering and Surveying
Attn: Garrett Keller, EIT
8 Spencer Road, Suite 100
Boerne , Texas 78006
830-249-0600, Fax 830-249-0099

Permit No. 92943
SITE: Crane's Mill Park
17600 Crane's Mill Road
Canyon Lake, Texas
Comal County, Texas

Re.: Deficiency Letter Dated 1 November 2010

1. The decision to split the water usage by 35 percent collected in holding tank on camper to 65 percent allotted to the shower and restroom facility was simply an engineering estimate. It is expected that less usage of the camper facilities vs local restroom/shower facility is based on two facts. Without being connected to a sewer hook-up camper facilities are limited to the relative small capacity of camper holding tank. Also camper facility usage of water is most usually very conservative. I know of no source for this justification – only many years of engineering experience in making judgement calls. I stand by the estimates made.

2. The information gleaned from the permitting process taken from on-line data base indicate the following:
   Site evaluation determined that soil was Class III – Ra = 0.2
   Five beds were constructed each with an excavation size of 5300 sq ft each.
   This information is found summarized in the specifications of design.
   This field is more than adequate for design flow.



3. Tank size of 1250 gallons can accommodate a flow of up to 499 gpd
   Task size of 2000 gallons can handle a Q = 800 gpd (ref. § 285 table II)

4. Water and sewer pipe crossings are identified on the drawings indicating that the water or sewer pipe is to be sleeved in a pressure pipe.

5. Drawing of site shows the 100 year flood plain (948 elevation contour) just below the septic

fields. Except for the fields with associated tanks the entire facilities of this design are in the 100 year flood zone.

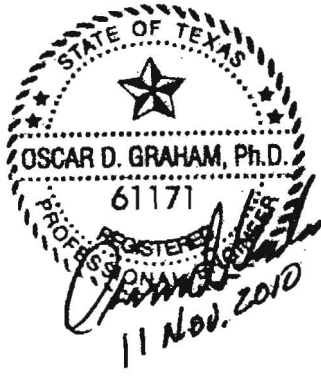
6. Letter is forth coming pending negotiation between Co mal County and Corp. Of Engineers

7. The gpd indicated in this design includes only those facilities specified in this design.

8. The pump tank buoyancy calculations are not for empty tanks. These calculations are for the highest buoyancy expected when pumps have emptied the tanks limited by cutoff float switch or pump intake level. We expect these tanks to have some water remaining at the lowest level.

9. Tank sizes and tank drawings and tank configurations are as identified in the specifications. Tank size and configurations are listed at the top of page 3 of design specs. The same a) through g) configurations are noted on the site drawings. These configurations and how they connect to sewer mains/forced mains are also depicted in additional insert drawings. See list of attachments: new versus existing are clearly identified. Existing attachments were excerpted from the approved design found on the internet.

If you have further need for clarification of our design please call.



South Texas Wastewater Treatment
Oscar D. Graham, PhD., Registered Professional Engineer
Registration Number 61171, State of Texas
PO Box 1284, Boerne, Texas

Oscar D. Graham

Oscar D Graham, PhD., PE

11 Nov 2010

Date

Comal County

OFFICE OF COMAL COUNTY ENGINEER

November 1, 2010

U.S. Army Corps of Engineers
Ft. Worth District
3110 FM 2271
Belton, Texas 76513

Re: 142 acres; Cranes Mill Park, Canyon Lake, Texas, Permit 92943
Application for Permit of Authorization to Construct an On-Site Sewage Facility (OSSF) and License to Operate

Dear property owner,

We received planning materials for the referenced permit application on October 21, 2010, and found those planning materials to be deficient. In order to continue processing this permit, we need the following information:

1. Indicate how percentages for the Dump Station/RV Camp were determined.
2. The existing system was permitted for 4700 gpd/ 23,520 sq. ft. disposal area.
3. Check tank sizing for the Dump Station and the restroom for the RV Camp.
4. Identify water and sewer line crossings pertaining to this permit.
5. Show flood plain location on the design.
6. Corps approval needed for all of the components located below the 948 line.
7. Does the gpd indicated on your planning materials include the gpd for the entire 142 acre site?
8. Clarify that the pump tank buoyancy calculations are for the tank when empty.
9. Match new construction and system components with the design specs and the existing system. Tank sizes are blank and restrooms are not identified on design. Design does not show how everything ties into existing system.

We realize this permit is important to you; to help speed up the process the above information may be faxed. Thank you for your patience and assistance.

Sincerely,

Brenda Raizen, OS7722
Environmental Health Coordinator

Cc: Oscar D. Graham, P.E.

COMAL COUNTY FLOODPLAIN
DEVELOPMENT PERMIT APPLICATION

Date: 9/7/2010 Permit #: _____

OWNER'S INFORMATION

Name:	Address:	Phone #:
U.S. ARMY CORPS OF ENGINEERS	2110 FM 2271 BELTON, TX 76513	254-939-1829

BUILDER'S INFORMATION

Name:	Address:	Phone #:
JSR INCORPORATED	P.O. BOX 870 SHERTZ, TX 78154	210-653-7772

PROJECT LOCATION

Legal Description: CANYON LAKE; CRANES MILL PARK

Address: 17606 CRANES MILL ROAD CANYON LAKE, TEXAS 78133

Ferguson Map Page: _____ Section: _____

PROJECT DESCRIPTION

Description of Work: (i.e., new home, commercial, manufactured home, septic replacement, fill, excavation, etc.):

EXCAVATION & FILL ASSOCIATED WITH NEW ROADS, UTILITIES, BUILDINGS

Estimated Cost of Construction: $ 1,000,000

PLEASE PROVIDE THE FOLLOWING DOCUMENTS TO IDENTIFY THE PROPERTY AND STRUCTURES:
Recorded Document showing ownership of property; sketch or drawing of property lines that is to scale showing where structures will be within the property lines. If proposed development is in a designated SFHA additional information will be requested.

READ THE FOLLOWING ACKNOWLEDGMENT AND CERTIFICATION BEFORE SIGNING THIS APPLICATION

By signing this application, I acknowledge the following: The flood insurance rate maps and other data used by Comal County in evaluating flood hazards for the proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best scientific and engineering data available. Greater floods can and do occur, and flood heights may be increased by man-made or natural causes. The issuance of an exemption certificate does not imply that development outside the identified areas of special flood hazards will be free from flooding or flood damage. Issuance of an exemption certificate or permit shall not create liability on the part of Comal County in the event flooding or flood damage does occur.

By signing this application, I certify that I have obtained all other necessary permits from those Federal, State, or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

Marcel Schimank
Property Owner's Signature

10/19/10
Date

COUNTY OF COMAL COUNTY ENGINEER'S OFFICE

Staff will complete shaded items

Date Received *Initials*

Permit Number

OSSF/FLOODPLAIN DEVELOPMENT APPLICATION CHECKLIST

Instructions:

Place a check mark next to all items that apply. For items that do not apply, place "N/A". This OSSF/Floodplain Development Application Checklist **must** accompany completed application.

OSSF Permit

✓ Completed Application for Permit for Authorization to Construct an On-Site Sewage Facility and License to Operate

✓ Site/Soil Evaluation Completed by a Certified Site Evaluator or a Professional Engineer original

___ Planning Materials of the OSSF as Required by the TCEQ Rules for OSSF Chapter 285. Planning Materials shall consist of a scaled design and all system specifications.

___ Required Permit Fee

N/A Surface Application/Aerobic Treatment System

N/A Recorded Certification of OSSF Requiring Maintenance/Affidavit to the Public

N/A Signed Maintenance Contract with Effective Date as Issuance of License to Operate

Floodplain Development Permit

___ Property in Incorporated City

___ Completed Application

___ Boundary Map Indicating Location of Proposed Improvements

___ Copy of Recorded Deed

___ Required Permit Fee

I affirm that I have provided all information required for my OSSF/Floodplain Development Application and that this application constitutes a completed OSSF/Floodplain Development Application.

Russell Schniewind
Signature of Applicant

10/19/10
Date

___ COMPLETE APPLICATION

Check No. _____ Receipt No. _____

___ INCOMPLETE APPLICATION

(Missing Items Circled, Application Refused)

*** COMAL COUNTY OFFICE OF ENVIRONMENTAL HEALTH ***

APPLICATION FOR PERMIT FOR AUTHORIZATION TO CONSTRUCT AN ON-SITE SEWAGE FACILITY AND LICENSE TO OPERATE

DATE:_____ PERMIT#:_____

OWNER NAME: U.S. Army Corp. of Engineers Ft. Worth District AGENT NAME: _____

MAILING ADDRESS: 3110 FM 2271 MAILING ADDRESS: _____

CITY, STATE, ZIP: Belton Tx 76513 CITY, STATE, ZIP: _____

PHONE #: 254 939 1829 PHONE #: _____

ALL CORRESPONDENCE SHOULD BE SENT TO: OWNER: _____ AGENT: _____ BOTH: _____

LEGAL DESCRIPTION OF PROPERTY:

SUBDIVISION NAME: Canyon Lake, Crane's Mill Park

UNIT: _____ LOT: _____ BLOCK: _____ ACREAGE/LEGAL: 14.2 ac

STREET NAME/ADDRESS: 17688 Cranes Mill Rd CITY: Canyon Lake ZIP: 78133

IS PROPERTY LOCATED OVER THE EDWARDS RECHARGE ZONE? YES _____ NO ✓ IF YES, THE PLANNING MATERIALS MUST BE COMPLETED BY A REGISTERED SANITARIAN (R.S.) OR PROFESSIONAL ENGINEER (P.E).

IS THERE AN EXISTING TCEQ APPROVED WPAP FOR THE PROPERTY? YES_____ NO_____IF YES, THE R.S. OR P.E. SHALL CERTIFY THAT THE OSSF DESIGN COMPLIES WITH ALL PROVISIONS OF THE EXISTING WPAP.

IF THERE IS NO EXISTING WPAP, DOES THE PROPOSED DEVELOPMENT ACTIVITY REQUIRE A TCEQ APPROVED WPAP? YES_____NO _____ IF YES, THE R.S. OR P.E. SHALL CERTIFY THAT THE OSSF DESIGN WILL COMPLY WITH ALL PROVISIONS OF THE PROPOSED WPAP. A PERMIT TO CONSTRUCT WILL NOT BE ISSUED FOR THE PROPOSED OSSF UNTIL THE PROPOSED WPAP HAS BEEN APPROVED BY THE APPROPRIATE REGIONAL OFFICE.

TYPE OF DEVELOPMENT: - CHECK ONE

_____SINGLE FAMILY RESIDENTIAL - TYPE OF CONSTRUCTION _____ (HOUSE/MOBILE, RV, ETC)

_____ # OF BEDROOMS _____TOTAL SQR. FT. OF LIVING AREA _____GALLONS PER DAY

✓ COMMERCIAL TYPE OF BUSINESS/INSTITUTION: Camp Ground Restroom
65 RV Camp sites
~~150 day visitors~~ NUMBER OF OCCUPANTS 4056 GALLONS PER DAY
4 employees

SITES GENERATING MORE THAN 5000 GALLONS PER DAY ARE REQUIRED TO OBTAIN PERMITTING THROUGH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY.

SOURCE OF WATER: PUBLIC ✓ PRIVATE WELL_____

PLANNING MATERIALS & SITE EVALUATION AS REQUIRED COMPLETED BY: _____

SYSTEM DESCRIPTION: Conventional tanks + field w/ lift stations

SIZE OF SEPTIC SYSTEM REQUIRED BASED ON PLANNING MATERIALS & SITE EVALUATION:

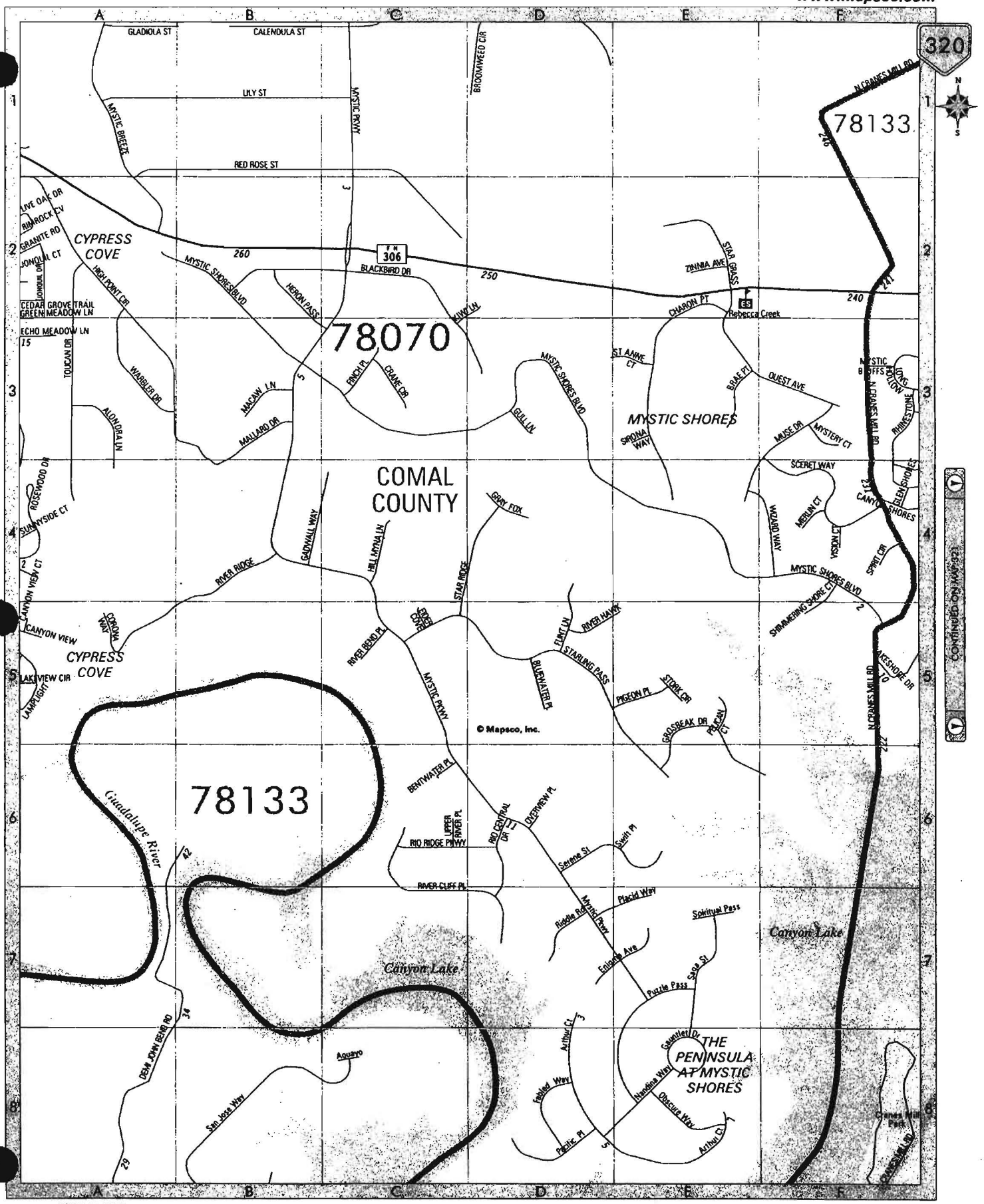
TANK SIZE(S) 1500, 2000, 3000 GALLONS ABSORPTION/APPLICATION AREA 23,520 SQR. FT.

ARE WATER SAVING DEVICES BEING UTILIZED WITHIN THE RESIDENCE? ✓ YES _____ NO

I CERTIFY THAT THE COMPLETED APPLICATION AND ALL ADDITIONAL INFORMATION SUBMITTED DOES NOT CONTAIN ANY FALSE INFORMATION AND DOES NOT CONCEAL ANY MATERIAL FACTS. AUTHORIZATION IS HEREBY GIVEN TO THE PERMITTING AUTHORITY AND DESIGNATED AGENTS TO ENTER UPON THE ABOVE DESCRIBED PROPERTY FOR THE PURPOSE OF SITE/SOIL EVALUATION AND INSPECTION OF PRIVATE SEWAGE FACILITIES. I ALSO UNDERSTAND THAT A PERMIT OF AUTHORIZATION TO CONSTRUCT WILL NOT BE ISSUED UNTIL THE FLOOD PLAIN ADMINISTRATOR HAS APPROVED AND RELEASED THE DEVELOPMENT PERMIT FOR THIS PROPERTY.

Marcel Schumann
SIGNATURE OF OWNER

195 DAVID JONAS DRIVE, NEW BRAUNFELS, TEXAS 78132-3760 * (830) 608-2094 FAX (830) 608-2078



90202

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
601 COE ROAD
CANYON LAKE, TEXAS 78133-4149

RECEIVED
FEB 04 2008
COUNTY ENGINEER

Feb 1, 2008

Comal County Environmental Health Dept
c/o Sandra Hernandez
195 David Jonas Dr.
New Braunfels Texas 78132

Ms. Hernandez,

This letter is being written as a part of the septic system installation process agreed upon by our agencies for facilities built below the elevation 948'. This letter will be addressing the facilities currently being requested in Cranes Mill Park which is operated by the US Army Corps of Engineers at the Canyon Lake Office.

When we have supplied approval for septic irrigation lines and other authorized septic structures before it has been for county citizens on lands they owned but on which the government held flowage easement rights. Approvals for structures on Federal flowage easement lands must come from our Real Estate Office in the Ft. Worth District. Conversely, the structures we are requesting to build in Cranes Mill Park will be on lands owned in fee title by the US government. As Lake Manager, I have authority to construct facilities on property owned by the US government and managed by this office as long as appropriate Federal, State and County permits have been acquired and funding for such structures have been approved.

The approved Master Plan for Canyon Lake and the current Operational Management Plan for Canyon Lake include Cranes Mill Park as one of the eight Federal parks approved for recreational facilities to be built for use by the general public. As such, restroom facilities, roads, picnic and camping facilities, beaches, boat ramps and other water-related recreational facilities have been authorized for construction. Therefore, the structures below elevation 948' msl needed for the restroom building and on-site sewage facility are authorized for construction by the US Army Corps of Engineers, Canyon Lake Office. This includes the restroom building, holding tanks, lift stations, waterlines and sewer lines, and other associated structures detailed in our construction request.

Thank you for working with us on supplying a environmentally safe and aesthetically pleasing restroom facility for the visitors to Canyon Lake. If you have any further questions please contact me at 830-964-3341.

Judith J. Scott
Canyon Lake Manager

SOUTH TEXAS WASTEWATER TREATMENT

Authorized JET Distributor - Home and Commercial - Engineering Services
P O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-800-86-WASTE; www.stwastewater.com

JET HOME WASTEWATER TREATMENT SYSTEM DESIGN
CONVENTIONAL FIELD SYSTEM

US Army Corp. Of Engineers
c/o Matkin-Hoover Engineering and Surveying
Attn: Garrett Keller, EIT
8 Spencer Road, Suite 100
Boerne , Texas 78006
830-249-0600, Fax 830-249-0099

Permit No. 90202
SITE: Crane's Mill Park
17600 Crane's Mill Road
Canyon Lake, Texas
Comal County, Texas

Discussion:

The Corp of Engineers recently completed an OSSF to accommodate the anticipated visitors to the Crane's Mill Park. While the anticipated number of visitors has not changed plans have been presented to upgrade and improve the camping and picnic facilities. An additional shower and restroom facility has been added at one of the camp grounds. Water and electrical hook-ups have been added to 30 of the camp sites with a new RV Dump station to accommodate the Recreation Vehicles (RV) that may take advantage of these sites which will not have direct sewer hook-ups. Three additional full RV campsites including sewer hook-ups have been added to accommodate park rangers/guards servicing this park. A new guard house has been added with restroom facilities to accommodate a two person office.

These plans will include the existing facilities including sizes an performance specifications. The 30 campsites upgraded with RV hook-ups shall have the allocation of the wastewater generated divided between the new shower and restroom facilities and the RV dump station based on 35 percent to dump station and 65 percent to the shower-restroom facility for the purpose of sizing treatment tanks. While tight lines following septic tanks do not have clean-outs and need only to have a negative slope this design shall require a two-way clean-out every 100 feet and a slope of 1/8 inch per foot.

This design includes an attached drawing No. _____ dated: _____

1 Oct 201

Design Specifications:

Estimated average daily wastewater flow: 4,056 gpd (see calculations)
The field size: Existing–five equal beds 5300 sq ft excavation each
Field dosed from 6000 gal eq tank preceded by 3000 gal settling tank
field and tanks located above 948 elevation line (see drawing)
Copies of design criteria found in existing permit design (copies attached for completeness)
Soil Class: Class III, R_a = 0.2 gal/sq ft/day
Designed to handle 4999 gpd according to design permitted
Tank Capacity:
a) new guard house 750 gal, 2-compartment
b) new full hook-up for 2 RV spaces, 750 gal, 2-compartment
c) new dump station, 750 plus 500 single compartment tanks

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d) new restroom/shower facility and lift station, 2 ea 1000 gal. tanks
Plus a 1000 gal. lift-station tank w/duplex pumps
e) new restroom w/o shower and lift station, 3 ea 1000 gal. tanks
Plus a 1000 gal. lift station w/duplex pumps
f) new 1 RV space with sewer hook-up, 750 gal 2-compartment
g) existing restroom facility from design, 3000 gal. plus 1500 gallon tank
Plus a 1250 gal. lift station w/duplex pumps

All new tanks are below the 948 line: each shall be certified **not** to float during flood
(See attached Precast Tank Floatation Calculations)

Risers and Lids: All pre-cast Tanks shall have cast in place 24" Zoeller Risers w/ SS screw down lids. Risers should be adjusted to 1 ½" above final grade.

Lift Stations: d) and e) shall be duplex
Controller: SJE Rhombus 1221W114H10E10F
Pump: Hydromatic SKHD 150 effluent pump
Float Switches: SPI Mod. 15CRDPC (signal – normally open)
Expected Head Loss;
Station d): elev.–30 ft; friction min. 25 gpm [0.96 x 5 = 4.8 ft] 30 ft
Station e): elev. – 30 ft + friction min. 25 gpm[0.96 x 22 = 21.1 ft] 46 ft
(Existing) Station g) elev. – 25 ft + friction min. 25 gpm[0.96 x 33 7 = 32.4] 57.4 ft

Forced Main Connections: Angle shall be 45 degrees or less with flapper check valves in Each branch–all fittings shall be pressure rated SCH 40 or SDR 26–use expandable coupling to splice into existing FM to maintain alignment.

Road Crossing: All sewer lines crossing roads shall be sleeved–2 pipe sizes larger than sewer pipe–sleeve shall be SCH 40 or SDR 35 minimum thickness pipe

Potable Water Line Crossing: water line crossing as prescribed in § 290.44.(e)(4)(B) In general lines must cross perpendicular with both water and wastewater crossing in the center of full joint of pressure rated pipes with wastewater passing below the water pipe, if this is not possible, see reference above for equal protection, a PE shall approve equal protection.

Flood Hazard Requirements: (see § 285.31.(c)(2))
The system shall not increase the height of flood
All components, with the exception of risers, chlorinators, cleanouts, sprinklers, and inspection ports shall be completely buried without adding fill

Offsets: property lines, wells, easements, water lines, structures, swimming pools, ponds, etc shall be strictly adhered to as required by latest Texas Commission on Environmental Quality Regulations.

STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
PROFESSIONAL ENGINEER
10 OCT 2011

Calculations

Water usage, Q:

a)	Guard Gate Building: 2 person office	2 shifts	4 g/p/s	16 gpd
b)	Two RV spaces w/sewer hook-up	2 spaces	40 g/s	80 gpd
c)	RV Dump Station	30 spaces	40 g/s(.35)	420 gpd
d)	RV Camp – hookups w/o sewer showers and restrooms	30 spaces	40 g/s(.65)	780 gpd
e)	Restroom building w/o showers	150 day Visit	8 g/v	1,200 gpd
f)	One RV space w/sewer hook-up	1 space	40 g/s	40 gpd
g)	Camp ground for tent campers	38 spaces	40g/s	1,520 gpd

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existing restroom facility

=======

4,056 gpd

Tank Requirement: see § 285 Table II

a)	Septic tank size:	minimum	750 gal 2-compartment	
b)	Septic tank size	minimum	750 gal 2-compartment	
c)	Septic tank size:	Table 2	1250 gal two compartments	750 + 500
d)	Septic tank size	2.5 Q	1950 gal	2 ea 1000 gal
	Lift station size:		1000 gal w/duplex pumps	
e)	Septic tank size:	2.5 Q	3000 gal	3 ea 1000 gal
	Lift station size		1000 gal w/duplex pumps	
f)	septic tank size	minimum	750 gal 2-compartment	
g)	septic tank size	existing	3800 gal required	3000 + 1500
	existing		1000 gal w/duplex pumps	1250 gal

Existing Disposal Field:

The existing OSSF is new (two years old) and in excellent shape. Due to construction and other activities, very little use has been made of the facilities. The existing field is sized to handle up to 5000 gallons per day. The new facilities being contemplated shall be tied into the existing forced main after being properly treated with new septic tanks. This design will revisit field sizing for completeness.

Field size required: Class III soil, Ra = 0.2

$A = Q \div Ra$

$A = 4056 \div 0.2 = 20{,}280$ sq ft

existing field size: five each excavations of 5300 sq ft each

Existing $A = 5 \times 5300 = 26{,}500$ sq ft

Pipe and fittings

All pipes and fittings in this system shall be 4' schedule 40 PVC. All joints shall be sealed with an approved solvent-type PVC cement. Forced mains are 2" SCH 40 or SDR 26 PVC.

Site Preparation

Little preparation is required. It is important to insure that the system will not be overloaded with excess rainwater and surface runoff. The distribution field must have a final shape that will shed rainwater rather than accumulate it in low areas or depressions. Any surface runoff that runs toward the distribution field must be intercepted and diverted.

Flood Prone Areas

The subject property is in a flood prone area below the 948 ft elevation line on Canyon Lake.

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Boerne, TX 78006

The disposal field is above the 948 ft elevation line.

FIR Map community-panel Number 4854630045C. The actual field is not in the 100 yr. flood plain .

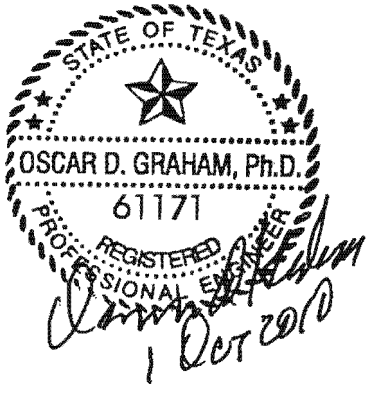
Tank Sizes

See tank sizing under the title: Calculations

This design meets all of the orders of Comal County the latest Texas Commission on Environmental Quality OSSF Regulations and will not cause a nuisance or health hazard. This system was designed using the latest engineering practices.

Inspections

Comal County will be doing at least one inspections:



This system designed by:

South Texas Wastewater Treatment
Oscar D. Graham, PhD., Registered Professional Engineer
Registration Number 61171, State of Texas
PO Box 1284, Boerne, Texas

Oscar D Graham, PhD., PE — Date: 1 Oct 2010

Attachments:

Drawing No. _____ dated _____
OSSF Tank Configuration Detail a)
OSSF Tank Configuration Detail b)
OSSF Tank Configuration Detail c)
OSSF Tank Configuration Detail d) and e)
OSSF Tank Configuration Detail f)
500 gal Pre-Cast Concrete Tank
750 gal Pre-Cast Concrete Tank
750 gal Pre-Cast 2-Compartment Concrete Tank
1000 gal Pre-Cast Concrete Tank
1000 gal Pre-Cast Concrete Pump Tank
Hydormatic Model SKHD 150 effluent pump Spec Sheets
Connections: Two new forced mains to existing forced main
Tank Floatation Calculation work sheet
Zoeller Riser Spec Sheet

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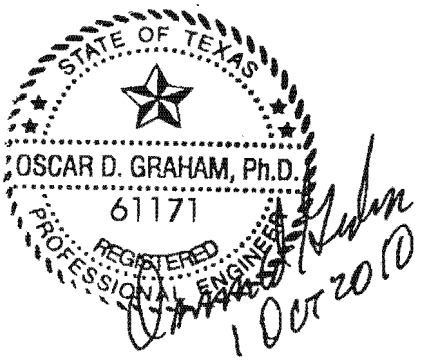
Boerne, TX 78006

Existing Facility/Equipment Specs:

- Site Evaluation Information Sheet
- Specs on existing septic disposal field:
  - Drawing:
  - Calculation sheet:
- Drawing of Drainage Plan
- Field Detail
- Drawing of Field and Forced Main
- Perc Test Holes in relation to 948 line
- Tank Configuration–Septic Tank and Lift Station 3,000 gal and 1,500 gal plus 1250 gal LS
- Tank Configuration–settling tank and Equalization tank: 3,000 gal plus 6,000 gal



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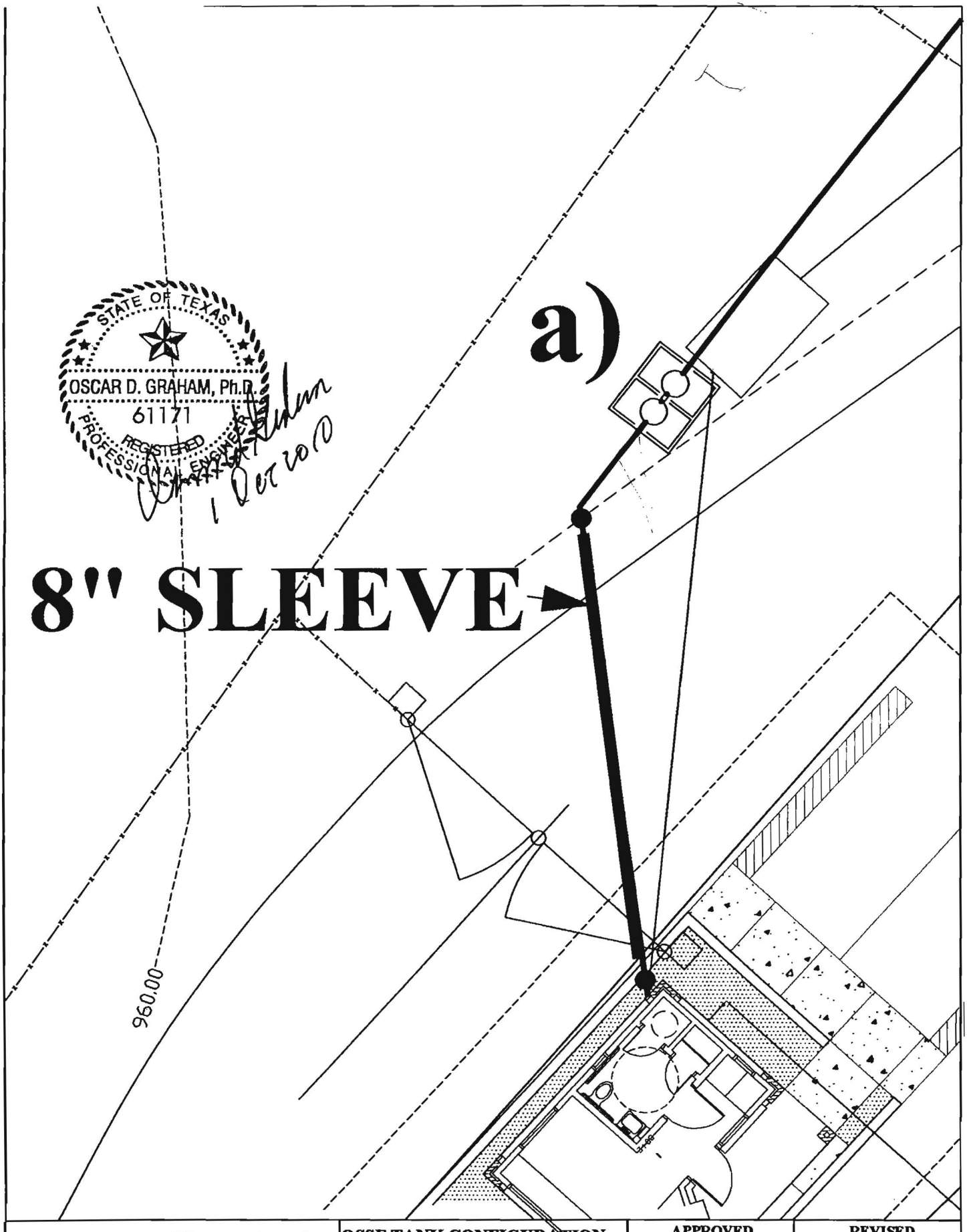
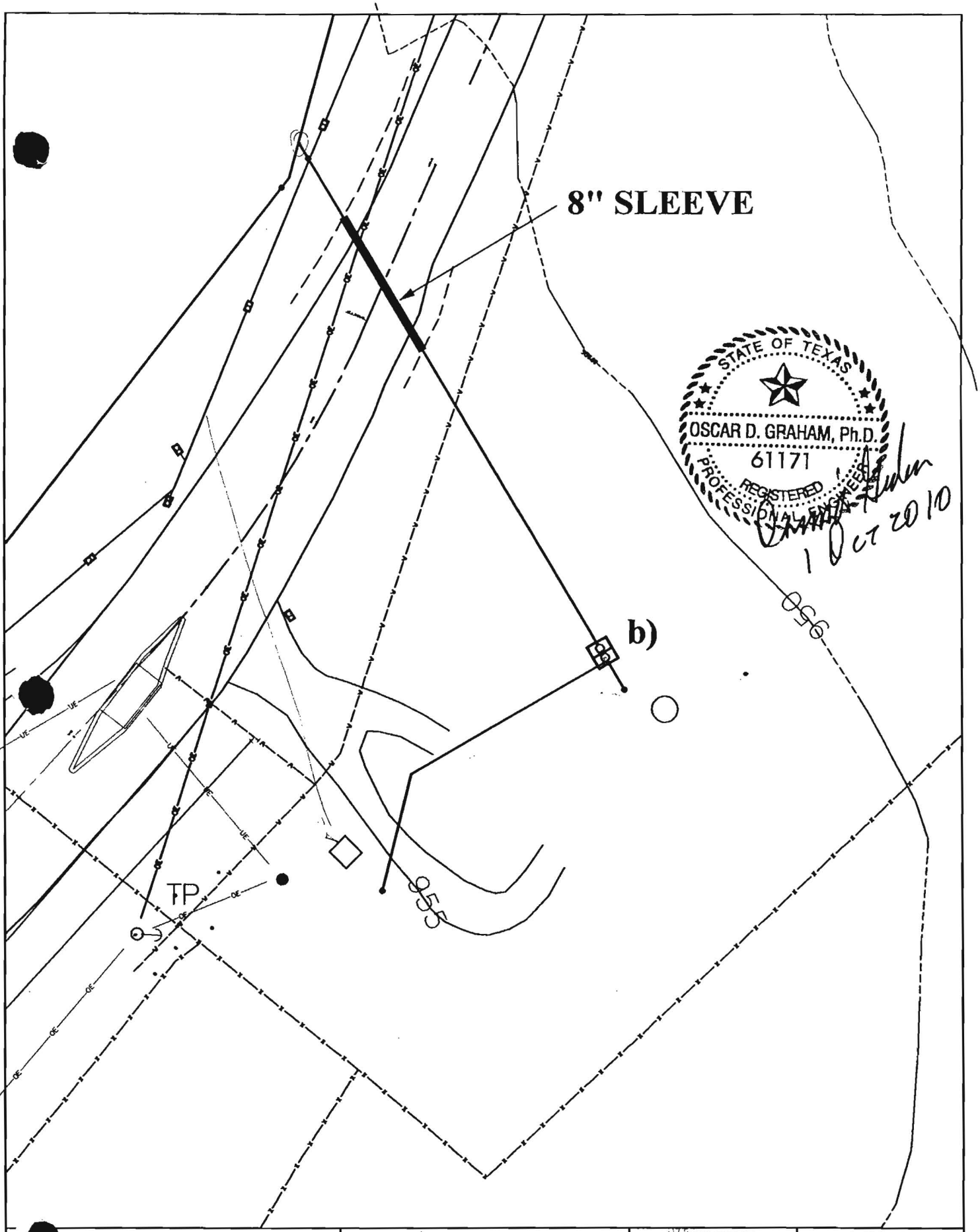
Texas Registered Engineering Firm F-10186
227 Commerce
Boerne, TX 78006



SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION a)	APPROVED	REVISED
			SHEET 1 OF 1

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

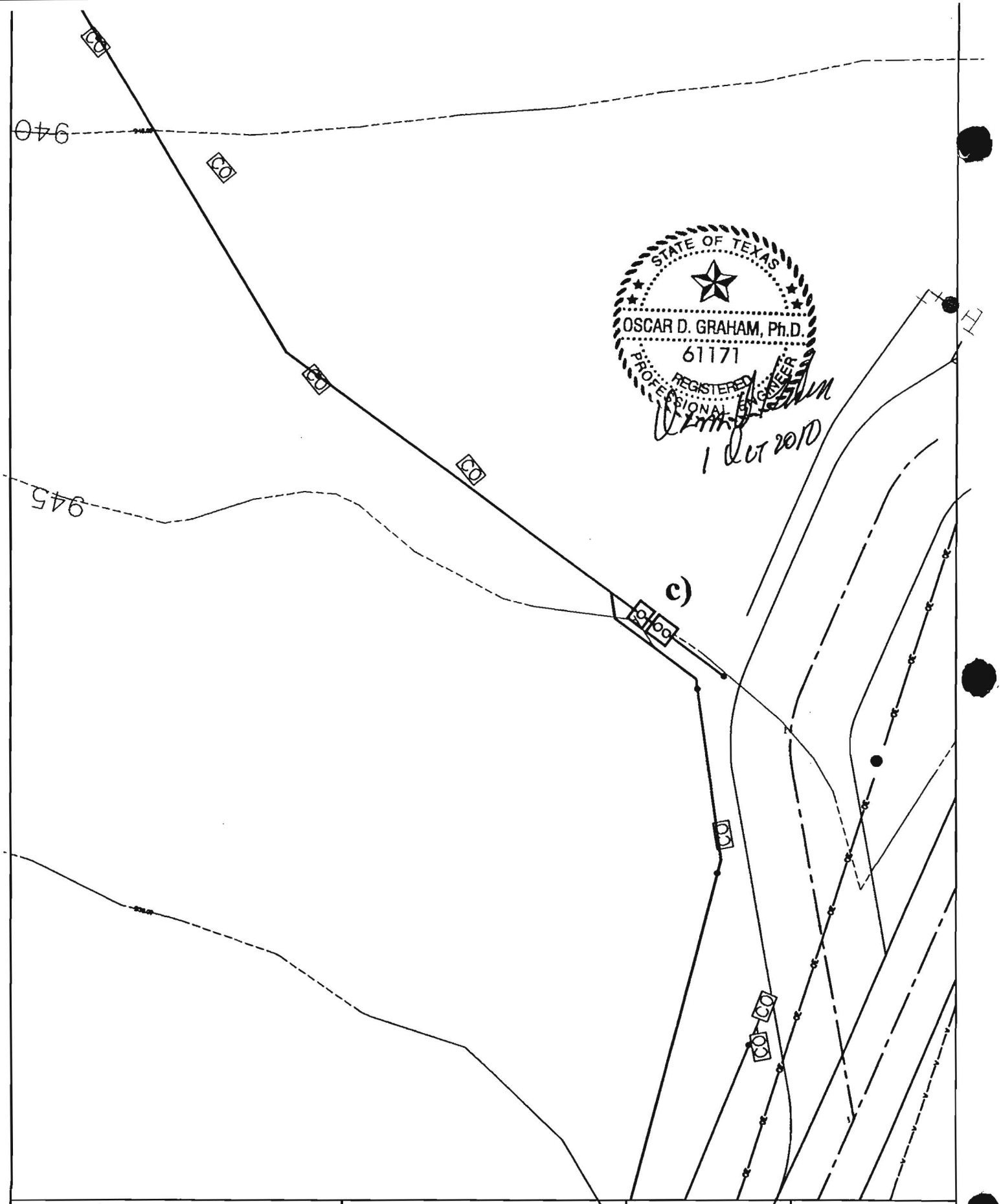


STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED
PROFESSIONAL ENGINEER

10 Oct 2010

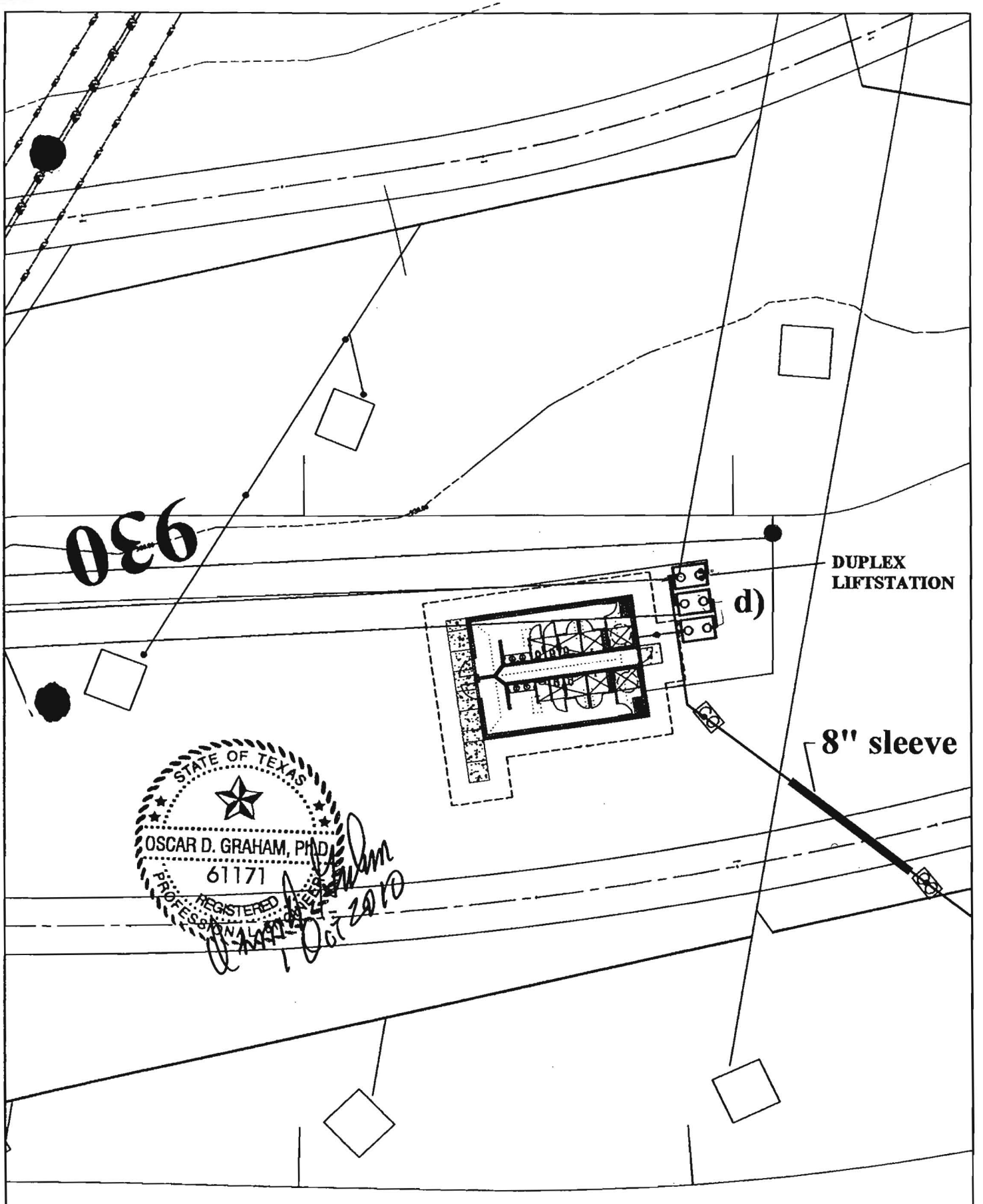
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-969-2783	OSSF TANK CONFIGURATION b)	APPROVED	REVISED
			SHEET ___OF___

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006



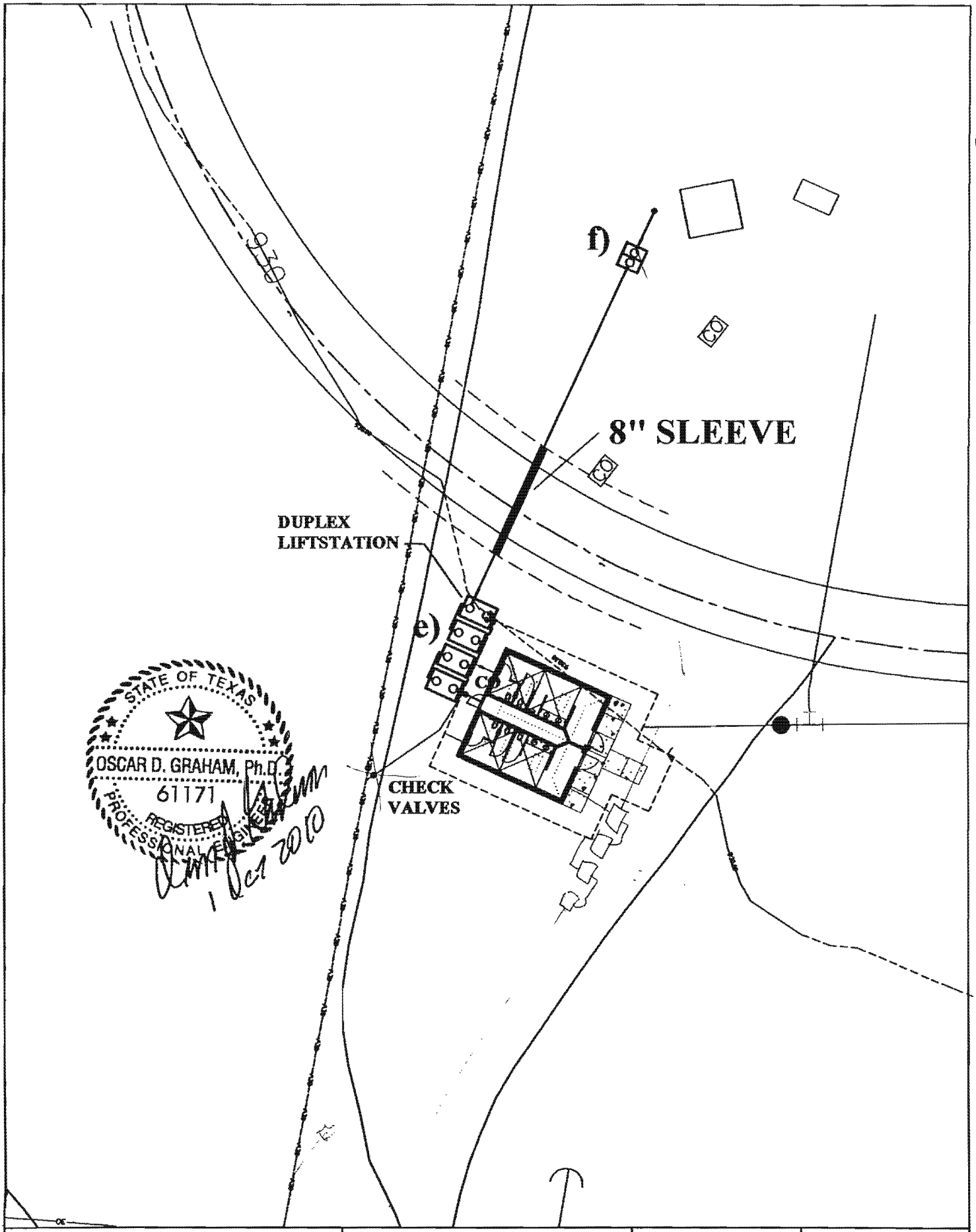
SOUTH TEXAS WASTEWATER TREATMENT **P.O. BOX 1284** **BOERNE, TEXAS 78006** **800-869-2783**	**OSSF TANK CONFIGURATION** **c)**	**APPROVED**	**REVISED**
			SHEET ___ **OF** ___

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006



SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION d)	APPROVED	REVISED
			SHEET ___OF___

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

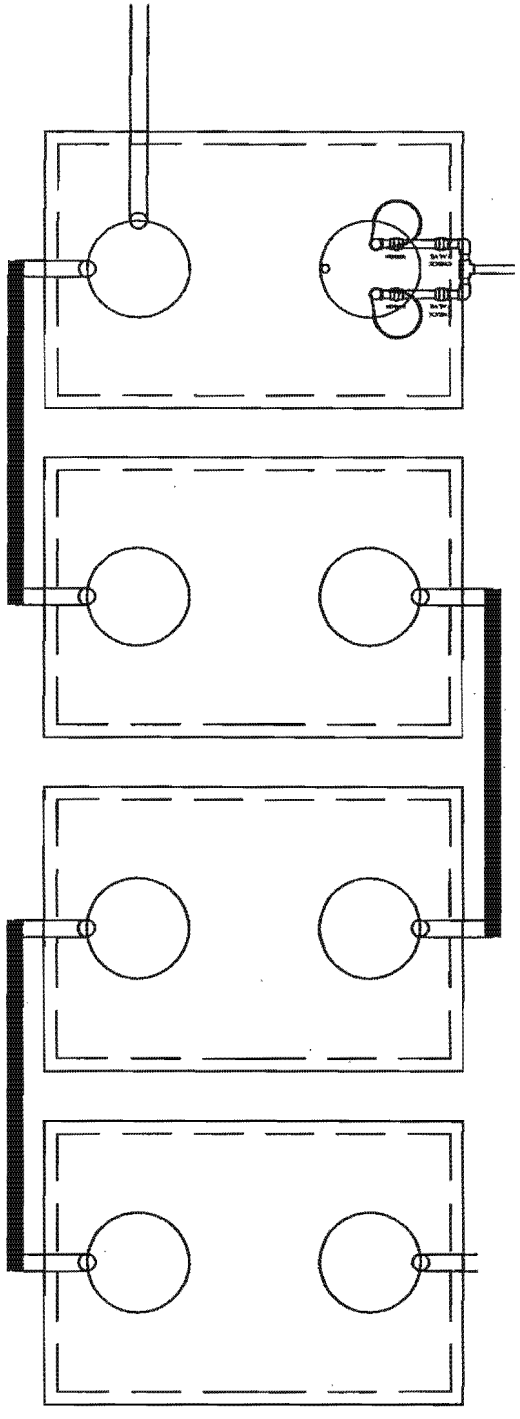


SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 830-428-0724	OSSF TANK CONFIGURATION e) and f)	APPROVED	REVISED

F:\Stwt26\Stw\DES\COMMERCIAL\4715 Cranes Mill\Crnes Mill dra

SHEET ___ OF ___

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10186
227 Commerce
Boerne, TX 78006



STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED PROFESSIONAL ENGINEER

1 Oct 2010

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10168
227 Commerce
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-962-2782	OSSF TANK CONFIGURATION THREE each 1000 gal TANKS plus 1000 gal PUMP TANK	APPROVED	REVISED

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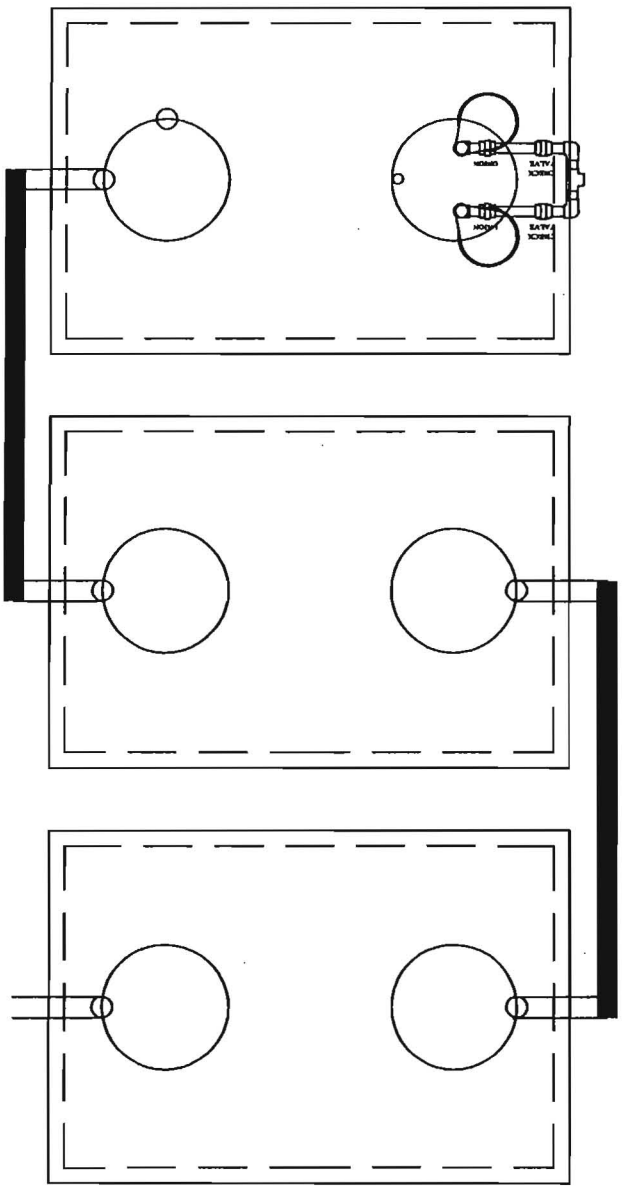


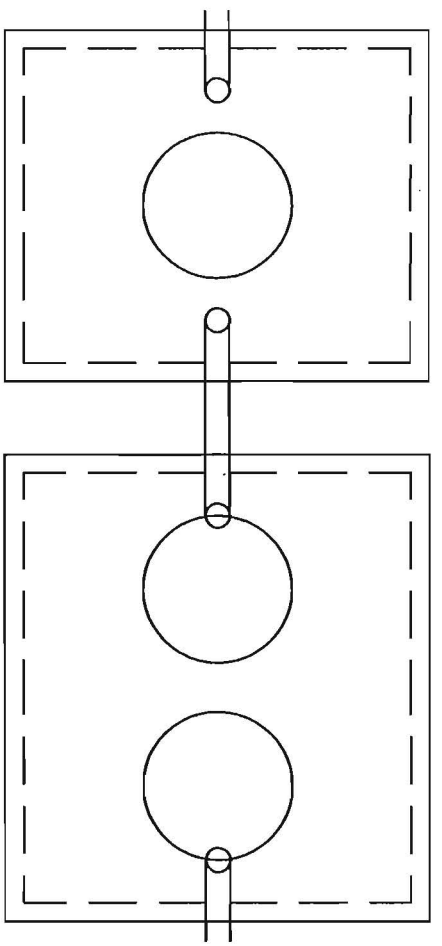
STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED PROFESSIONAL ENGINEER

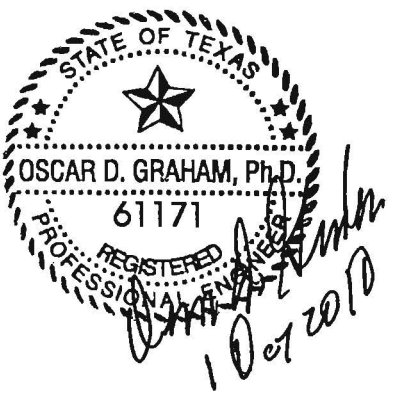
1 Dec 2010

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10186
227 Commerce
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 830-537-2000	OSSF TANK CONFIGURATION TWO each 1000 gal TANKS plus 1000 gal PUMP TANK	APPROVED	REVISED
			SHEET 1 of 1

F:\Stwt26\STW\DES\COMMERCIAL\4715 Cranes Mill\Crnes Mill dra





South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10186
227 Commerce
Bourne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 750 gal PLUS 500 gal TANK CONNECTED IN SERIES	APPROVED	REVISED
			SHEET OF

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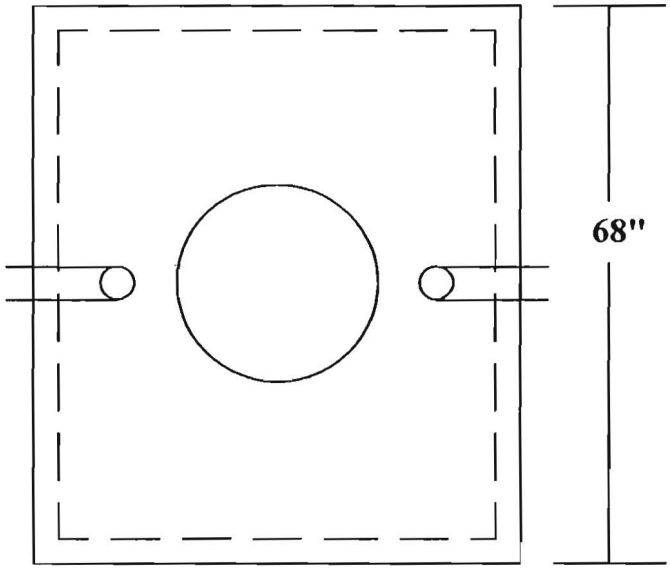
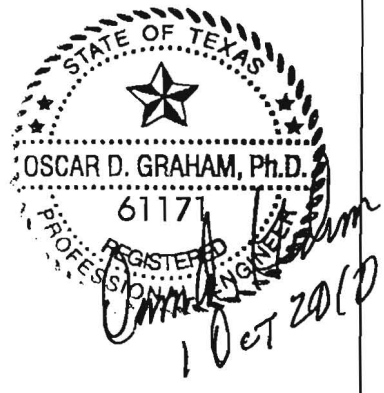
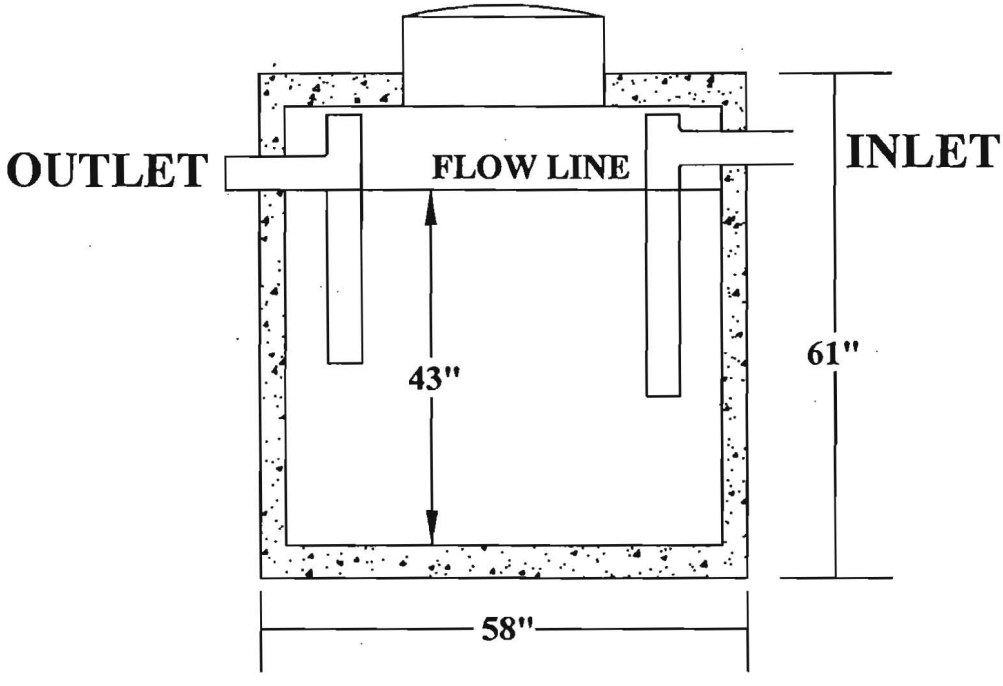
500 gal. PRE-CAST CONCRETE TANK
BLOCK CREEK CONCRETE PRODUCTS LLC





24" Cast in Place Zoeller Risers w/SS Screw Down Lids



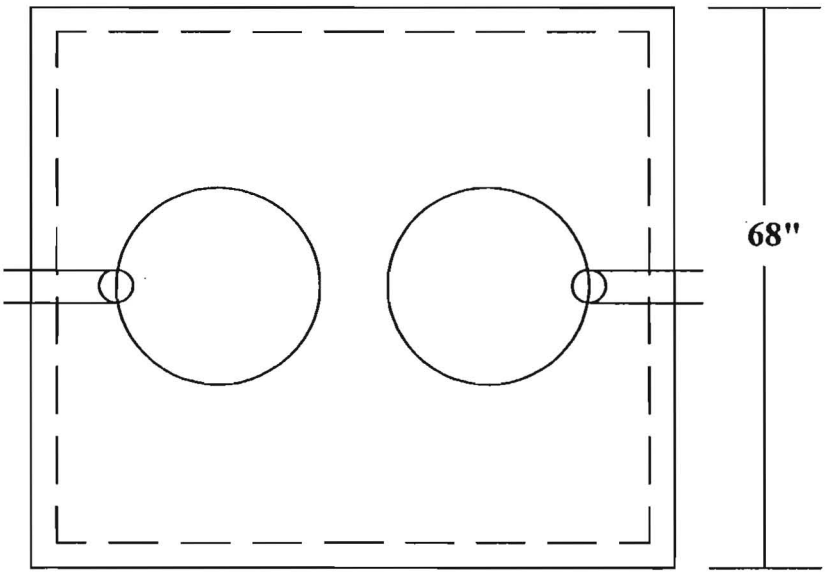
South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 500 gal ONE COMPARTMENT	APPROVED	REVISED
			SHEET ___ OF ___

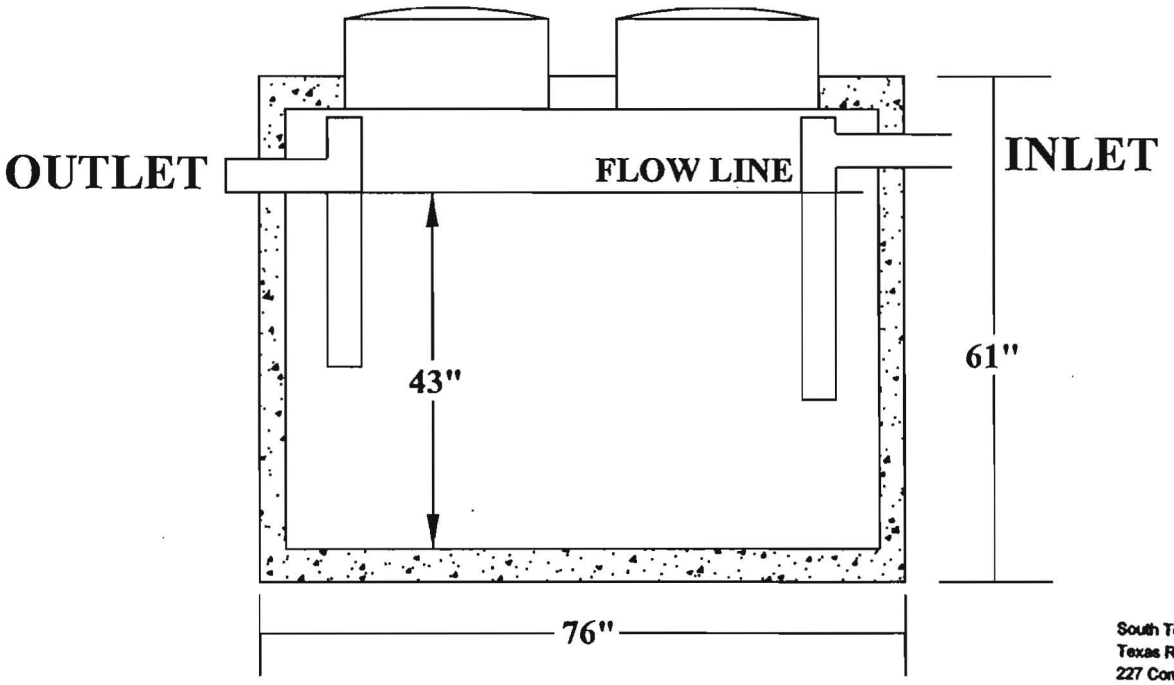
750 gal. PRE-CAST CONCRETE TANK

BLOCK CREEK CONCRETE PRODUCTS LLC

STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED
PROFESSIONAL ENGINEER
1 Oct 10



24" Cast in Place Zoeller Risers w/SS Screw Down Lids



South Texas Wastewater Treatment
Texas Registered Engineering Firm F-1018
227 Commerce
Boerne, TX 78006

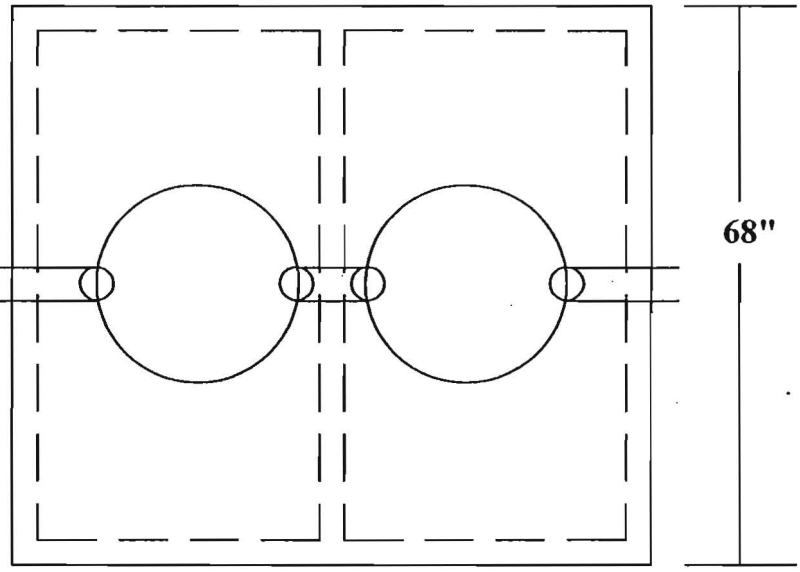
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 750 gal ONE COMPARTMENT	APPROVED	REVISED
			SHEET ___ OF ___

750 gal. PRE-CAST CONCRETE TANK

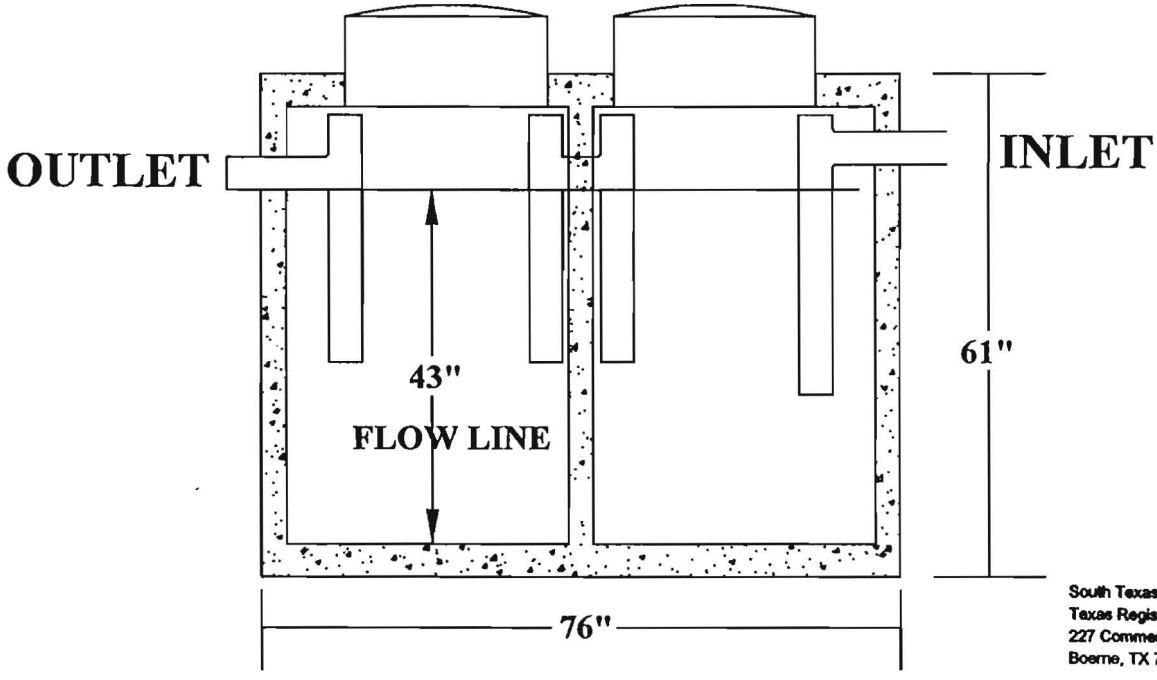
Two Compartment

BLOCK CREEK CONCRETE PRODUCTS LLC

STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED
PROFESSIONAL ENGINEER
1 Oct 2010



24" Cast in Place Zoeller Risers w/SS Screw Down Lids

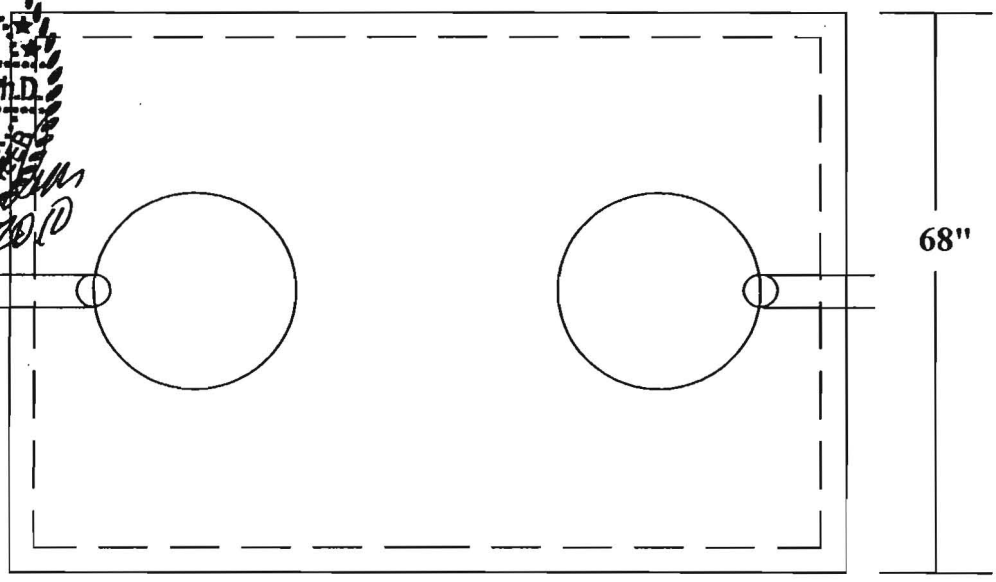


South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

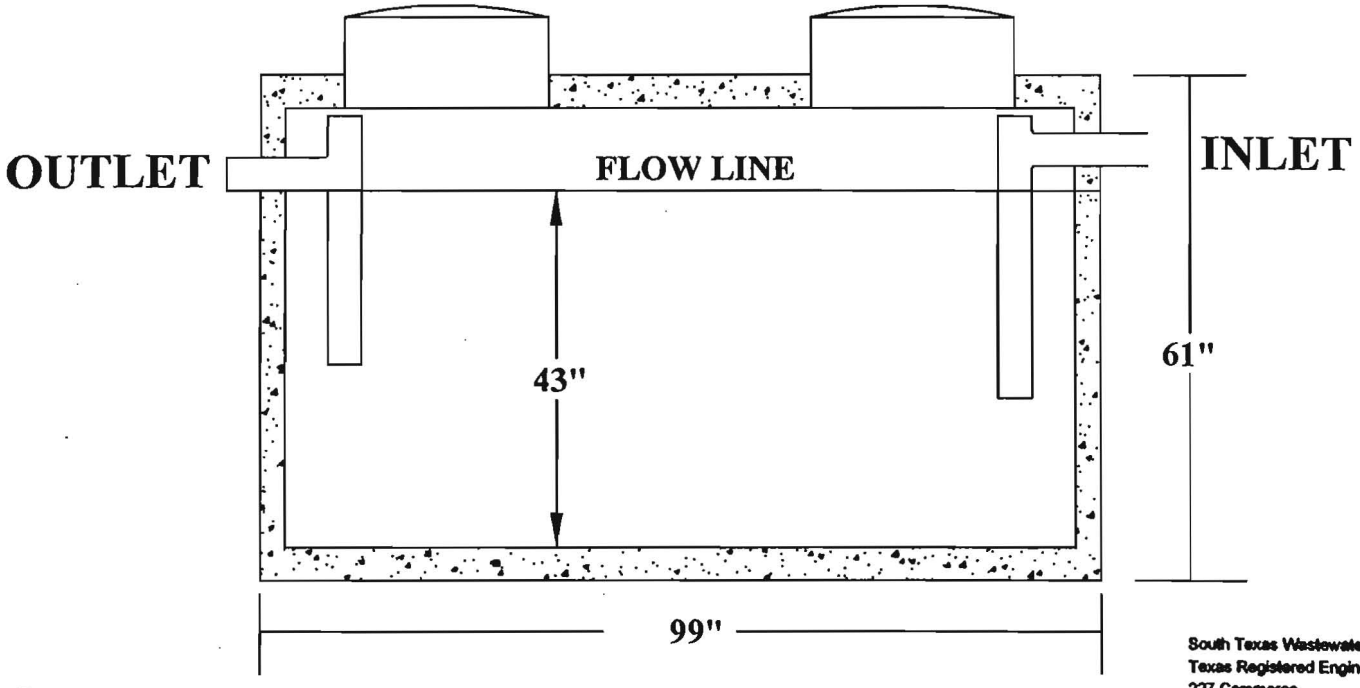
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 750 gal TWO COMPARTMENT	APPROVED	REVISED
			SHEET ___ OF ___

1000 gal. PRE-CAST CONCRETE TANK
BLOCK CREEK CONCRETE PRODUCTS LLC

STATE OF TEXAS
OSCAR D. GRAHAM, PH.D.
61171
REGISTERED
PROFESSIONAL ENGINEER
1 Oct 2010



24" Cast in Place Zoeller Risers w/SS Screw Down Lids

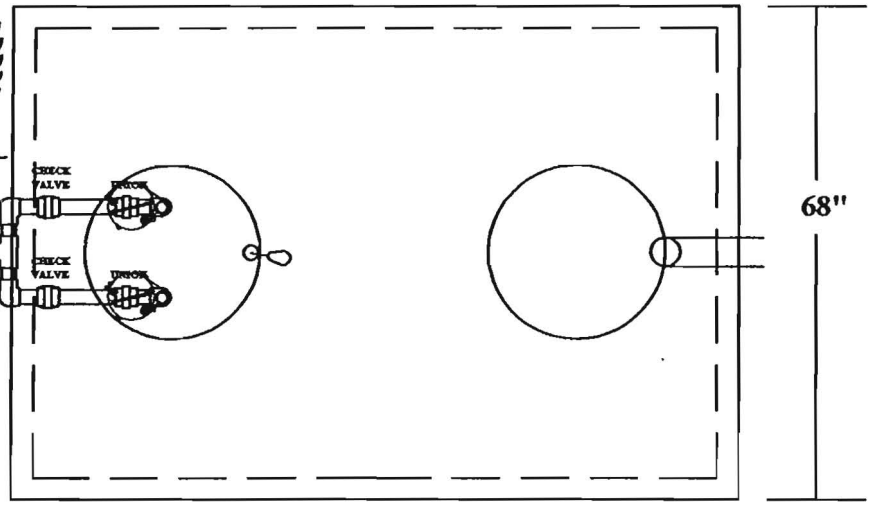


South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10168
227 Commerce
Boerne, TX 78006

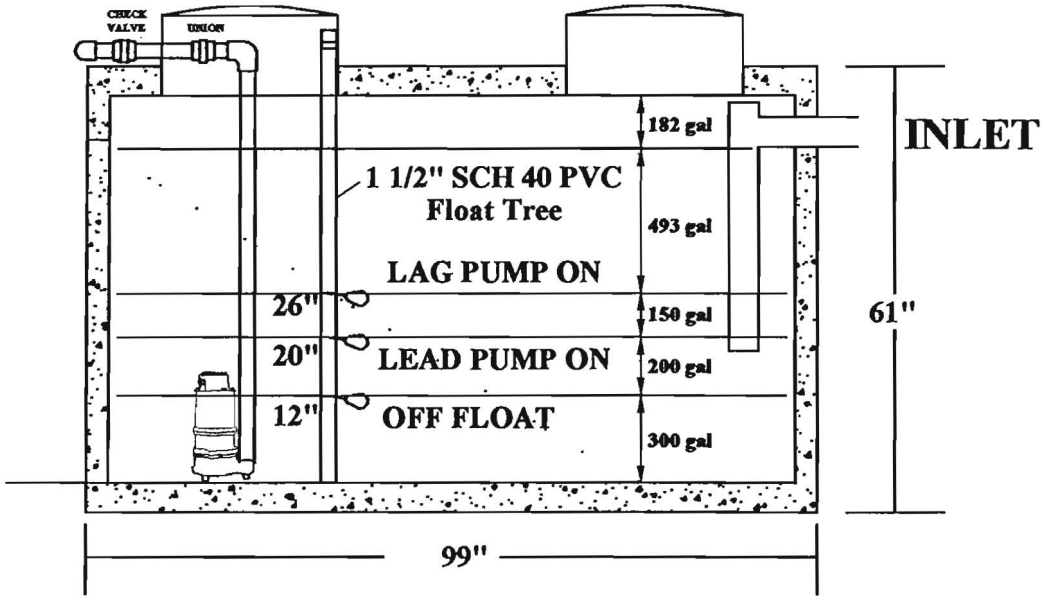
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 1000 gal ONE COMPARTMENT	APPROVED	REVISED
			SHEET ___OF___

1000 gal. PRE-CAST CONCRETE LIFT STATION
BLOCK CREEK CONCRETE PRODUCTS LLC

STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED PROFESSIONAL ENGINEER
1 Oct 2010



24" Cast in Place Zoeller Risers w/SS Screw Down Lids



DUPLEX HYDROMATIC Mod. SKHD 150 EFFLUENT PUMPS

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	1000 gal DUPLEX LIFT STATION	APPROVED	REVISED
			SHEET ___OF___

HYDROMATIC®

SKHD150

Submersible Effluent Pump

Applications:

- Septic Tank Effluent
- High-Head Sump

Pentair Water™

SKHD150 - Submersible Effluent Pump

DETAILS

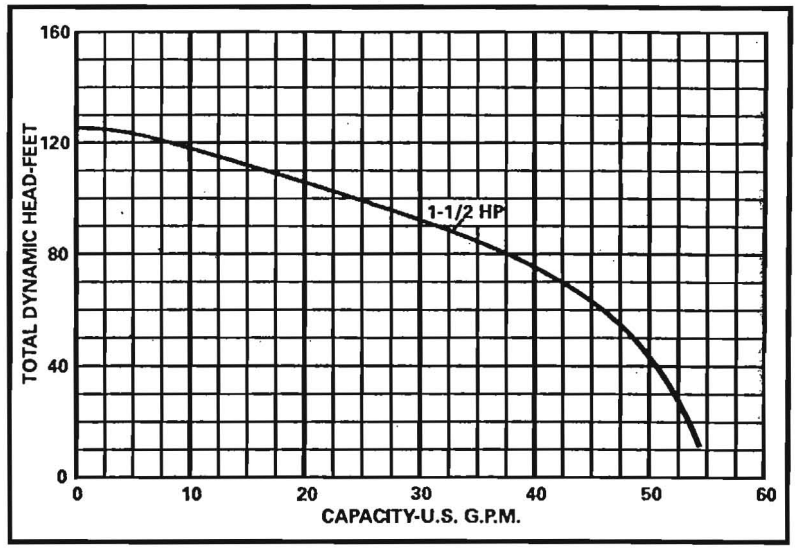
Pump Characteristics

Pump/Motor Unit	Submersible				
Manual Models	M2	M6	M3	M4	M5
Horsepower	1-1/2				
Full Load Amps	12.0	6.1	5.7	2.9	2.7
Motor Type	Capacitor Start	Three-Phase			
R.P.M.	3450				
Phase Ø	1	3			
Voltage	230	200	230	460	575
Hertz	60				
Operation	Intermittent				
Temperature	140°F Ambient				
NEMA Design	B				
Insulation	Class F				
Discharge Size	1-1/2" NPT				
Solids Handling	3/4"				
Unit Weight	75 lbs.				
Power Cord	16/3, STWA, 1ø, 230V = 20' std. 16/4, STWA, 1ø, 230V = 20' std.(S.F.) 18/5, STWA, 3ø, 200V, 230V 460V, or 575V = 20' std. (S.F.)				

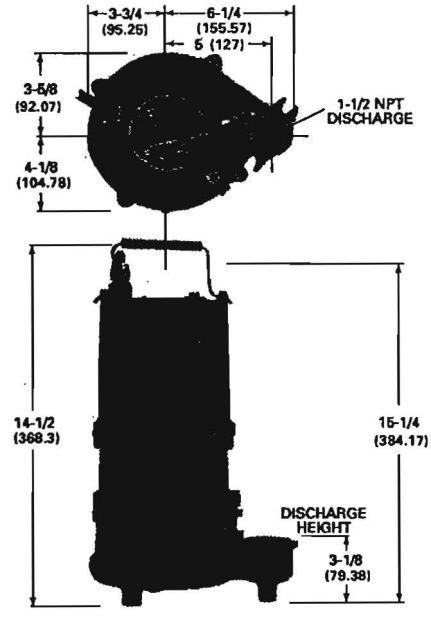
Materials of Construction

Handle	Steel
Lubricating Oil	Dielectric Oil
Seal Housing	Cast Iron
Motor Housing	Cast Iron
Pump Casing	Cast Iron
Shaft	Stainless Steel
Mechanical Shaft Seal	Seal Faces: Carbon/Ceramic Seal Body: Brass, Spring: Stainless Steel Bellows: Buna-N
Impeller	Thermoplastic
Upper Bearing	Single Row Ball Bearing
Lower Bearing	Single Row Ball Bearing
Fasteners	Stainless Steel

Performance Data



Dimensional Data



All dimensions in inches. Component dimensions may vary ± 1/8 inch.Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product and their specificationswithout notice.

HYDROMATIC®
Pentair Water

USA
740 East 9th Street Ashland, Ohio 44805
Tel: 419-289-3042 Fax: 419-281-4087

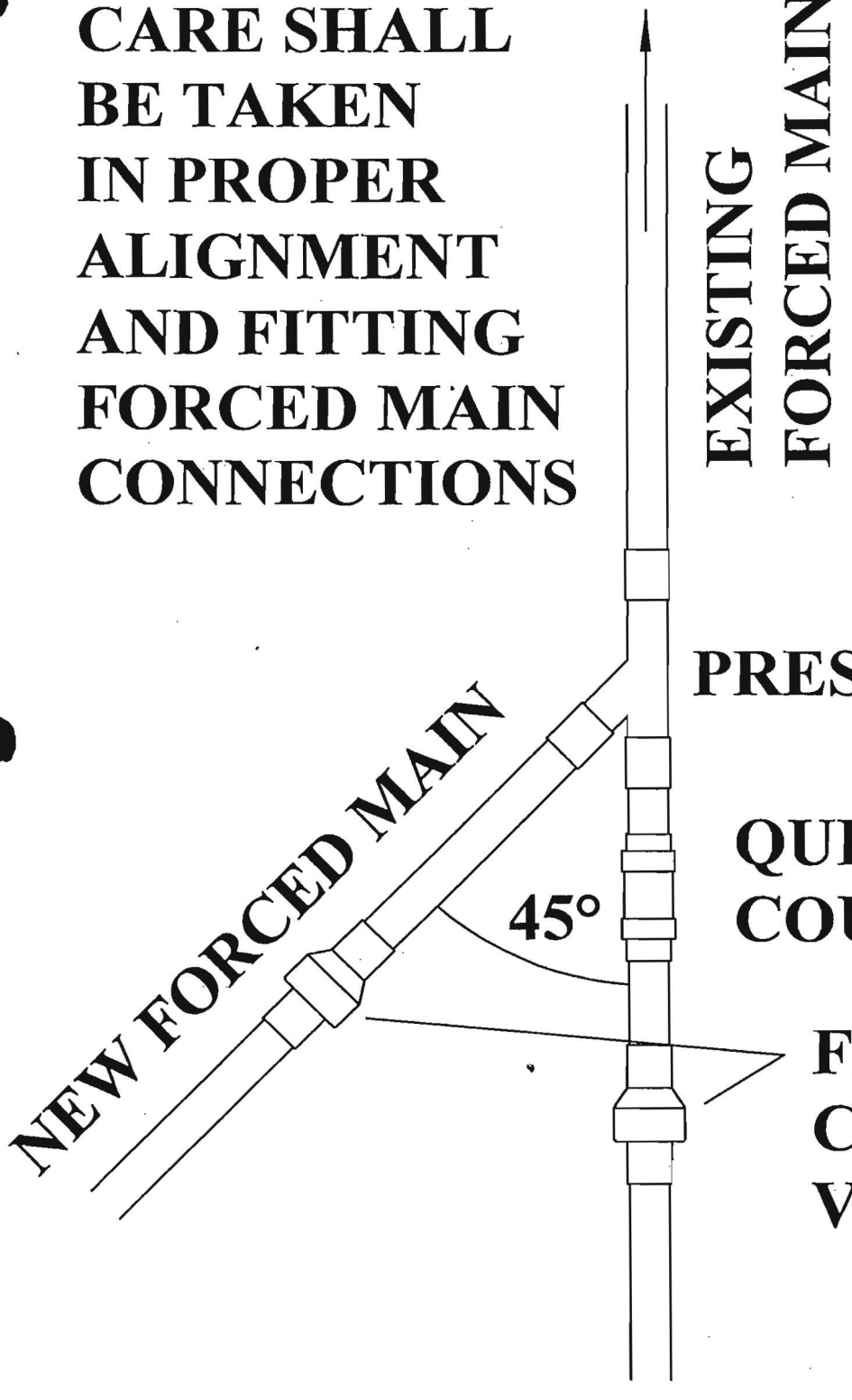
www.hydromatic.com

CANADA
269 Trillium Drive Kitchener, Ontario, Canada N2G 4W5
Tel: 519-896-2163 Fax: 519-896-6337

– Your Authorized Local Distributor –

Item #: W-02-6250 1.5M 3/05

CARE SHALL BE TAKEN IN PROPER ALIGNMENT AND FITTING FORCED MAIN CONNECTIONS



STATE OF TEXAS
OSCAR D. GRAHAM, Ph.D.
61171
REGISTERED PROFESSIONAL ENGINEER
10 Oct 2010

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10166
227 Commerce
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	FORCED MAIN CONNECTION	APPROVED	REVISED
			SHEET __ OF __

SOUTH TEXAS WASTEWATER TREATMENT

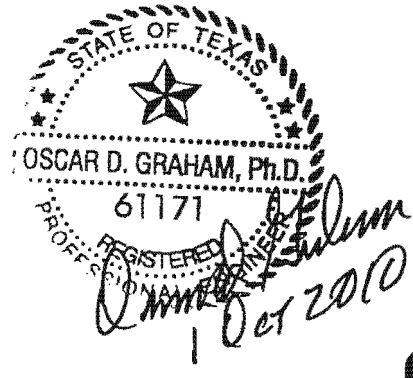
Authorized JET Distributor - Home and Commercial - Engineering Services
P O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-800-86-WASTE

30 September 2010

PRECAST CONCRETE TANK FLOATATION CALCULATIONS
TIE-DOWN REQUIREMENTS WITHIN FLOOD ZONE

This letter acknowledges that according to FEMA map this property ***IS*** in the shaded area indicating that the entire lot is in the 100-year flood plain. The design for this OSSF has sufficient safeguards to insure that in the event of a 100 year flood this system will not cause a nuisance or health hazard. The concrete septic tank will not need special anchoring to prevent floatation during a flood event covering the area where tank is buried. (See calculations)

<u>Calculations</u>



The weight of one cubic foot of water = 62.4 pounds

1000 gallon precast concrete tank: (Block Creek)
area inside tank = 93" x 62" = 5,766 sq in
3.34 cu ft/in of air space

12" of air space above the flow line:
3.34 x 12" = 40.0 cu ft
40.0 x 62.4 pounds = 2,499 pounds (buoyancy)
the tank weights approximately 9,174 pounds; therefore, this tank will not float if filled to flow line even in an empty hole with no back-fill or soil on top.

1000 gal Pump Tank:
Empty tank has 3.34 cu ft/in x 41 in x 62.4 pounds/cu ft = 8,545 pounds of buoyancy with 12"(pump intake height) of water in the tank.
Tank weights 9,174 pounds; therefore, there is no need for extra weight to hold tank from floating.
Two Pumps weigh 75 pounds each for an additional 150 pounds – subtracting water displaced would add approximately 90 additional pounds

The tank should weight approximately 628 pounds more than the buoyancy when there is 12 inches of water left in the pump tank. Normally there is a minimum of 12 inches of soil on top of the tank.
12 inches of soil as a safety factor would weigh an additional 4,212 pounds.

area of top of tank = 8.25 ft x 6.33 ft = 52.2 sq ft
12 inches of soil would mean that 1.93 cubic yards of soil would weigh down this tank for an additional 1.93 x 3,240 lbs/cu yd = 6,266 pounds

Oscar D Graham, PhD., PE
Registered Professional Engineer No. 61171
South Texas Wastewater Treatment
P.O. Box 1284
Boerne, Texas 78006

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Boerne, TX 78006

"Quality Pumps Since 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER PUMP CO.

SECTION: 3.20.190
FM1572
0903
Supersedes
0203

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:
http://www.zoeller.com

ZOELLER ON-SITE WASTEWATER PRODUCTS

Zoeller Septic Tank Risers

Septic tank risers are an important part of any on-site treatment system. Risers allow easy access to septic or pump tanks in order to monitor system performance. Periodic maintenance costs are lowered due to easy accessibility to tanks. Many codes require risers on new installations. Zoeller Septic Tank Risers can be adapted to both new and existing installations. All materials are noncorrosive and environmentally safe.

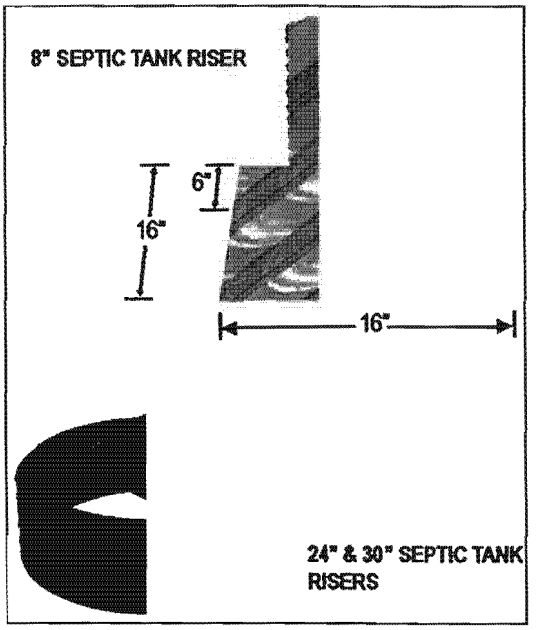
8" Diameter Riser Features:

- Riser is available in 12", 24" and 36" heights.
- Entire system is constructed of UV stabilized PVC to resist sunlight deterioration.
- Cover is dark grey in color and clearly marked with the word "Sewer".
- Screws are square head (#2 Robertson) for extra added security.
- PVC pipes, PVC mounting flange, and stainless steel screws all included in kit.
- Risers are also available without mounting plate for cast in place applications.

24" & 30" Diameter Riser Features:

- Risers are available in heights of 8" up to 7 feet.
- Height is easily adjustable in the field by cutting riser pipe between any two ribs.
- Cover is green in color and has attractive texture to blend in with surroundings.
- All risers and covers are wheel load rated for 2500 pounds for added strength and durability.
- Riser pipes are ribbed for extra strong construction.
- Components are watertight to avoid unwanted ground water infiltration.
- Screws are square head (#3 Robertson) for extra added security.
- PVC pipe, stainless steel screws, and fiberglass UV stabilized cover are all included for easy, quick ordering.

Lifetime Warranty - Every Zoeller riser is guaranteed to be free from defects in materials and workmanship for the lifetime of the homeowner/purchaser. Free repair or replacement, excluding labor, will be made on return of the riser prepaid to the factory. This warranty is limited to product proven to be free from abuse or improper installation.



P/N 014514

8" SEPTIC TANK RISER

Part Number	Riser Height
172-0023	12" Tall
172-0024	24" Tall
172-0025	36" Tall
172-0046	12" Tall without Mounting Plate
172-0026	24" Tall without Mounting Plate
172-0027	36" Tall without Mounting Plate

24" SEPTIC TANK RISER

Part Number	Riser Height
172-0018	8"
172-0003	1'
172-0044	18"
172-0004	2'
172-0005	3'
172-0006	4'
172-0007	5'
172-0008	6'
172-0009	7'

30" SEPTIC TANK RISER

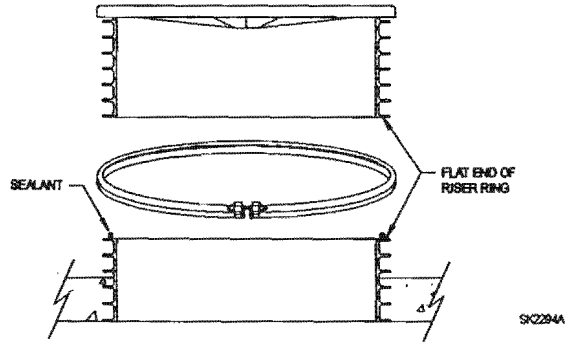
Part Number	Riser Height
172-0028	8"
172-0029	1'
172-0045	18"
172-0030	2'
172-0031	3'
172-0032	4'
172-0033	5'
172-0034	6'
172-0035	7'

Mounting Options

CAST IN PLACE

☐ P/N 172-0050 for 24" dia. risers.
Barrel clamp and sealant extension kit.

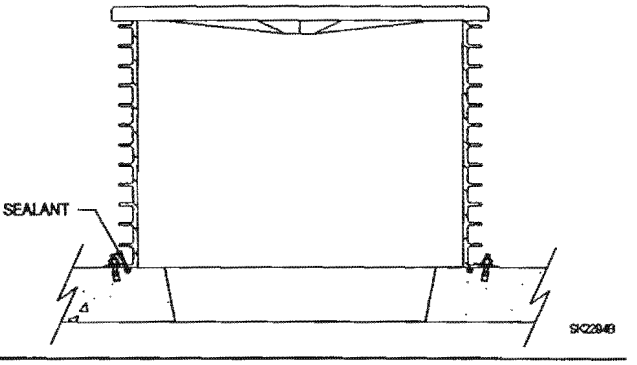
Risers can be cast in place or an 8" tall adapter and coupling can be used to extend riser.



BOLT DOWN KIT

☐ P/N 172-0047

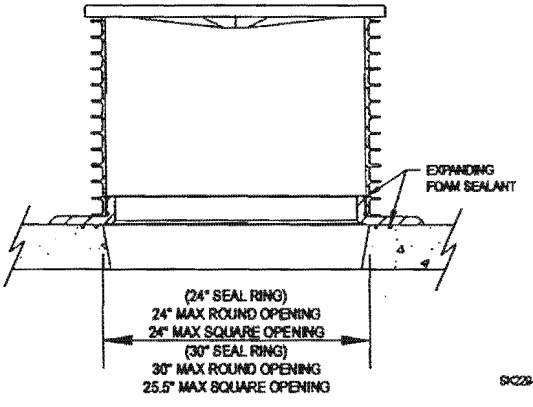
Bolt down kit with sealant for securing riser to flat tank top where riser will cover tank opening.



SEAL RING

☐ P/N 172-0048 34" outer diameter ring for 24" dia. risers.
☐ P/N 172-0049 36" outer diameter ring for 30" dia. risers.
☐ P/N 172-0052 Expanding foam sealant.

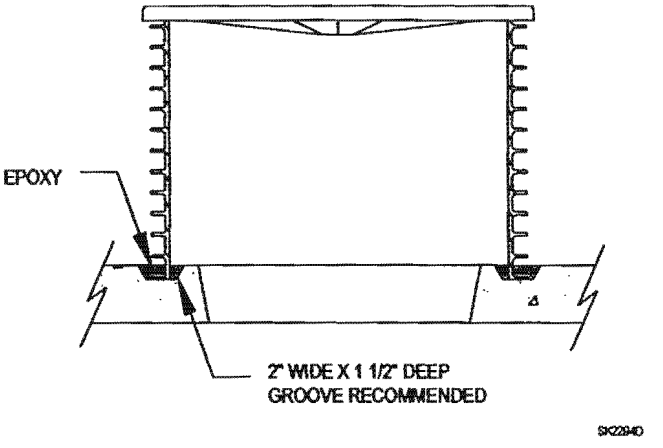
For mounting risers to oversized opening.
(Uses expanding foam sealant to secure)



EPOXY MOUNTING

☐ P/N 172-0019 Quart Wgt. 1.0 lb.

For mounting riser in a precast groove.

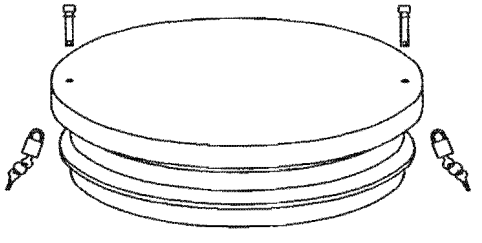


Accessories

Lockable Latch

☐ 172-0020* 24" Diameter Riser Wgt. 1.0 lb.
☐ 172-0056* 30" Diameter Riser Wgt. 1.0 lb.

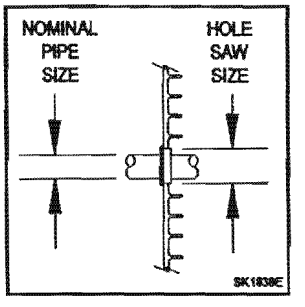
*3/16" Shackled locks required (Not Included)



Lid Only with SS Screws

☐ 17-0275 Lid only 24" Wgt. 16 lbs.
☐ 17-0342 Lid only 30" Wgt. 24 lbs.

SK16366



Pipe Seals

Part Number	Nominal Pipe Size	Hole Saw Dia.	Weight
014502	⅜" IPS	1"	0.5 lbs.
014503	½" IPS	1.25"	0.5 lbs.
014504	¾" IPS	1.25"	0.5 lbs.
014505	1" IPS	1.75"	0.5 lbs.
008813	1¼" IPS	2"	0.5 lbs.
005882	1½" IPS	2.5"	0.5 lbs.
005588	2" IPS	3"	0.5 lbs.
005587	3" IPS	4"	0.5 lbs.
005196	4" IPS	5"	0.5 lbs.

ALL ZOELLER ON-SITE WASTEWATER PRODUCTS MUST BE INSTALLED IN ACCORDANCE WITH LOCAL AND/OR STATE PLUMBING AND/OR HEALTH DEPARTMENT CODES.

DATE: 9/21/07 SITE EVALUATION NUMBER: 90202

Applicant Information:
Name Country Mill Park
Address Canyon Lake
City
State Tx Zip Phone

Site Evaluator Information:
Name Patrick Kerr
Company Southern On-Site Solution
Address 401A Cottonham Dr.
City Temple State Tx
Zip 76504 Phone 254-742-2177 Fax 254-742-2183

Property Location:
Lot Block Subdivision
Address
City State Zip
County
Unincorporated Area? Yes No
Other Information:

Installer Information:
Name
Company TTC Utilities
Address
City St. Zip
Phone Fax Cell

Schematic of Lot or Tract

Show: Compass North, Adjacent streets, Property lines, Property dimensions, Location of buildings, Easements, Swimming pools, Water lines, all other surface improvements. Place all EXISTING or PROPOSED water wells within 150 feet of property. Indicate slope or provide contour lines from the structure to the farthest location of the proposed OSSF. Location of natural, constructed or proposed drainage ways (streams, ponds, lakes, rivers, tidal ways), water impoundment areas, cut or filled banks, all elevation planes and breaks in grade

SITE DRAWING

LOT [illegible] Note: type of vegetation on lot

RECEIVED
SEP 2 1 2007
COUNTY ENGINEER

See Attached Drawing

Presence of 100 year flood zone? Y N
Existing or proposed water well in nearby area? Y N
Presence of adjacent ponds, streams, or water impoundments Y N
Organized sewage service available to lot or tract? Y N

Site Evaluator Name Patrick Kerr Signature License No. 11892
(Circle one: RS, PE, DR, SE, Installer II)

90202

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NOV 2 7 2007

COUNTY ENGINEER

On-Site Sewage Facility
Soil Evaluation Report Information

Site Location: Crane's Mill Park, Canyon Lake COUNTY: Comal

Proposed Excavation Depth 24"

REVISED

Test Hole # 1

Depth (inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0–18"	III	Blocky w/ chunk rock	No ground water	None	Installer must Divert surface water away from Drainfield
18"–40"	III	Blocky Clay Loam	" "	None	
40"–60"	Fissured Rock				

Test Hole #2

Depth (inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0–28"	III	Blocky w/ Chunk Rock	No ground water	None	Installer must Divert surface water away from Drainfield
28"–52"	III	Clay Loam, Blocky	" "	" "	
52"–60"	Fissured Rock				

At least **two (2)** soil excavations must be performed on the site. **(Locations of soil borings must be shown on the site drawing).**

SUBSURFACE DISPOSAL: Soil evaluations must be performed to a depth of at least two feet below the proposed excavation depth. Describe each soil horizon and identify any restrictive features on the form.

SURFACE DISPOSAL: The surface horizon must be evaluated.

I certify that the findings of this report are based on my observations and are accurate to the best of my ability

Signature of Site Evaluator / License Number / (Date)

11892 / 6/13/07

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On-Site Sewage Facility
Soil Evaluation Report Information

Site Location: Crane's Mill Park, Canyon LAKE COUNTY: Comal

Proposed Excavation Depth 24"

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Test Hole #3

Depth (inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0 – 24"	III	Blocky w/ Chunk Rock	NO ground water ~~#3~~	None	Installer must Divert water away from Drainfield
24" – 44"	III	Clay Loam Blocky	" "	NONE	
44" – 5		Fissured	Rock		

Test Hole #4

Depth (inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0 – 10"		Blocky w/	NO ground water	NONE	Installer must Divert surface
10" – 38"	III	Blocky Clay Loam	" "	" "	water away From Drainfield
38" – 5		Fissured	Rock		

At least **two (2)** soil excavations must be performed on the site. **(Locations of soil borings must be shown on the site drawing).**

SUBSURFACE DISPOSAL: Soil evaluations must be performed to a depth of at least two feet below the proposed excavation depth. Describe each soil horizon and identify any restrictive features on the form.

SURFACE DISPOSAL: The surface horizon must be evaluated.

I certify that the findings of this report are based on my observations and are accurate to the best of my ability

Signature of Site Evaluator	License Number	(Date)
	11892	6/13/07

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On-Site Sewage Facility
Soil Evaluation Report Information

Site Location: Crane's Mill Park, Canyon Lake COUNTY: Comal

Proposed Excavation Depth 24"

REVISED

Test Hole #5

Depth (Inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0 – 12"	III	Chunk Rock & Blocky Clay 30%	NO ground water	None	Installer must Divert surface
12" – 46"	III	Clay Loam	" "	" "	water away from Drainfield
46" – 5			Assumed	Rock	

~~Test Hole #2~~

Depth (Inches)	Texture Class	Soil Texture	Drainage (Mottles/Water Table)	Restrictive Horizon	Observations
0					
1					
2					
3					
4					
5					

At least **two (2)** soil excavations must be performed on the site. **(Locations of soil borings must be shown on the site drawing).**

SUBSURFACE DISPOSAL: Soil evaluations must be performed to a depth of at least two feet below the proposed excavation depth. Describe each soil horizon and identify any restrictive features on the form.

SURFACE DISPOSAL: The surface horizon must be evaluated.

I certify that the findings of this report are based on my observations and are accurate to the best of my ability

Signature of Site Evaluator	/	License Number	/	(Date)
		11892		6/13/07

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Project Description:

This project consists of the addition of an on-site sewage facility at Cranes Mill Park on Canyon Lake, Comal County, Texas. The proposed OSSF will serve a dump station for 68 campsites and one restroom facility.

OSSF Summary:

The proposed OSSF will be sized for 4,700 gallons per day with a drainfield size of 23,520 square feet. The application rate for the proposed field is 0.2 (Ra). The drain field and tanks are located within the Edward's Aquifer Contributing Zone and not within the Recharge Zone. To the best of our knowledge, no recharge features are located within the vicinity of the proposed OSSF.

Effluent from the restroom facility will flow into a septic tanks/pump tanks where the effluent is pumped to an equalization tank at the disposal field. The equalization tanks allow for surges in the daily flow and time for the effluent to settle after being pumped in the force main. The effluent will be time dosed into one of five fields and will alternate between fields after each dose. The fields will be standard drainfields with pressure distribution through 1-1/4" laterals.

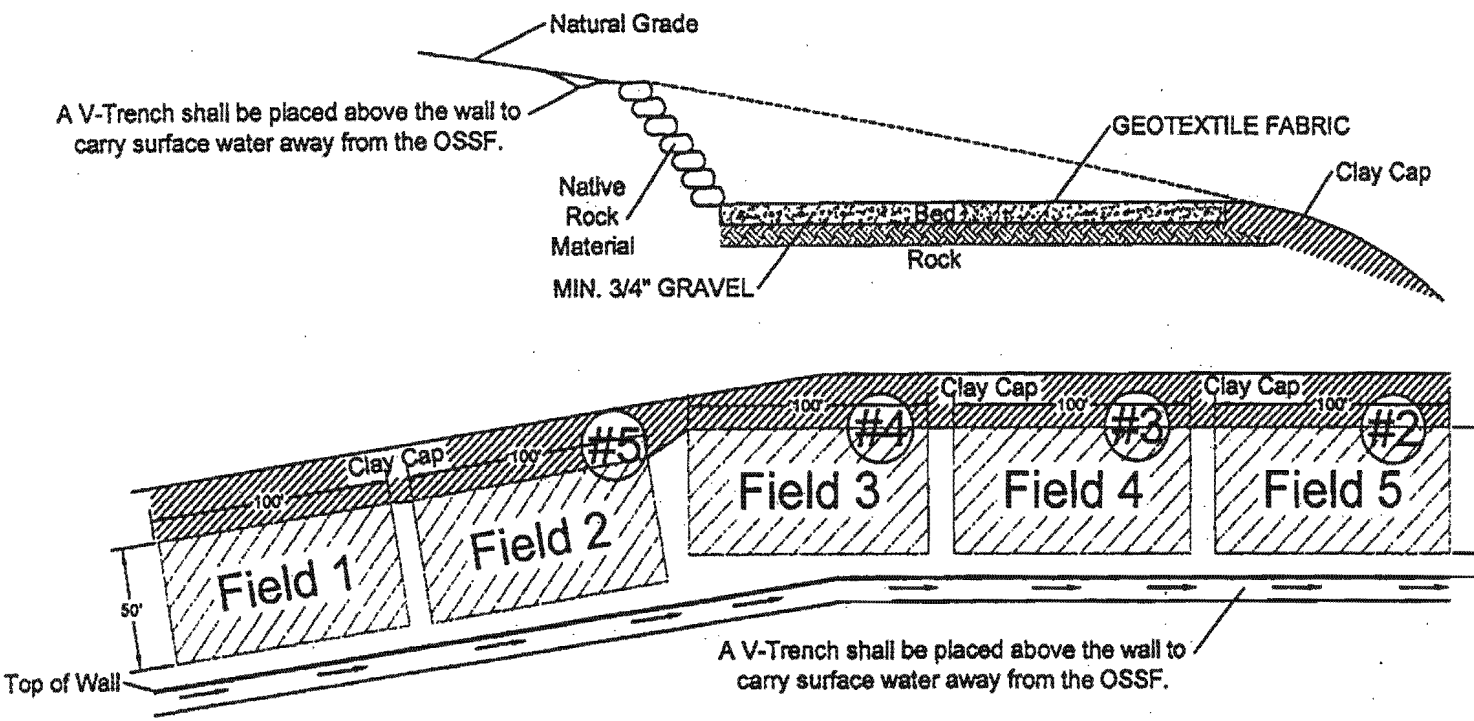
Estimated Flow Rate and Disposal Area:

- 68 Campsites x 40 GPD/Campsite = 2,720 GPD, say **2,800 GPD**
- 150 Day Visitors x 12 GPD/Visitor = 1800 GPD, say **1,900 GPD**
- **4,700 GPD** / 0.2 Ra = 23,500 SF of Disposal Area Required (including future expansions)
- **23,520 SF** of Disposal Area Proposed

Proposed OSSF:

Restroom #1: The effluent will gravity flow through a two-way cleanout to a 3,000 gallon 1-compartment septic tank and followed by a 1,500 gallon 1-compartment septic tank for settling and primary treatment. A 1,250 gallon concrete pump tank (no outlet with anti-floatation, actual volume 1,351 gallons) will be utilized for the main lift station. This lift station will contain duplex Hydromatic SKHD 150 effluent pumps which will lift the effluent approximately 3,368 lf to the equalization/pump tanks near the drainfields.

DRAINAGE PLAN



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FIELD DETAIL REVISED

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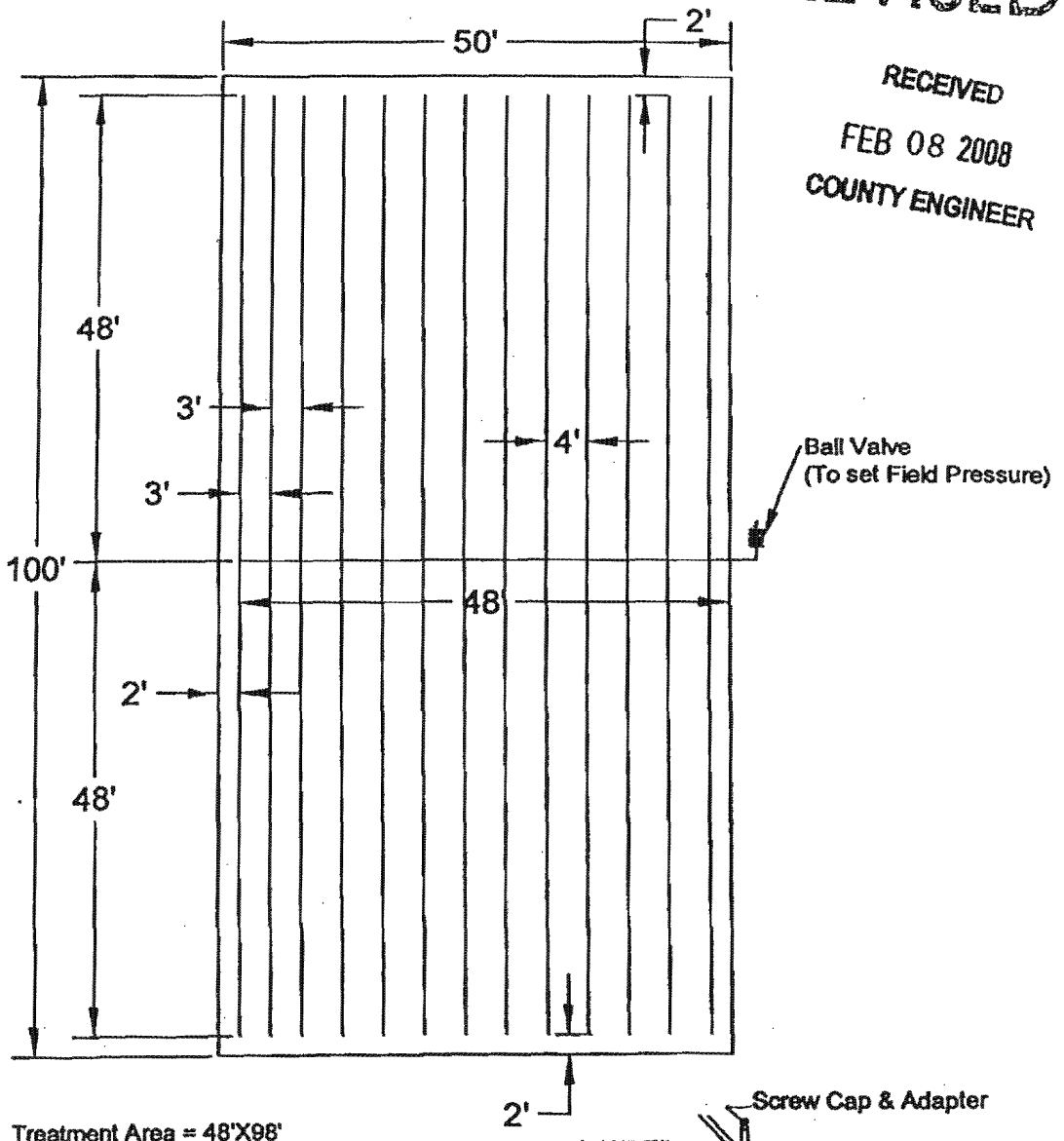
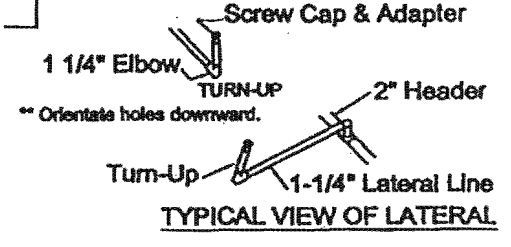
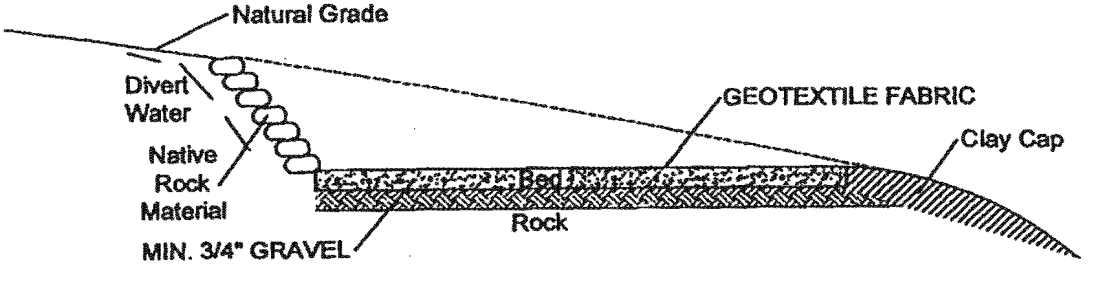


Treatment Area = 48'X98'



TYPICAL VIEW OF LATERAL



SCALE: NTS
date: 8/30/07 rev: 11/20/07
filename: #2007-133
drawn by: CCW
checked by: PVK

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Key:
-- Water Line
— 3" Sch. 40 PVC
— 2" Sch. 40 PVC
(#) Test Holes

Cranes Mill Park, Canyon Lake, Comal County

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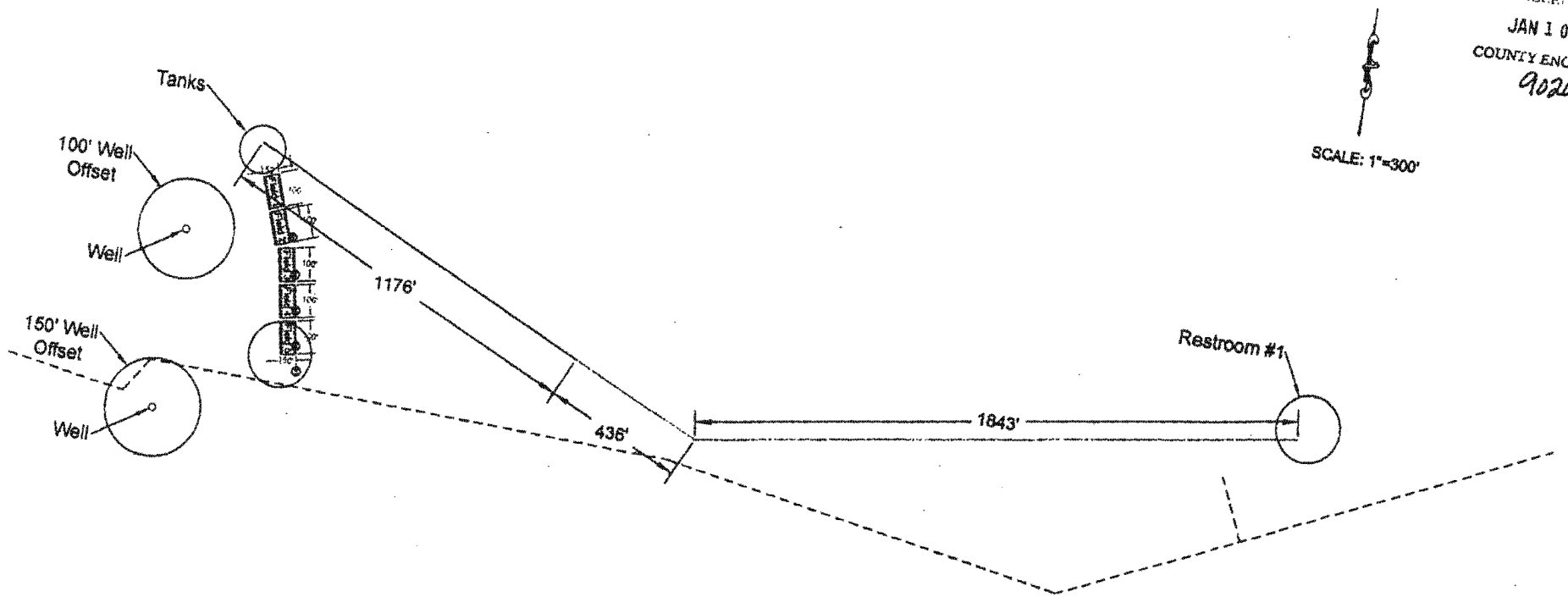

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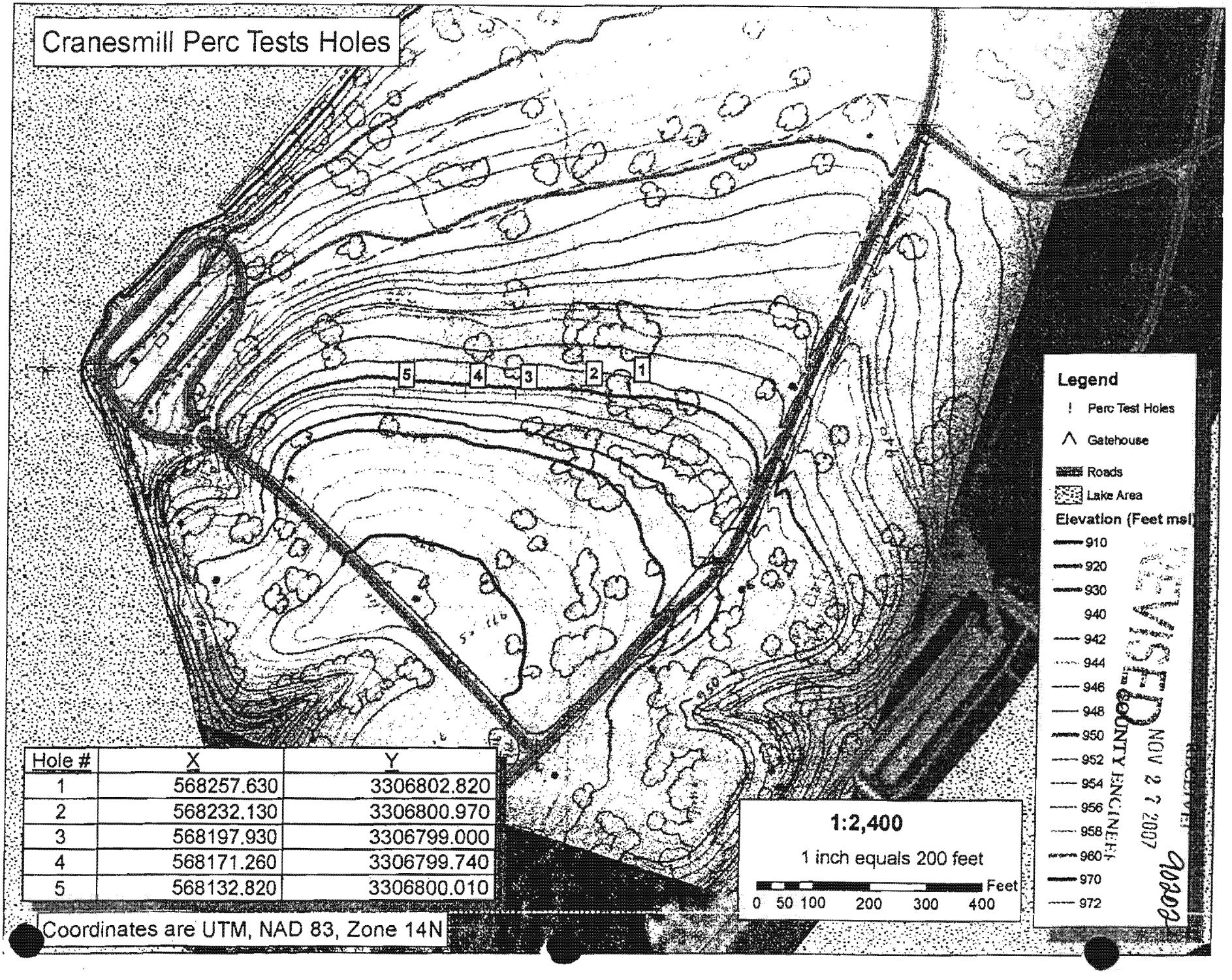
19-B



Hole #	X	Y
1	568257.630	3306802.820
2	568232.130	3306800.970
3	568197.930	3306799.000
4	568171.260	3306799.740
5	568132.820	3306800.010

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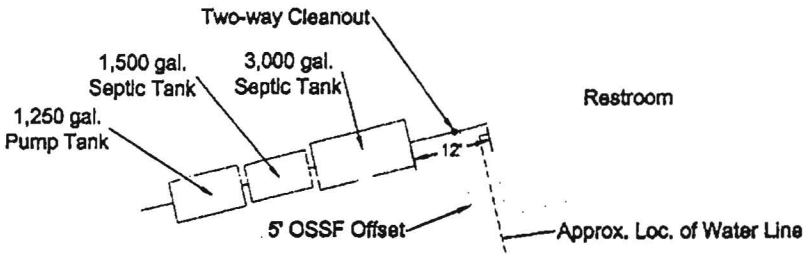
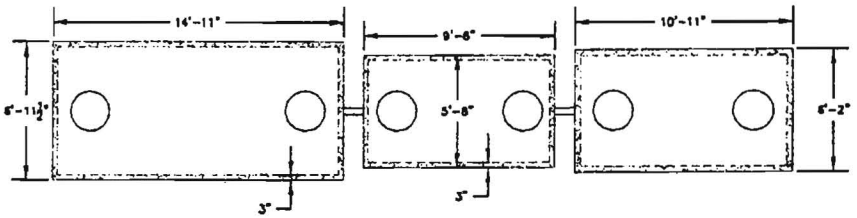
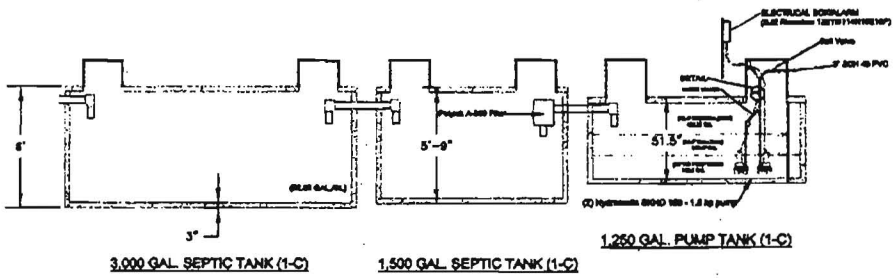
RESTROOM #1



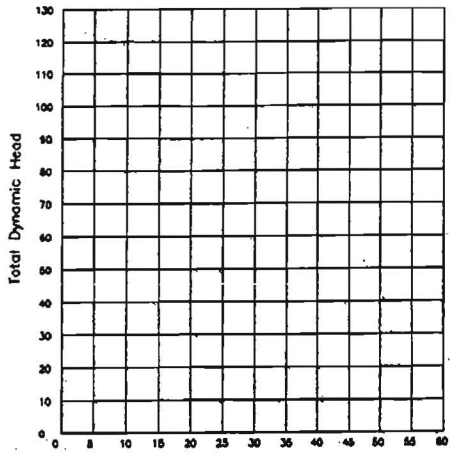




3,000 GAL. SEPTIC TANK (1-C)

1,500 GAL. SEPTIC TANK (1-C)

1,250 GAL. PUMP TANK (1-C)



Pump Curve
(Hydromatic SKHD 150)

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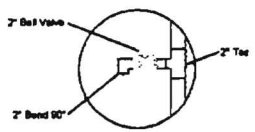

Detail "A-1"
NTS

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TANKS DETAIL

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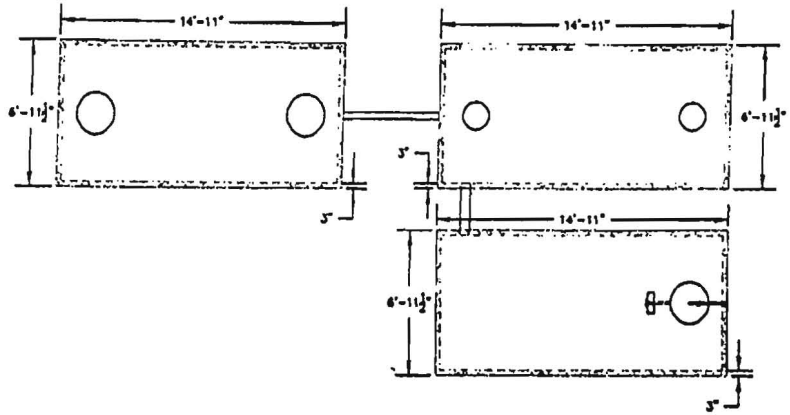
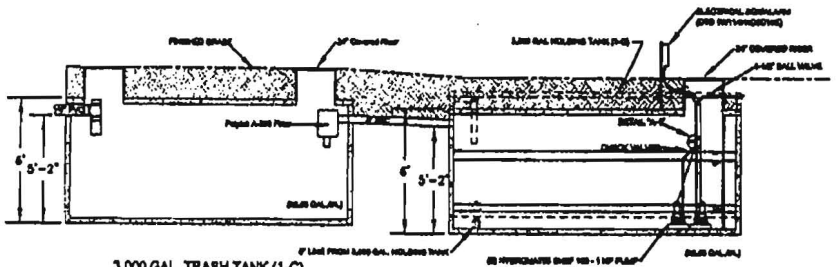
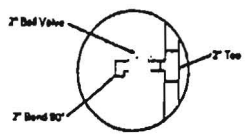


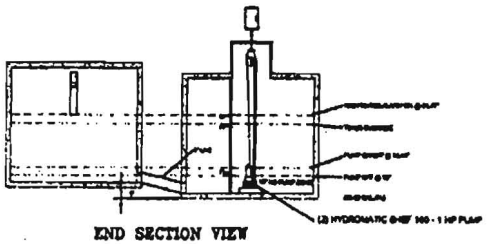
3,000 GAL. TRASH TANK (1-C)



1-3,000 GAL. PUMP/SURGE TANK (1-C)
&
1-3,000 GAL. HOLDING TANK (1-C)



Detail "A-1"
NTS

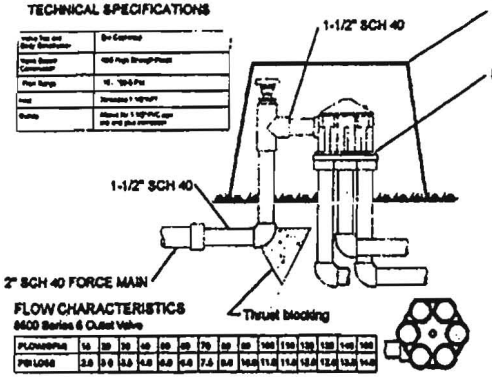


END SECTION VIEW
1-3,000 GAL. PUMP/SURGE TANK (1-C)
&
1-3,000 GAL. HOLDING TANK (1-C)

* NOTE: ONLY 3 OUTLETS SHOWING OF 6 ON CROSS SECTION.
* NOTE: ALL CONNECTIONS SHALL BE THREADED

TECHNICAL SPECIFICATIONS

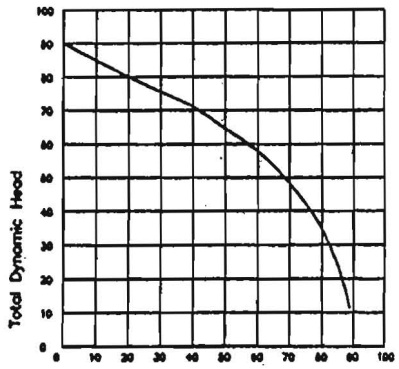
Valve Top and Body Construction	Bronze
Body Seat Construction	Resilient
Flow Range	10 - 1000 GPM
Inlet	Threaded 1 1/2" NPT
Outlet	Allows for 1 1/2" PVC pipe and glue connection



FLOW CHARACTERISTICS
6600 Series 6 Outlet Valve

FLOW GPM	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
PSI LOSS	2.5	3.0	3.5	4.0	5.0	6.0	7.5	9.0	10.5	11.5	11.5	12.0	12.5	13.5	14.0

HYDROTEK VALVE 6606
SCALE = NTS



Capacity – GPM
Pump Curve
(Hydromatic SHEF100A 2-20')

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checked by: PVK

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SOUTH TEXAS WASTEWATER TREATMENT

Authorized JET Distributor - Home and Commercial - Engineering Services
P O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-800-86-WASTE; www.stwastewater.com

WASTEWATER TREATMENT SYSTEM DESIGN FOR CRANE'S MILL PARK CONVENTIONAL FIELD SYSTEM

(Revised)

US Army Corp. Of Engineers
c/o Matkin-Hoover Engineering and Surveying
Attn: Garrett Keller, EIT
8 Spencer Road, Suite 100
Boerne , Texas 78006
830-249-0600, Fax 830-249-0099

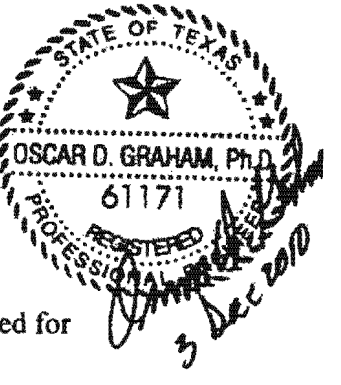
Permit No. 90202
SITE: Crane's Mill Park
17600 Crane's Mill Road
Canyon Lake, Texas
Comal County, Texas

Discussion:

The Corp of Engineers recently completed an OSSF to accommodate the anticipated visitors to the Crane's Mill Park. While the anticipated number of visitors has not changed plans have been presented to upgrade and improve the camping and picnic facilities. An additional shower and restroom facility has been added at one of the camp grounds. Water and electrical hook-ups have been added to 30 of the camp sites with a new RV Dump station to accommodate the Recreation Vehicles (RV) that may take advantage of these sites which will not have direct sewer hook-ups. Three additional full RV campsites including sewer hook-ups have been added to accommodate park rangers/guards servicing this park. A new guard house has been added with restroom facilities to accommodate a two person office.

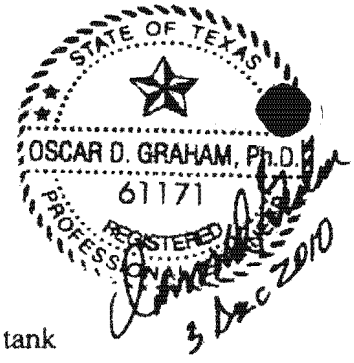
These plans will include the existing facilities including sizes an performance specifications. The 30 campsites upgraded with RV hook-ups shall assume that 100 percent of the wastewater generated is used at the the new shower and restroom facilities and that 100 percent could be dumped at RV dump station. While tight lines following septic tanks do not have clean-outs and need only to have a negative slope this design shall require a two-way clean-out every 100 feet and a slope of 1/8 inch per foot.

This design includes an attached drawing No. _____ dated: _____



Design Specifications:

Estimated average daily wastewater flow: 4,056 gpd (see calculations)
The field size: Existing–five equal beds 5300 sq ft excavation each
Field dosed from 6000 gal eq tank preceded by 3000 gal settling tank
field and tanks located above 948 elevation line (see drawing)
Copies of design criteria found in existing permit design (copies attached for completeness)
Soil Class: Class III, R_a = 0.2 gal/sq ft/day
Designed to handle 4999 gpd according to design permitted
Tank Capacity:
a) new guard house 750 gal, 2-compartment
b) new full hook-up for 2 RV spaces, 750 gal, 2-compartment



c) new dump station, three 1000 gallon single compartment tanks
d) new restroom/shower facility and lift station, 3 ea 1000 gal. tanks
Plus a 1000 gal. lift-station tank w/duplex pumps
e) new restroom w/o shower facilities, 3 ea 1000 gal. tanks
Plus a 1000 gal. lift station w/duplex pumps
f) new 1 RV space with sewer hook-up, 750 gal 2-compartment
g) existing restroom facility from design, 3000 gal. plus 1500 gallon tank
Plus a 1250 gal. lift station w/duplex pumps

All new tanks are below the 948 line: each shall be certified **not** to float during flood
(See attached Precast Tank Floatation Calculations)

Risers and Lids: All pre-cast Tanks shall have cast in place 24" Zoeller Risers w/ SS screw down lids

Lift Stations: d) and e) shall be duplex
Controller: SJE Rhombus 1221W114H10E10F
Pump: Hydromatic SKHD 150 effluent pump
Float Switches: SPI Mod. 15CRDPC (signal – normally open)
Expected Head Loss;
Station d): elev.–30 ft; friction min. 25 gpm [0.96 x 5 = 4.8 ft]-- 34.8 ft
Station e): elev. – 30 ft + friction min. 25 gpm[0.96 x 22 = 21.1 ft] --46 ft
(Existing) Station g) elev. – 25 ft + friction min. 25 gpm[0.96 x 33 7 = 32.4] --57.4 ft

Forced Main Connections: Angle shall be 45 degrees or less with flapper check valves in Each branch–all fittings shall be pressure rated SCH 40 or SDR 26–use expandable coupling to splice into existing FM to maintain alignment.

Road Crossing: All sewer lines crossing roads shall be sleeved–2 pipe sizes larger than sewer pipe–sleeve shall be SCH 40 or SDR 35 minimum thickness pipe

Potable Water Line Crossing: water line crossing as prescribed in § 290.44.(e)(4)(B)
In general lines must cross perpendicular with both water and wastewater crossing in the center of full joint of pressure rated pipes with wastewater passing below the water pipe, if this is not possible, see reference above for equal protection, a PE shall approve equal protection.

Flood Hazard Requirements: (see § 285.31.(c)(2))
The system shall not increase the height of flood
All components, with the exception of risers, chlorinators, cleanouts, sprinklers, and inspection ports shall be completely buried without adding fill

Offsets: property lines, wells, easements, water lines, structures, swimming pools, ponds, etc shall be strictly adhered to as required by latest Texas Commission on Environmental Quality Regulations.

Calculations

Water usage, Q:

a)	Guard Gate Building: 2 person office	2 shifts	4 g/p/s	16 gpd
b)	Two RV spaces w/sewer hook-up	2 spaces	40 g/s	80 gpd
c)	RV Dump Station	30 spaces	40 g/s	1200 gpd
d)	RV Camp – hookups w/o sewer showers and restrooms	30 spaces	40 g/s	1200 gpd
e)	Restroom building w/o showers	150 day Visit	8 g/v	1,200 gpd
f)	One RV space w/sewer hook-up	1 space	40 g/s	40 gpd

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Boerne, TX 78006

g)	Camp ground for tent campers existing restroom facility		38 spaces	40g/s	1,520 gpd
					4,056 gpd

Tank Requirement: see § 285 Table II

a)	Septic tank size:	minimum	750 gal 2-compartment	
b)	Septic tank size	minimum	750 gal 2-compartment	
c)	Septic tank size:	2.5Q	3000 gal	3 ea 1000 gal
d)	Septic tank size	2.5 Q	3000 gal	3 ea 1000 gal
	Lift station size:		1000 gal w/duplex pumps	
e)	Septic tank size:	2.5 Q	3000 gal	3 ea 1000 gal
	Lift station size		1000 gal w/duplex pumps	
f)	septic tank size	minimum	750 gal 2-compartment	
g)	septic tank size	existing	3800 gal required	3000 + 1500
	existing		1000 gal w/duplex pumps	1250 gal

Existing Disposal Field:

The existing OSSF is new (two years old) and in excellent shape. Due to construction and other activities, very little use has been made of the facilities. The existing field is sized to handle up to 5000 gallons per day. The new facilities being contemplated shall be tied into the existing forced main after being properly treated with new septic tanks. This design will revisit field sizing for completeness.

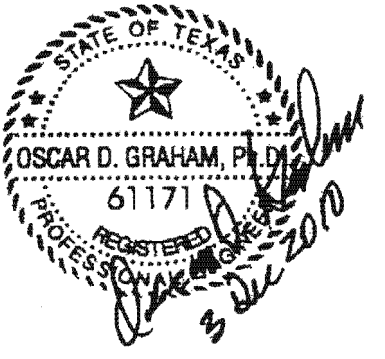
Field size required: Class III soil, Ra = 0.2

$A = Q \div Ra$

$A = 4056 \div 0.2 = 20{,}280$ sq ft

existing field size: five each excavations of 5300 sq ft each

Existing $A = 5 \times 5300 = 26{,}500$ sq ft



Pipe and fittings

All pipes and fittings in this system shall be 4' schedule 40 PVC. All joints shall be sealed with an approved solvent-type PVC cement. Forced mains are 2" SCH 40 or SDR 26 PVC.

Site Preparation

Little preparation is required. It is important to insure that the system will not be overloaded with excess rainwater and surface runoff. The distribution field must have a final shape that will shed rainwater rather than accumulate it in low areas or depressions. Any surface runoff that runs toward the distribution field must be intercepted and diverted.

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Flood Prone Areas

The subject property is in a flood prone area below the 948 ft elevation line on Canyon Lake. The disposal field is above the 948 ft elevation line.

FIR Map community-panel Number 4854630045C. The actual field is not in the 100 yr. flood plain .

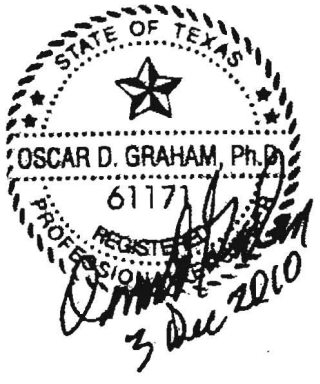
Tank Sizes

See tank sizing under the title: Calculations

This design meets all of the orders of Comal County the latest Texas Commission on Environmental Quality OSSF Regulations and will not cause a nuisance or health hazard. This system was designed using the latest engineering practices.

Inspections

Comal County will be doing at least one inspections:



This system designed by:

South Texas Wastewater Treatment
Oscar D. Graham, PhD., Registered Professional Engineer
Registration Number 61171, State of Texas
PO Box 1284, Boerne, Texas

Oscar D Graham, PhD., PE — 3 Dec 2010 Date

Attachments:

Drawing No. _____ dated _____
OSSF Tank Configuration Detail a)
OSSF Tank Configuration Detail b)
OSSF Tank Configuration Detail c)
OSSF Tank Configuration Detail d) and e)
OSSF Tank Configuration Detail f)
750 gal Pre-Cast 2-Compartment Concrete Tank
1000 gal Pre-Cast Concrete Tank
1000 gal Pre-Cast Concrete Pump Tank
Hydormatic Model SKHD 150 effluent pump Spec Sheets
SJE Rombus Duplex Controller Mod. 1221W114H1OEF
Connections: Two new forced mains to existing forced main
Tank Floatation Calculation work sheet
Zoeller Riser Spec Sheet

Existing Facility/Equipment Specs:

Site Evaluation Information Sheet
Specs on existing septic disposal field:
Drawing:

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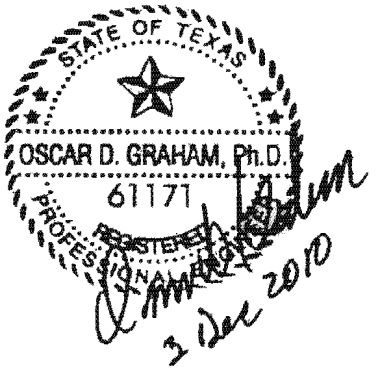
Calculation sheet:
Drawing of Drainage Plan
Field Detail
Drawing of Field and Forced Main
Perc Test Holes in relation to 948 line
Tank Configuration–Septic Tank and Lift Station 3,000 gal and 1,500 gal plus 1250 gal LS
Tank Configuration–settling tank and Equalization tank: 3,000 gal plus 6,000 gal

F:\Stwt26\Stw\DES\COMMERCIAL\4715 Cranes Mill\4715R1 Cranes Mill Park Modernization OSSF Design.wpd



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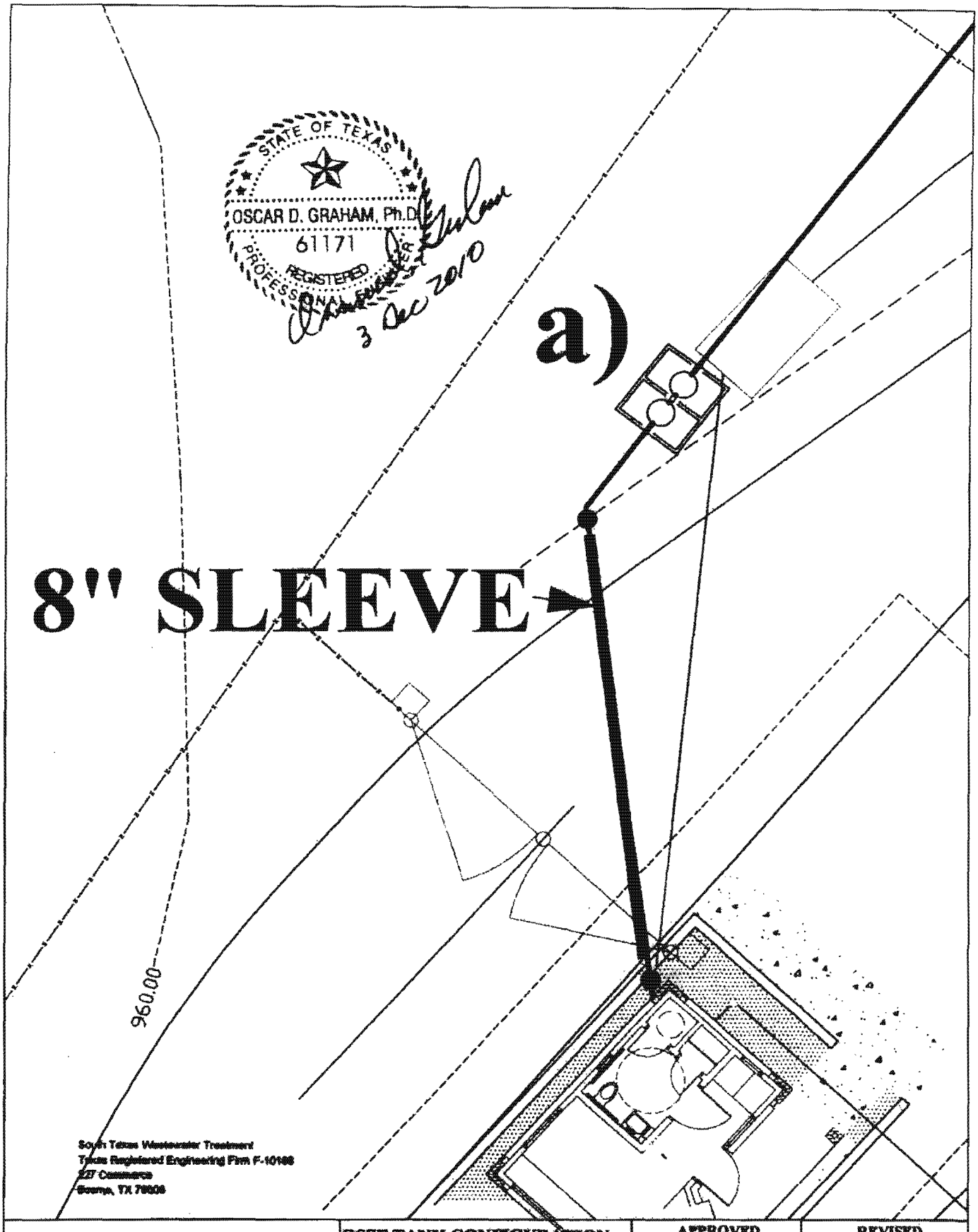
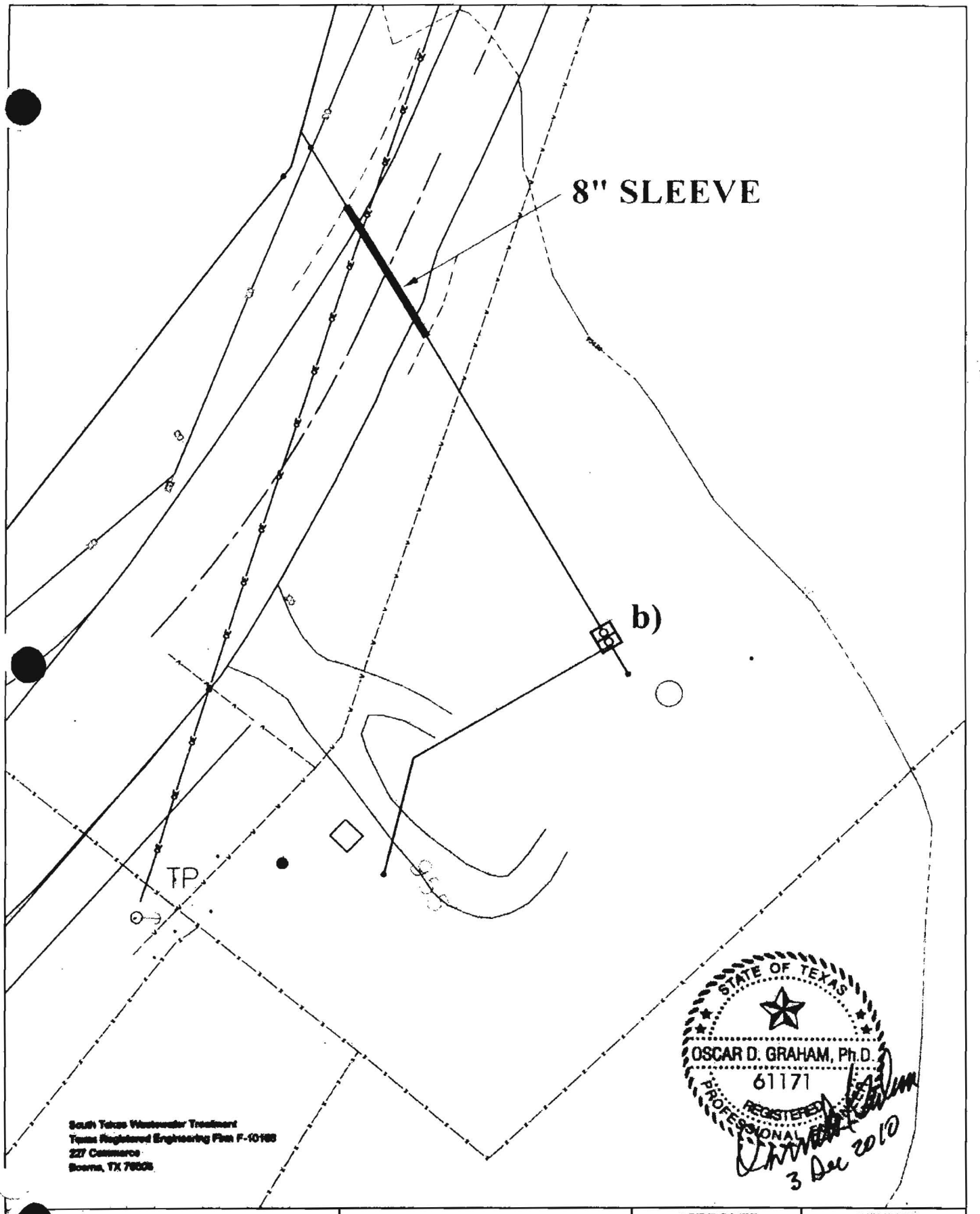


SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION a)	APPROVED	REVISED
			SHEET 1 OF 1



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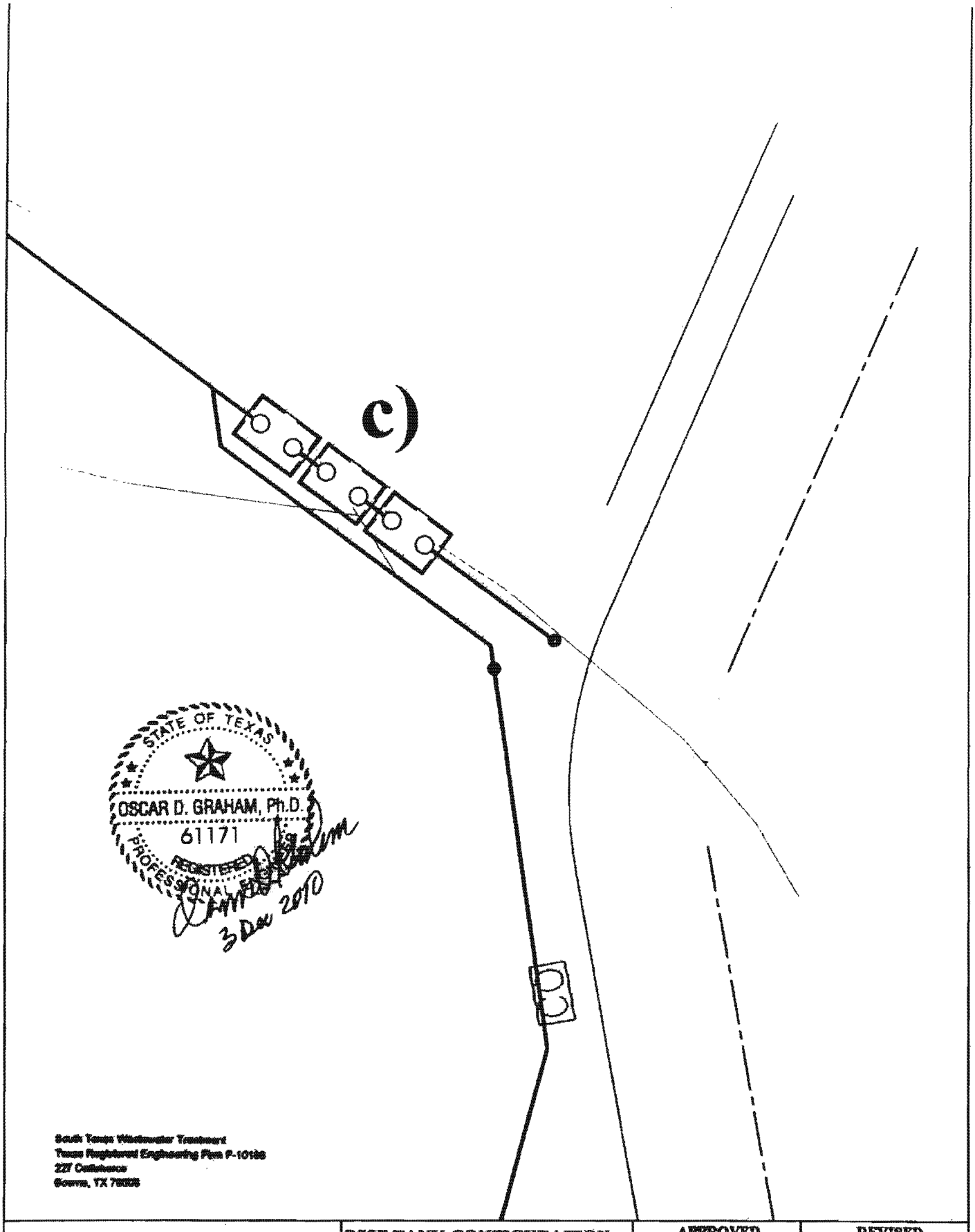
ENGINEER
3 Dec 2010

TH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-669-2783	OSSF TANK CONFIGURATION b)	APPROVED	REVISED
			SHEET ___OF___



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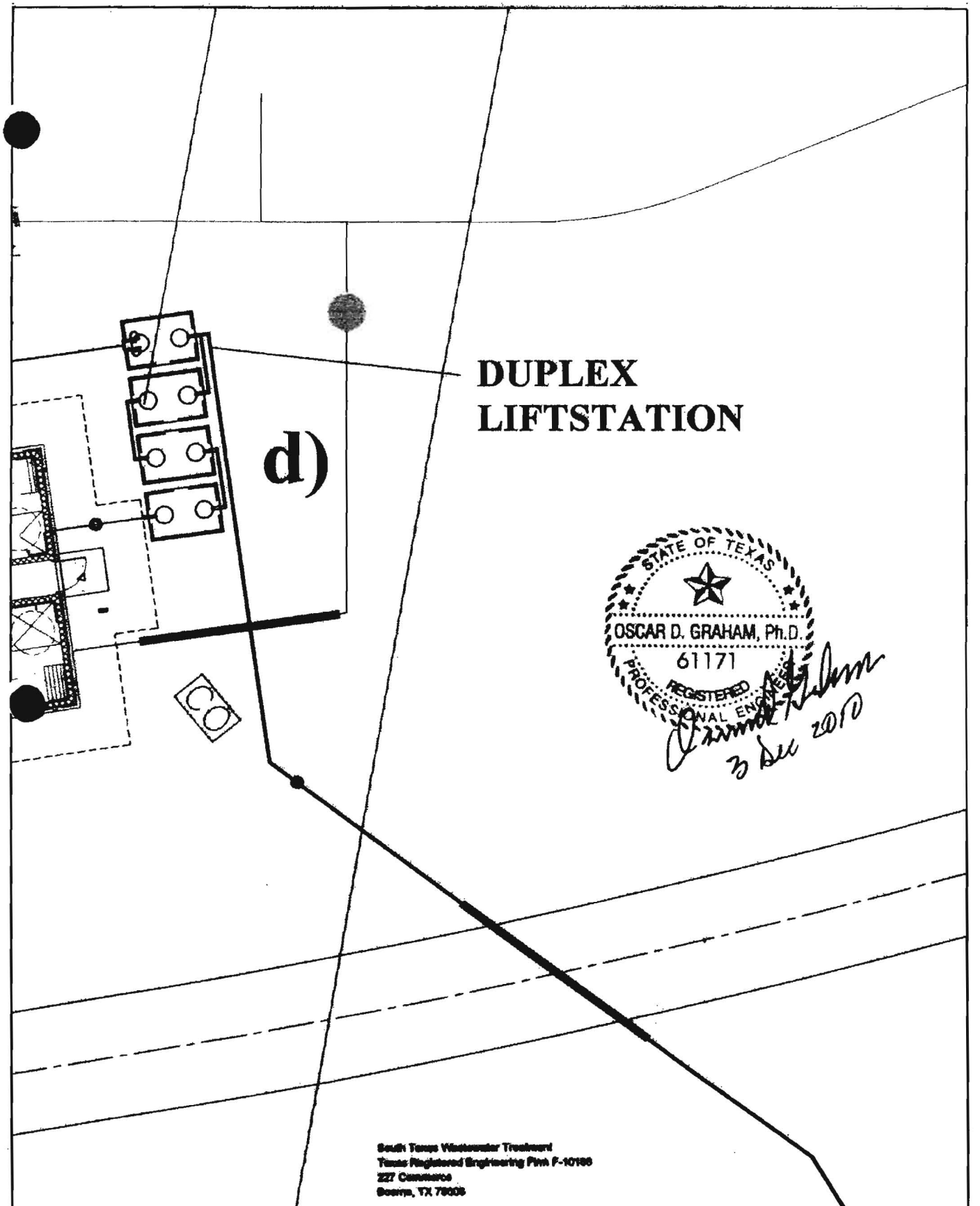
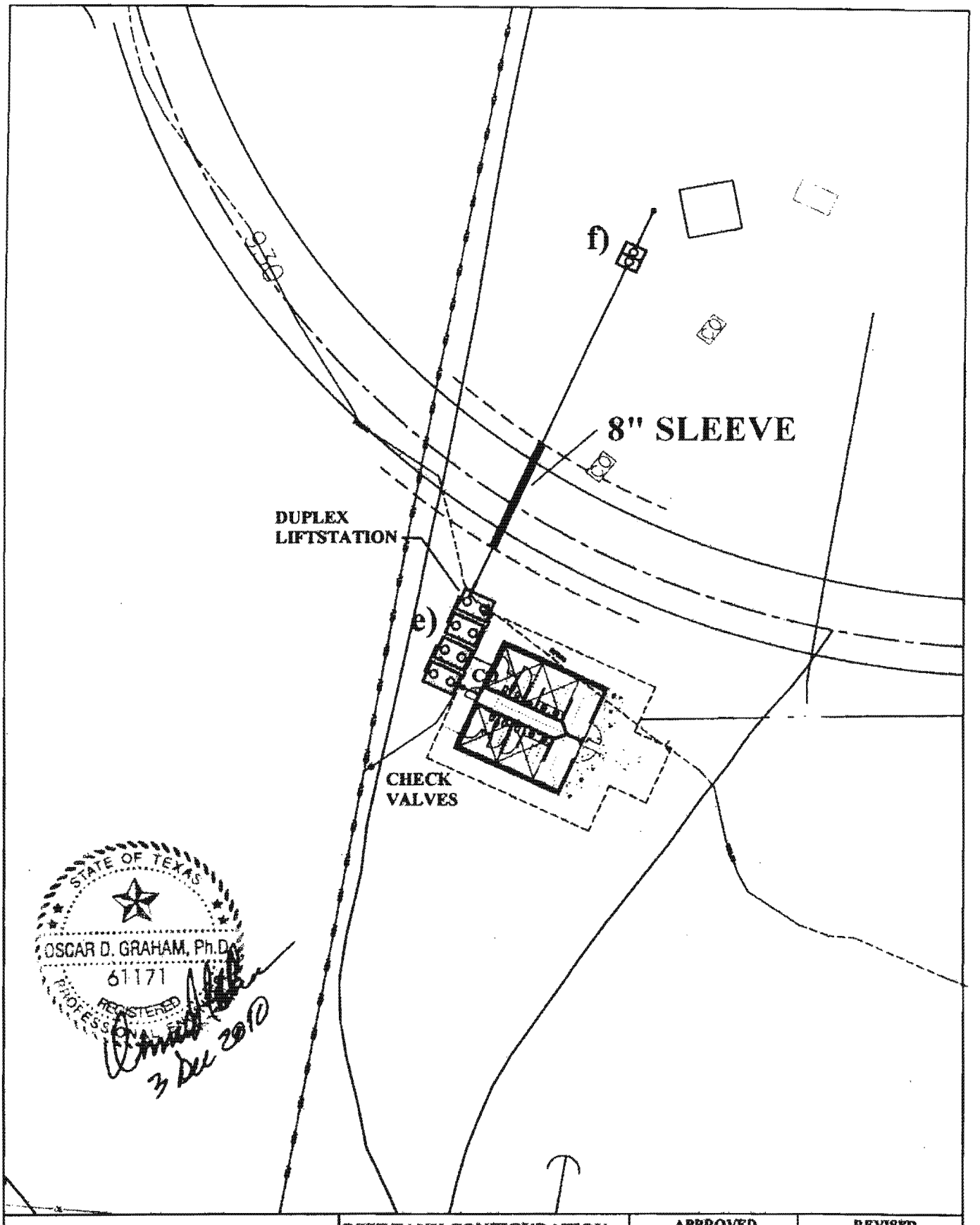
Texas Registered Engineering Firm P-10188
227 Cottonwood
Boerne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 830-669-2783	OSSF TANK CONFIGURATION c) revised	APPROVED	REVISED
			SHEET ___ of ___



SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 830-865-2783	OSSF TANK CONFIGURATION d) revised	APPROVED	REVISED
			SHEET --



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SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-569-2783	OSSF TANK CONFIGURATION e) and f)	APPROVED	REVISED
			SHEET ___OF___

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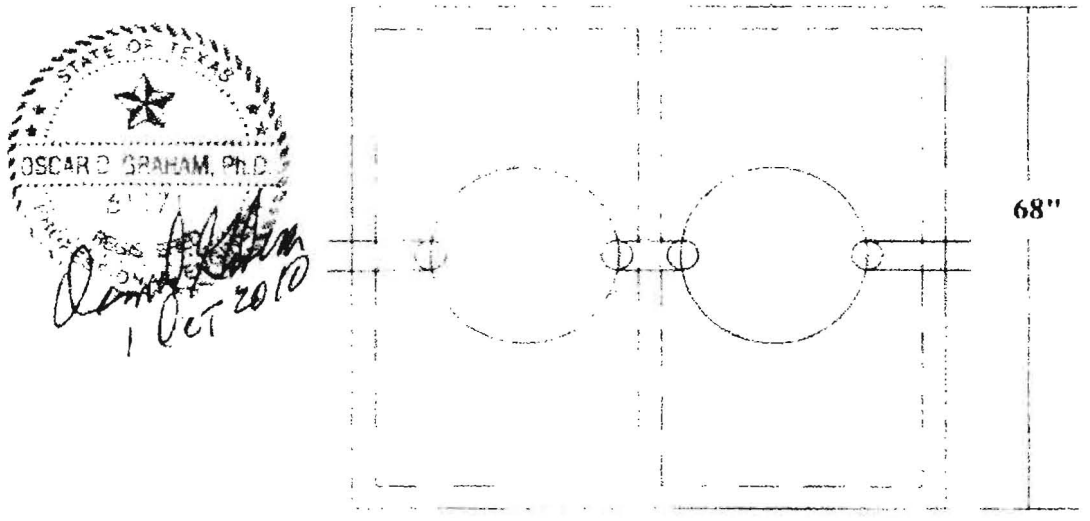
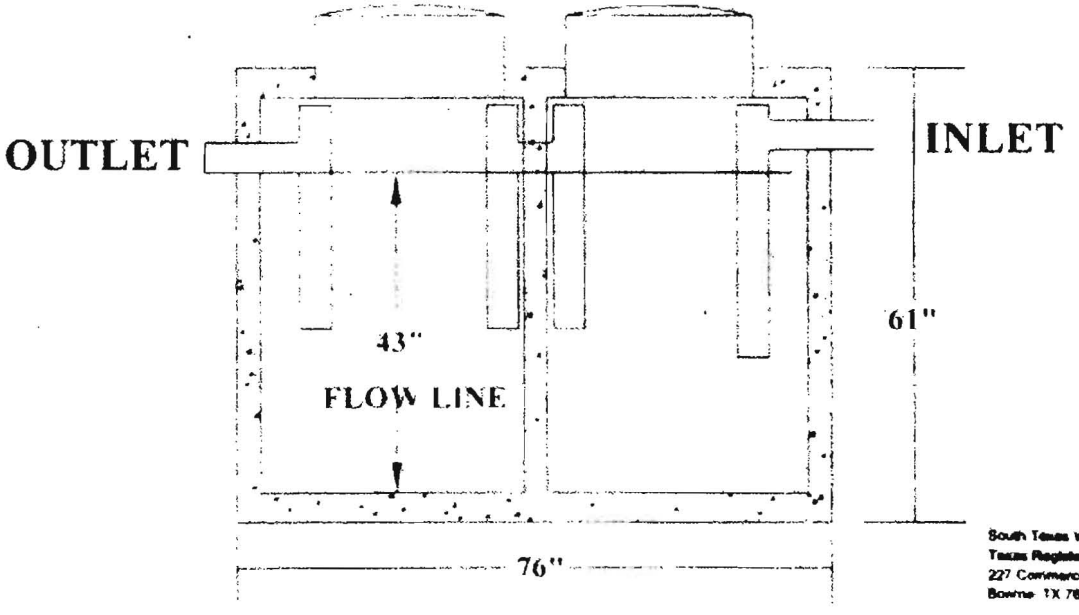
750 gal. PRE-CAST CONCRETE TANK

Two Compartment

BLOCK CREEK CONCRETE PRODUCTS LLC



24" Cast in Place Zoeller Risers w/SS Screw Down Lids



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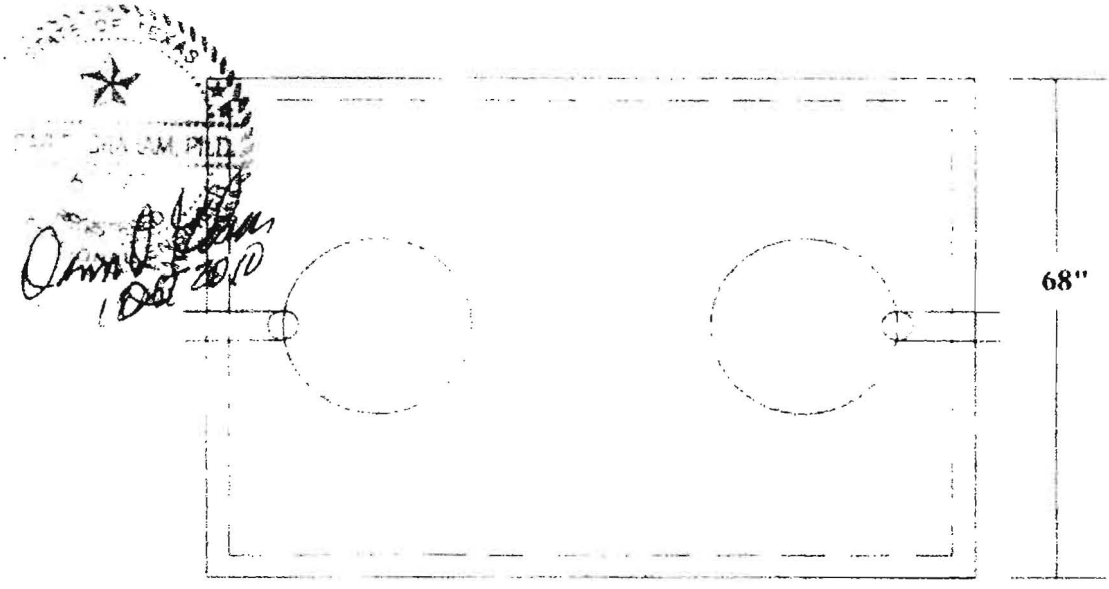
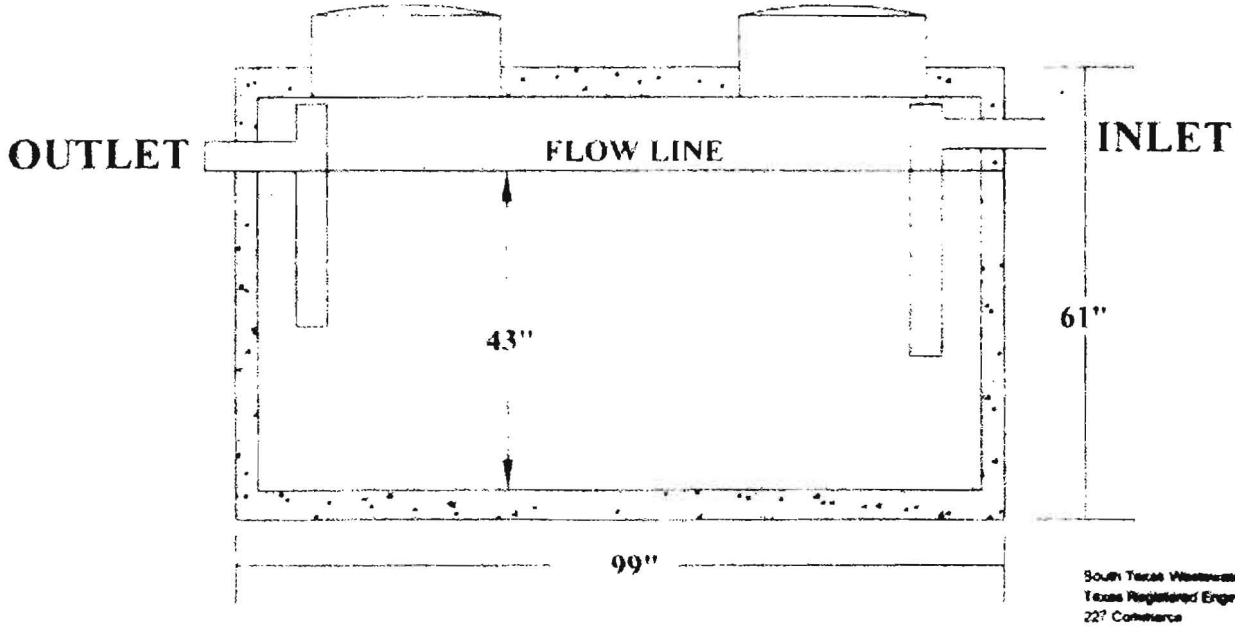
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 750 gal TWO COMPARTMENT	APPROVED	REVISED
			SHEET __OF__

1000 gal. PRE-CAST CONCRETE TANK
BLOCK CREEK CONCRETE PRODUCTS LLC



24" Cast in Place Zoeller Risers w/SS Screw Down Lids



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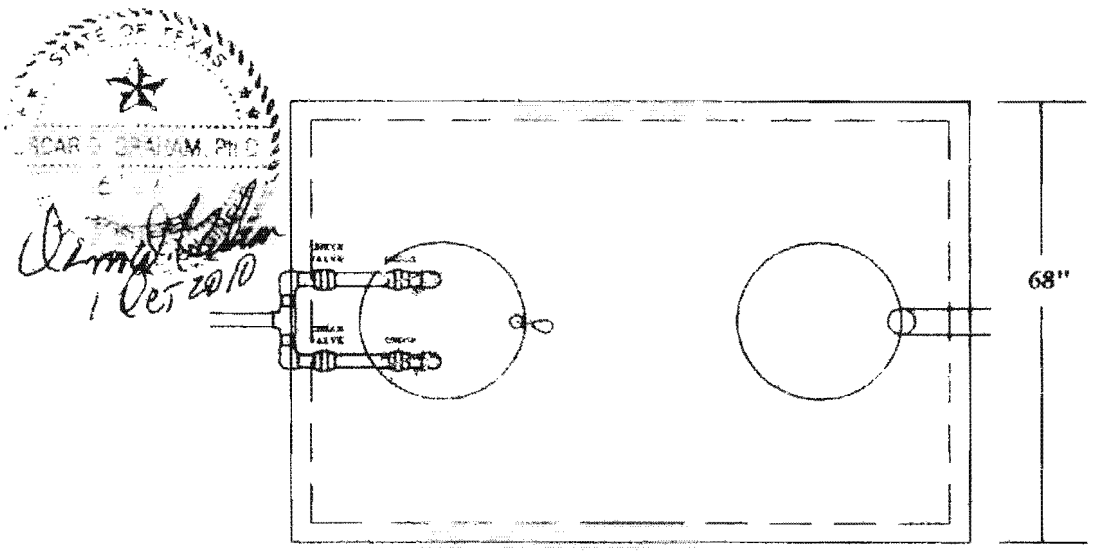
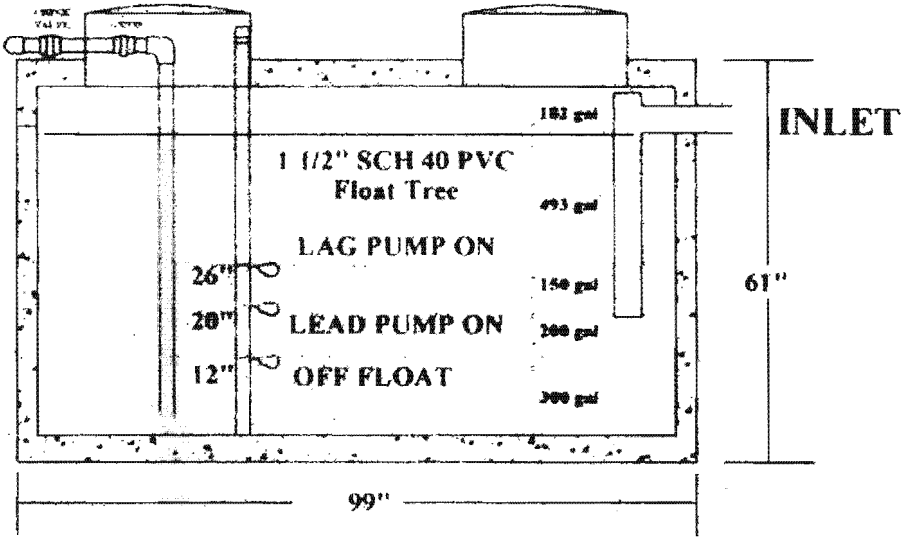
SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	OSSF TANK CONFIGURATION 1000 gal ONE COMPARTMENT	APPROVED	REVISED
			SHEET __ OF __

1000 gal. PRE-CAST CONCRETE LIFT STATION
BLOCK CREEK CONCRETE PRODUCTS LLC



24" Cast in Place Zoeller Risers w/SS Screw Down Lids



DUPLEX HYDROMATIC Mod. SKHD 150 EFFLUENT PUMPS

South Texas Wastewater Treatment
Texas Registered Engineering Firm F-10188
227 Commerce
Bourne, TX 78006

SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOURNE, TEXAS 78006 800-869-2783	1000 gal DUPLEX LIFT STATION	APPROVED	REVISED
			SHEET ___OF___

SKHD150 - Submersible Effluent Pump

DETAILS

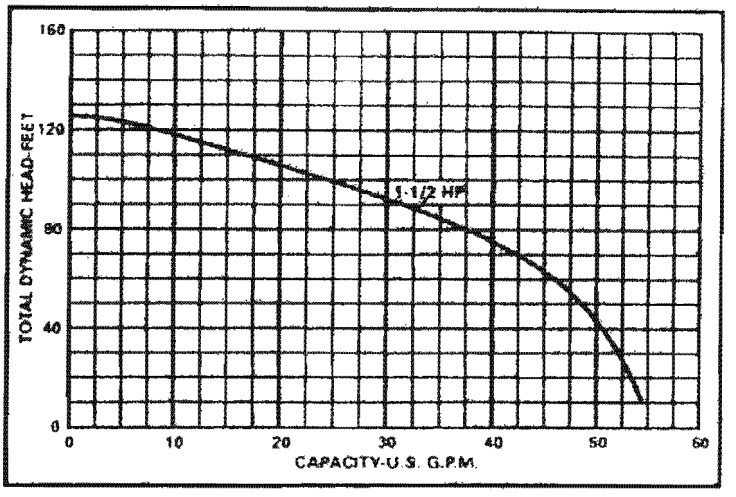
Pump Characteristics

Pump/Motor Unit	Submersible				
Normal Models	M2	M6	M3	M4	M5
Horsepower	1-1/2				
Full Load Amps	12.0	6.1	5.7	2.9	2.7
Motor Type	Capacitor Start	Three-Phase			
R.P.M.	3450				
Phase Ø	1	3			
Voltage	230	200	230	460	575
Hertz	60				
Operation	Intermittent				
Temperature	140°F Ambient				
NEMA Design	B				
Insulation	Class F				
Discharge Size	1-1/2" NPT				
Solids Handling	3/4"				
Unit Weight	75 lbs.				
Power Cord	16/3, STWA, 1ø, 230V = 20' std. 16/4, STWA, 1ø, 230V = 20' std.(S.F.) 18/5, STWA, 3ø, 200V, 230V 460V, or 575V = 20' std. (S.F.)				

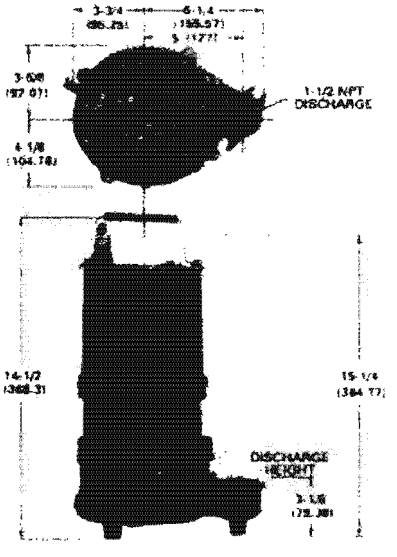
Materials of Construction

Handle	Steel
Lubricating Oil	Dielectric Oil
Seal Housing	Cast Iron
Motor Housing	Cast Iron
Pump Casing	Cast Iron
Shaft	Stainless Steel
Mechanical Shaft Seal	Seal Faces: Carbon/Ceramic Seal Body: Brass, Spring: Stainless Steel Bellows: Buna-N
Impeller	Thermoplastic
Upper Bearing	Single Row Ball Bearing
Lower Bearing	Single Row Ball Bearing
Fasteners	Stainless Steel

Performance Data



Dimensional Data



All dimensions in inches. Components dimensions may vary ± 1/8 inch. Dimensions data not to construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product and their specificationswithout notice.

HYDROMATIC®
Pentair Water

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740 East 9th Street Ashland, Ohio 44805
Tel: 419-289-3042 Fax: 419-281-4087

www.hydromatic.com

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269 Trillium Drive Kitchener, Ontario, Canada N2G 4W5
Tel: 519-896-2163 Fax: 519-896-6337

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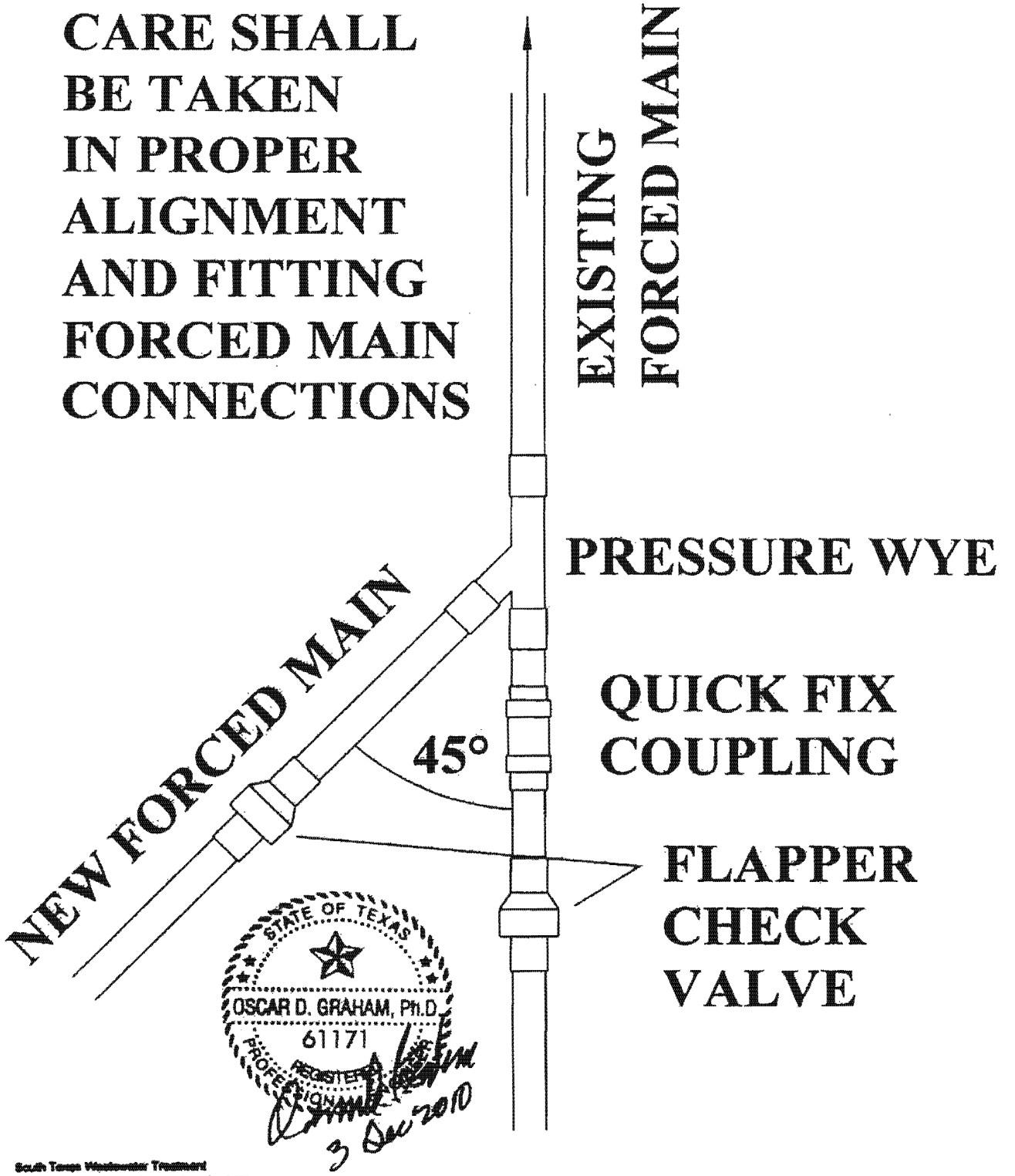
CARE SHALL BE TAKEN IN PROPER ALIGNMENT AND FITTING FORCED MAIN CONNECTIONS



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PROFESSIONAL ENGINEER
3 Dec 2010

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SOUTH TEXAS WASTEWATER TREATMENT P.O. BOX 1284 BOERNE, TEXAS 78006 800-869-2783	FORCED MAIN CONNECTION	APPROVED	REVISED
			SHEET __ OF __

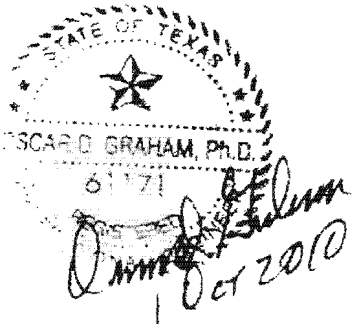
SOUTH TEXAS WASTEWATER TREATMENT

Authorized JET Distributor - Home and Commercial - Engineering Services
P.O Box 1284 Boerne, Texas 78006 * 830-249-8098 or 1-888-SO WASTE

PRECAST CONCRETE TANK FLOATATION CALCULATIONS
TIE-DOWN REQUIREMENTS WITHIN FLOOD ZONE

This letter acknowledges that according to FEMA map this property ***IS*** in the shaded area indicating that the entire lot is in the 100-year flood plain. The design for this OSSF has sufficient safeguards to insure that in the event of a 100 year flood this system will not cause a nuisance or health hazard. The concrete septic tank will not need special anchoring to prevent floatation during a flood event covering the area where tank is buried. (See calculations)

Calculations



The weight of one cubic foot of water = 62.4 pounds

1000 gallon precast concrete tank: (Block Creek)
area inside tank = 93" x 62" = 5,766 sq in
3.34 cu ft/in of air space

12" of air space above the flow line.
3.34 x 12" = 40.0 cu ft
40.0 x 62.4 pounds = 2,499 pounds (buoyancy)
the tank weights approximately 9,174 pounds; therefore, this tank will not float if filled to flow line even in an empty hole with no back-fill or soil on top.

1000 gal Pump Tank:
Empty tank has 3.34 cu ft/in x 41 in x 62.4 pounds/cu ft = 8,545 pounds of buoyancy with 12"(pump intake height) of water in the tank.
Tank weights 9,174 pounds; therefore, there is no need for extra weight to hold tank from floating.
Two Pumps weigh 75 pounds each for an additional 150 pounds - subtracting water displaced would add approximately 90 additional pounds

The tank should weight approximately 628 pounds more than the buoyancy when there is 12 inches of water left in the pump tank. Normally there is a minimum of 12 inches of soil on top of the tank.
12 inches of soil as a safety factor would weigh an additional 4,212 pounds

area of top of tank = 8.25 ft x 6.33 ft = 52.2 sq ft
12 inches of soil would mean that 1.93 cubic yards of soil would weigh down this tank for an additional 1.93 x 3,240 lbs/cu yd = 6,266 pounds

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South Texas Wastewater Treatment
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Boerne, TX 78006

"Quality Pumps Since 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER PUMP CO.

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347
SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

SECTION: 3.20.190
FM1572
0903
Supersedes
0203

visit our web site:
http://www.zoeller.com

ZOELLER ON-SITE WASTEWATER PRODUCTS

Zoeller Septic Tank Risers

Septic tank risers are an important part of any on-site treatment system. Risers allow easy access to septic or pump tanks in order to monitor system performance. Periodic maintenance costs are lowered due to easy accessibility to tanks. Many codes require risers on new installations. Zoeller Septic Tank Risers can be adapted to both new and existing installations. All materials are noncorrosive and environmentally safe.

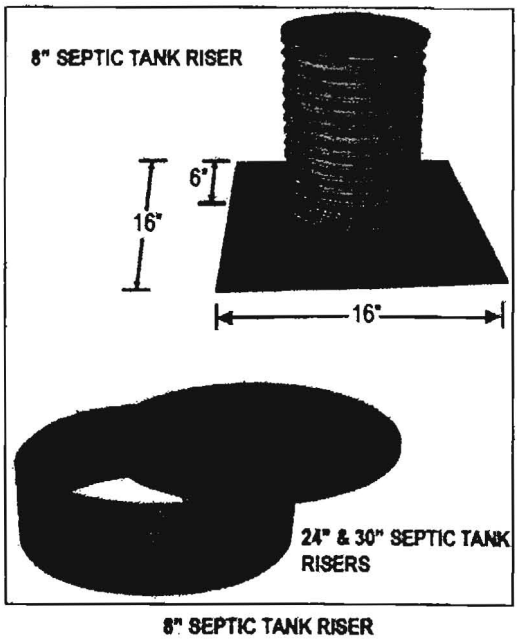
8" Diameter Riser Features:

- Riser is available in 12", 24" and 36" heights.
- Entire system is constructed of UV stabilized PVC to resist sunlight deterioration.
- Cover is dark grey in color and clearly marked with the word "Sewer".
- Screws are square head (#2 Robertson) for extra added security.
- PVC pipes, PVC mounting flange, and stainless steel screws all included in kit.
- Risers are also available without mounting plate for cast in place applications.

24" & 30" Diameter Riser Features:

- Risers are available in heights of 8" up to 7 feet.
- Height is easily adjustable in the field by cutting riser pipe between any two ribs.
- Cover is green in color and has attractive texture to blend in with surroundings.
- All risers and covers are wheel load rated for 2500 pounds for added strength and durability.
- Riser pipes are ribbed for extra strong construction.
- Components are watertight to avoid unwanted ground water infiltration.
- Screws are square head (#3 Robertson) for extra added security.
- PVC pipe, stainless steel screws, and fiberglass UV stabilized cover are all included for easy, quick ordering.

Lifetime Warranty - Every Zoeller riser is guaranteed to be free from defects in materials and workmanship for the lifetime of the homeowner/purchaser. Free repair or replacement, excluding labor, will be made on return of the riser prepaid to the factory. This warranty is limited to product proven to be free from abuse or improper installation.



P/N 014514

8" SEPTIC TANK RISER

Part Number	Riser Height
172-0023	12" Tall
172-0024	24" Tall
172-0025	36" Tall
172-0046	12" Tall without Mounting Plate
172-0026	24" Tall without Mounting Plate
172-0027	36" Tall without Mounting Plate

24" SEPTIC TANK RISER

Part Number	Riser Height
172-0018	8"
172-0003	1'
172-0044	18"
172-0004	2'
172-0005	3'
172-0006	4'
172-0007	5'
172-0008	6'
172-0009	7'

30" SEPTIC TANK RISER

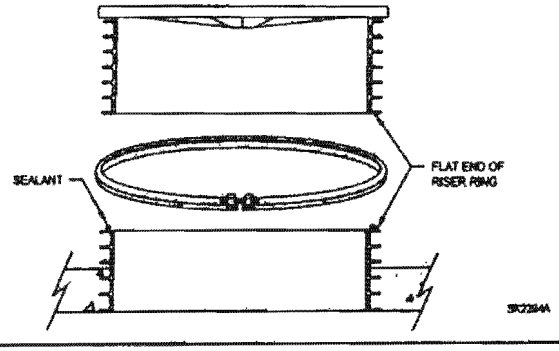
Part Number	Riser Height
172-0028	8"
172-0029	1'
172-0045	18"
172-0030	2'
172-0031	3'
172-0032	4'
172-0033	5'
172-0034	6'
172-0035	7'

Mounting Options

CAST IN PLACE

☐ P/N 172-0050 for 24" dia. risers.
Barrel clamp and sealant extension kit.

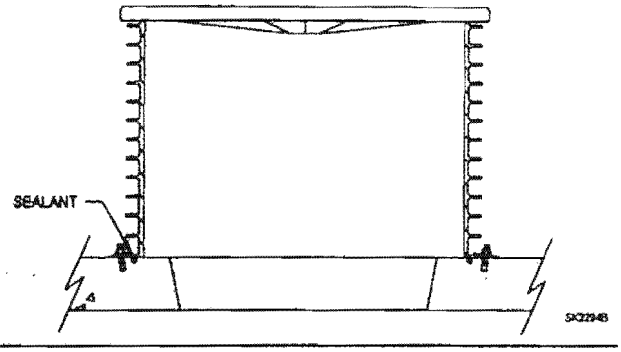
Risers can be cast in place or an 8" tall adapter and coupling can be used to extend riser.



BOLT DOWN KIT

☐ P/N 172-0047

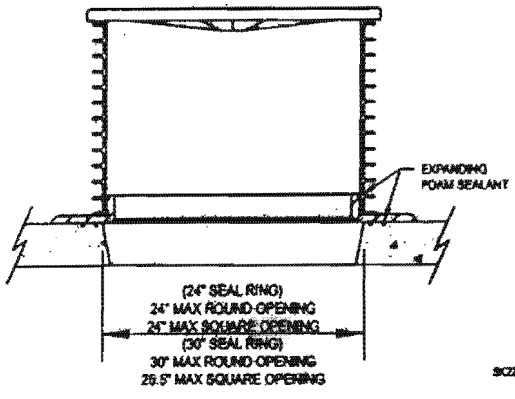
Bolt down kit with sealant for securing riser to flat tank top where riser will cover tank opening.



SEAL RING

☐ P/N 172-0048 34" outer diameter ring for 24" dia. risers.
☐ P/N 172-0049 36" outer diameter ring for 30" dia. risers.
☐ P/N 172-0052 Expanding foam sealant.

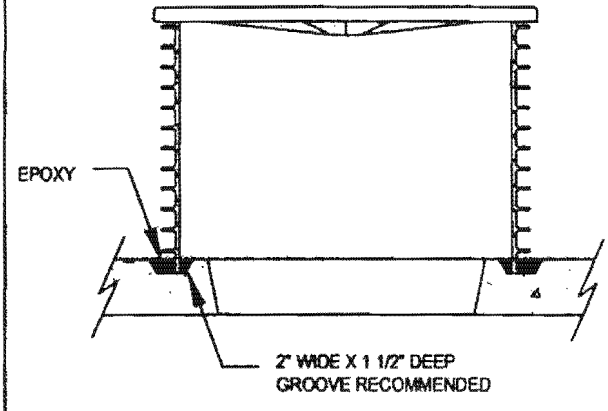
For mounting risers to oversized opening.
(Uses expanding foam sealant to secure)



EPOXY MOUNTING

☐ P/N 172-0019 Quart Wgt. 1.0 lb.

For mounting riser in a precast groove.

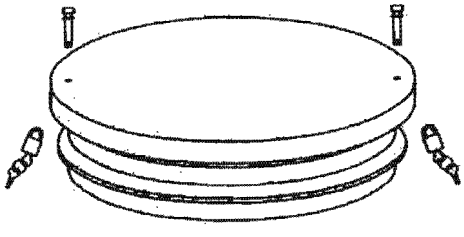


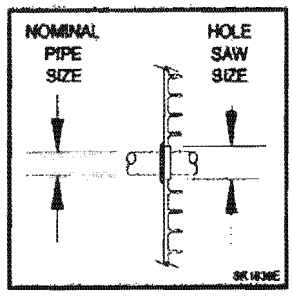
Accessories

Lockable Latch

☐ 172-0020* 24" Diameter Riser Wgt. 1.0 lb.
☐ 172-0056* 30" Diameter Riser Wgt. 1.0 lb.

*3/16" Shackled locks required (Not Included)





Pipe Seals			
Part Number	Nominal Pipe Size	Hole Saw Dia.	Weight
014502	3/8" IPS	1"	0.5 lbs.
014503	½" IPS	1.25"	0.5 lbs.
014504	¾" IPS	1.25"	0.5 lbs.
014505	1" IPS	1.75"	0.5 lbs.
006813	1¼" IPS	2"	0.5 lbs.
005882	1½" IPS	2.5"	0.5 lbs.
005588	2" IPS	3"	0.5 lbs.
005587	3" IPS	4"	0.5 lbs.
005196	4" IPS	5"	0.5 lbs.

Lid Only with SS Screws

☐ 17-0275 Lid only 24" Wgt. 16 lbs.
☐ 17-0342 Lid only 30" Wgt. 24 lbs.

ALL ZOELLER ON-SITE WASTEWATER PRODUCTS MUST BE INSTALLED IN ACCORDANCE WITH LOCAL AND/OR STATE PLUMBING AND/OR HEALTH DEPARTMENT CODES.

Attachment G

Alternative Secondary Containment Methods

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(No alternative secondary containment methods are proposed as part of the project. – Not Applicable.)

Attachment I

20% or Less Impervious Cover

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(While this site does not have over 20% of Impervious cover, it does not qualify as a multi-family residential development, school, or small business. – Not Applicable.)

Attachment J

BMP for Upgradient Stormwater

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

There is a minimal amount of upgradient stormwater generated towards proposed construction sites and is generally represented as overland or 'sheet' flow towards Canyon Lake.

Canyon Lake's Crane's Mill Park is located on the south shore of Canyon Lake at the western end of the lake. The peninsula that is the park has a 'spine' running down the center of the park that slope towards the lake to the west, north and east. Topography ranges from relatively flat (2 - 4% grade) over the majority of the park to steep banks along the western shoreline.

Naturally occurring Vegetative Buffers located upgradient of areas of soil disturbance will serve as a permanent BMP to reduce the velocity and volume of storm water related runoff flowing towards these disturbed areas. These areas adjacent to construction areas will be protected from disturbance. If necessary, existing grasses and ground covering vegetation will be over seeded if necessary to provide adequate vegetative cover to insure their function as buffer zones.

Buffers will be constructed by the planting of native grasses and forbs to include but not limited little bluestem, sideoats grama, sandhill lovegrass, buffalo grass, eastern gama and wildflowers native to the area. If construction activities are completed during fall or winter, a mixture of cool weather annual grasses, i.e. oats and wheat, will be planted as an over crop to provide soil stabilization until the permanent grasses and forbs germinate.

If it is determined that additional upgradient runoff control measures are needed, such as silt fences or hay bale dikes, they will be located and constructed in accordance with TCEQ's Technical Guidance Manual (TGM).

Attachment K

BMPs for On-Site Storm water

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

DESCRIPTION OF PERMANENT CONTROL MEASURES

Vegetative Buffers will be established as part of the post-construction work on all disturbed areas. These buffer strips in addition to existing vegetative areas will provide a total of approximately 43.0 acres of filtration to slow down storm water runoff and trap sediment. Existing vegetation will protected during construction activities and all disturbed areas will be planted with native grasses and forbs to include but not limited to little bluestem, sideoats grama, sandhill lovegrass, buffalo grass, eastern gama and wildflowers native to the area. If construction activities are completed during fall or winter, a mixture of cool weather annual grasses, i.e. oats and wheat, will be planted as an over crop to provide soil stabilization until the permanent grasses and forbs germinate.

The Vegetative Buffer Strips will serve to prevent pollutants from entering surface drainages that flow towards Canyon Lake. In addition to the strips planted after construction activities are completed, existing grasses and ground covering vegetation, i.e. grasses, forbs, etc., adjacent to construction areas will be over seeded if necessary to provide adequate vegetative cover to insure their function as buffer zones.

TSS REMOVAL AND BMP SIZING CALCULATIONS

Equation 3.1 **L = A x p x Rv x C x 0.226**

Where: L = annual pollutant load (pounds)

A = Contributing drainage area (acres)

P = Average annual precipitation (inches)

Rv = Appropriate runoff coefficient

C = Average TSS concentration (mg/L)

0.226 = units conversion factor

Pervious cover

L = 22.3 x 33 x 0.03 x 80 x 0.226 = 399 pounds

Impervious cover

L = 22.3 x 33 x 0.90 x 170 x 0.226 = 25,446 pounds

Total Annual Pollutant Load

399 + 25446 = 25,845 pounds

STEP 1 **Equation 3.3** **Required TSS Removal**

Lm = 27.2(An x P)

Where: Lm = Required TSS removal (pounds)

An = Net increase in Impervious area (acres)

P = Average annual precipitation (inches)

Lm = 27.2(2.8 x 33) = 2513 pounds

STEP 2 **Select BMP**

Vegetative Filter Strip

STEP 3 **Equation 3.8** **TSS Load Removed by BMP**

Lr = (PMP efficiency) x P x (Ai x 34.6 = Ap x 0.54)

Where: Lr = Load removed by BMP

BMP efficiency = TSS removal (efficiency expressed as a decimal fraction from Table 3-4)

Ai = impervious tributary area to the BMP (ac)

Ap = pervious tributary area to the BMP (ac)

P = average annual precipitation (inches, Table 3-3)

Lr = 0.85 x 33 x (9.5 x 34.6) + (33.5 x 0.54)

Lr = 28.05(328.7 + 18.09)

Lr = 9727 pounds removed by BMP

STEP 4 **Equation 3.9** **Fraction of Annual Runoff to be Treated**

F = Lm/Lr

Where: F = Fraction of the annual rainfall treated by the BMP

Lr = Load removed for each BMP from Step 3 calculation (pounds)

Lm = Required load reduction from Step 1 (pounds)

F = 2513/9727

F = 0.26

STEP 5 **Equation 3.10** **Water Quality Volume**

WQV = Rainfall depth (Table 3-5) x Runoff coefficient x Area

WQV = 0.16 x 0.16 x 22.3

WQV = 0.57

The load removed exceeds required reduction.

Attachment L

BMP for Surface Streams

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(This project does not contain any surface streams. All runoff goes directly into receiving waters. – Not Applicable.)

Attachment M

Construction Plans

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

See attached sheets.

US Army Corps of Engineers
Fort Worth District

CRANES MILL PARK

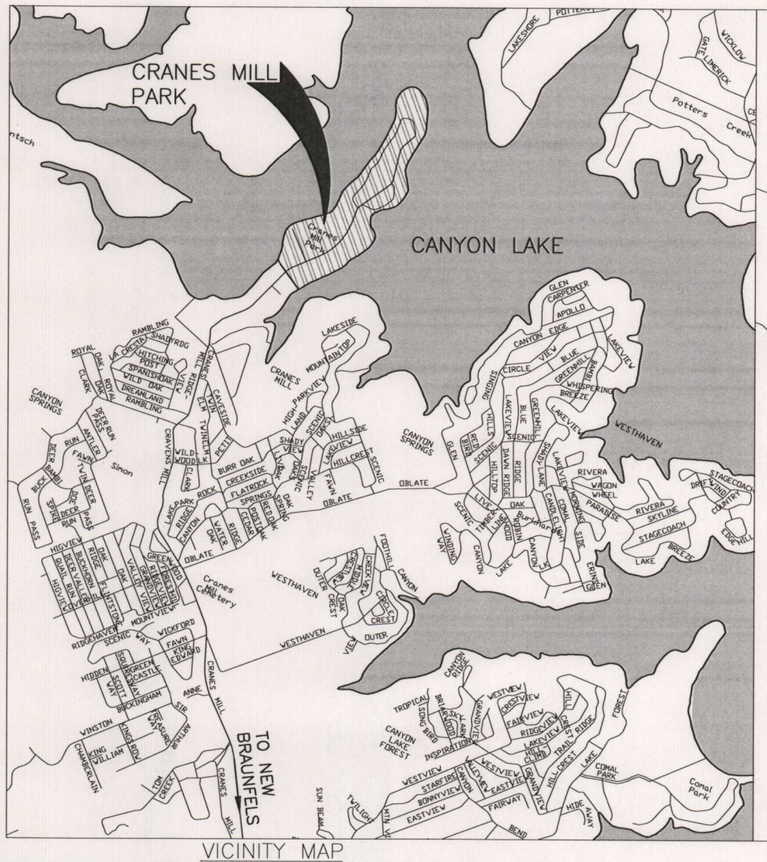
FURNISH AND INSTALL UTILITIES AND ROADS

CANYON LAKE, TEXAS

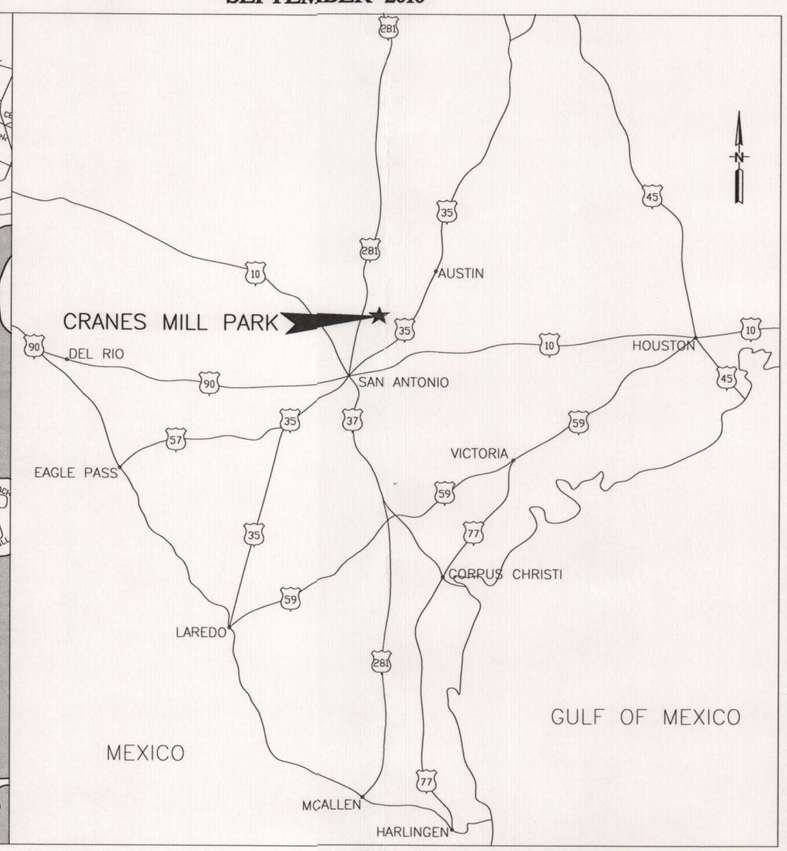
CONTRACT NO. W9126G-10-C-0066

SEPTEMBER 2010

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.



VICINITY MAP



AREA MAP

SHEET LISTING

SHEET NUMBER	SHEET IDENTIFIER	SHEET TITLE
1	C1.1	TITLE SHEET / AREA MAP / SHEET LISTING
2	C2.1	OVERALL SITE MAP
3	C3.1	UTILITY PLAN / SHEET 1
4	C3.2	UTILITY PLAN / SHEET 2
5	C4.1	SITE PLAN / ACCESS COMPLEX
6	C4.2	SITE PLAN / DUMP STATION / CAMPSITE AREA 1
7	C4.3	SITE PLAN / CONNECTING ROAD
8	C4.4	SITE PLAN / CAMPSITE AREA 2
9	C5.1	DETAIL SHEET / SHEET 1
10	C5.2	DETAIL SHEET / SHEET 2
11	C5.3	DETAIL SHEET / SHEET 3
12	E0.1	ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES
13	E1.1	PARTIAL SITE PLAN (SOUTH) ELECTRICAL
14	E1.2	PARTIAL SITE PLAN (NORTH) ELECTRICAL
15	E2.1	ONE LINE RISER AND ELECTRICAL CALCULATIONS FOR RV PARK
16	E2.2	ONE LINE RISER AND ELECTRICAL CALCULATIONS FOR TENT AREA

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN-MARK MATKIN
DATE: 09/15/2010
DWN BY: JDV
CKD BY: GDK
SOLICITATION NO.: W9126G-09-R-0116
SUBMITTED BY: ANNUAL
CONTRACT NO.: W9126G-10-C-0066
PLOT SCALE:
PLOT DATE:
FILE NUMBER: 2410.060
SIZE: ANSI D
FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS

TITLE SHEET AREA MAP SHEET LISTING

SHEET IDENTIFICATION
C-1.1
SHEET 1 OF 16

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.

SCALE: 1" = 200'

0 100 200 400 800

GRAPHIC SCALE

LEGEND

PROPOSED ROADWAY

SITE MAP
ACCESS COMPLEX
SHEET C4.1

SITE MAP
DUMP STATION
CAMPSITE AREA 1
SHEET C4.2

OVERALL UTILITY PLAN
SHEET C3.2

SITE MAP
CONNECTING ROAD
SHEET C4.3

OVERALL UTILITY PLAN
SHEET C3.1

SITE MAP
CAMPSITE AREA 2
SHEET C4.4

BOAT RAMP ACCESS

CRANES MILL ROAD

TRAIL

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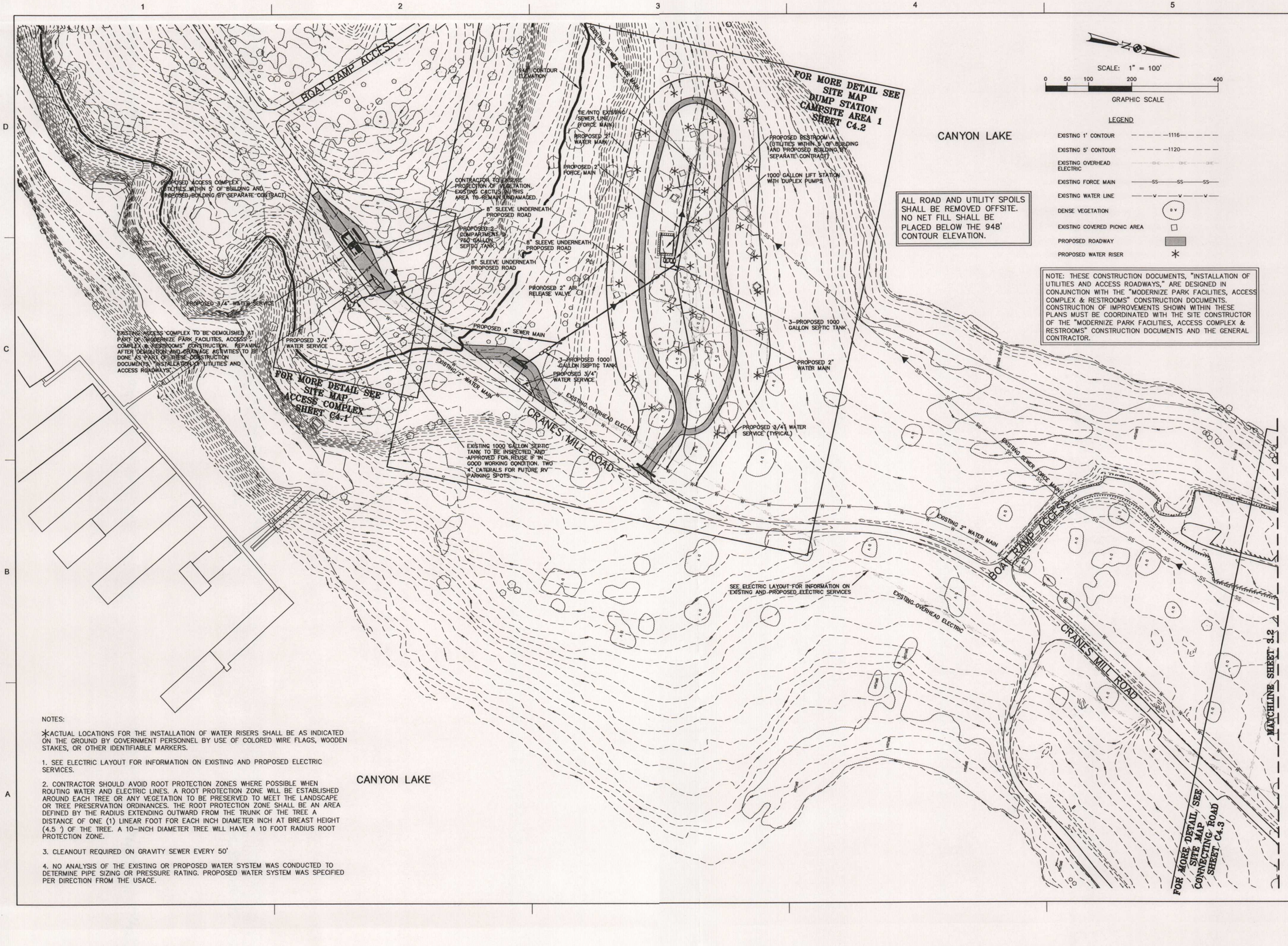
MATTHEW B. McDONALD
95797
LICENSED
PROFESSIONAL ENGINEER
1/7/11

DESIGNED BY:	DATE:
DWN BY:	CKD BY:
SUBMITTED BY:	SOLICITATION NO.:
PLOT SCALE:	PLOT DATE:
SIZE:	FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL
UTILITIES AND ROADS
CANYON LAKE, TEXAS

OVERALL SITE MAP

SHEET IDENTIFICATION
C-2.1



NOTES:

*ACTUAL LOCATIONS FOR THE INSTALLATION OF WATER RISERS SHALL BE AS INDICATED ON THE GROUND BY GOVERNMENT PERSONNEL BY USE OF COLORED WIRE FLAGS, WOODEN STAKES, OR OTHER IDENTIFIABLE MARKERS.

1. SEE ELECTRIC LAYOUT FOR INFORMATION ON EXISTING AND PROPOSED ELECTRIC SERVICES.

2. CONTRACTOR SHOULD AVOID ROOT PROTECTION ZONES WHERE POSSIBLE WHEN ROUTING WATER AND ELECTRIC LINES. A ROOT PROTECTION ZONE WILL BE ESTABLISHED AROUND EACH TREE OR ANY VEGETATION TO BE PRESERVED TO MEET THE LANDSCAPE OR TREE PRESERVATION ORDINANCES. THE ROOT PROTECTION ZONE SHALL BE AN AREA DEFINED BY THE RADIUS EXTENDING OUTWARD FROM THE TRUNK OF THE TREE A DISTANCE OF ONE (1) LINEAR FOOT FOR EACH INCH DIAMETER INCH AT BREAST HEIGHT (4.5 ') OF THE TREE. A 10-INCH DIAMETER TREE WILL HAVE A 10 FOOT RADIUS ROOT PROTECTION ZONE.

3. CLEANOUT REQUIRED ON GRAVITY SEWER EVERY 50'

4. NO ANALYSIS OF THE EXISTING OR PROPOSED WATER SYSTEM WAS CONDUCTED TO DETERMINE PIPE SIZING OR PRESSURE RATING. PROPOSED WATER SYSTEM WAS SPECIFIED PER DIRECTION FROM THE USACE.

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DESIGNED BY: JOHN-MARK MATKIN
DWN BY: JDV
CKD BY: GDK
SUBMITTED BY: JIM BEHL
PLOT SCALE: 1
PLOT DATE:
FILE NAME:
SIZE: ANSI D
DATE: 09/15/2010
SOLICITATION NO.: W912QG-08-R-0116
CONTRACT NO.: W912QG-10-C-0086
FILE NUMBER: 2416.00

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS
UTILITY PLAN
SHEET 1

SHEET IDENTIFICATION
C-3.1
SHEET 3 OF 16

NOTES:

✳ACTUAL LOCATIONS FOR THE INSTALLATION OF WATER RISERS SHALL BE AS INDICATED ON THE GROUND BY GOVERNMENT PERSONNEL BY USE OF COLORED WIRE FLAGS, WOODEN STAKES, OR OTHER IDENTIFIABLE MARKERS.

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3. CLEANOUT REQUIRED ON GRAVITY SEWER EVERY 50'

4. NO ANALYSIS OF THE EXISTING OR PROPOSED WATER SYSTEM WAS CONDUCTED TO DETERMINE PIPE SIZING OR PRESSURE RATING. PROPOSED WATER SYSTEM WAS SPECIFIED PER DIRECTION FROM THE USACE.

SCALE: 1" = 100'

0 50 100 200 400

GRAPHIC SCALE

LEGEND

- EXISTING 1' CONTOUR ——1116——
- EXISTING 5' CONTOUR ——1120——
- EXISTING OVERHEAD ELECTRIC ——OHE——
- EXISTING UNDERGROUND ELECTRIC ——UGE——
- EXISTING WATER LINE ——W——
- DENSE VEGETATION DV
- EXISTING COVERED PICNIC AREA
- PROPOSED IMPROVEMENTS
- PROPOSED WATER RISER ✳
- PROPOSED UTILITY CROSSING SEE DETAIL SHEET

ALL ROAD AND UTILITY SPOILS SHALL BE REMOVED OFFSITE. NO NET FILL SHALL BE PLACED BELOW THE 948' CONTOUR ELEVATION.

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.

FOR MORE DETAIL SEE SITE MAP CONNECTING ROAD SHEET C4.3

FOR MORE DETAIL SEE SITE MAP CAMPSITE AREA 2 SHEET C4.4

MATCHLINE SHEET C-3.1

CANYON LAKE

CRANES MILL ROAD

1000 GALLON LIFT STATION WITH DUPLEX PUMPS

PROPOSED RESTROOM 'G' (UTILITIES WITHIN 5' OF BUILDING AND PROPOSED BUILDING BY SEPARATE CONTRACT)

8" SLEEVE UNDERNEATH PROPOSED ROAD

EXISTING UNDERGROUND ELECTRIC

PROPOSED 4" SEWER LATERAL

PROPOSED 2" SEWER FORCE MAIN

3-PROPOSED 1000 GALLON SEPTIC TANK

EXISTING 4" SEWER FORCE MAIN

PROPOSED 2 COMPARTMENT 750 GALLON SEPTIC TANK

PROPOSED 3/4" WATER SERVICE

PROPOSED 2" WATER MAIN

SEE ELECTRIC LAYOUT FOR INFORMATION ON EXISTING AND PROPOSED ELECTRIC SERVICES

EXISTING OVERHEAD ELECTRIC

EXISTING 2" WATER MAIN

CONTRACTOR SHALL OPEN CUT EXISTING ROAD, RIVER TO MATCH EXISTING PAVEMENT FOR PAVEMENT REPAIR

2" 90° BEND, PVC

2"X3/4" CROSS, PVC

PROPOSED 3/4" WATER SERVICE

EXISTING POWER STATION

1-2" TEE, PVC
1-2" BALL VALVE W/ BOX, COMPLETE

1-2" TEE, PVC
2-2" BALL VALVE W/ BOX, COMPLETE

2" 90° BEND, PVC

CONTRACTOR SHALL OPEN CUT EXISTING ROAD, REFER TO MATCH EXISTING PAVEMENT FOR PAVEMENT REPAIR

PROPOSED 2" WATER MAIN

PROPOSED 3/4" WATER SERVICE

PROPOSED 1 1/2" WATER SERVICE

2"X3/4" TEE, PVC

PROPOSED 3/4" WATER SERVICE

CANYON LAKE

PROPOSED 2" WATER MAIN

CONTRACTOR SHALL OPEN CUT EXISTING ROAD, REFER TO MATCH EXISTING PAVEMENT FOR PAVEMENT REPAIR.

PROPOSED 2" WATER MAIN

PROPOSED 3/4" WATER SERVICE (TYPICAL)

PROPOSED 2" WATER MAIN

PROPOSED 2" WATER MAIN

PROPOSED 1 1/2" WATER SERVICE

PROPOSED 3/4" WATER SERVICE

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CHK BY: JM
SUBMITTED BY: JIM BEHL
PLOT SCALE: 1
PLOT DATE:
SIZE: ANSI D
DATE: DEC 2010
SOLICITATION NO.: W912RG-08-R-0116
CONTRACT NO.: W912RG-10-C-0066
FILE NUMBER: 2415.00
FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS

UTILITY PLAN
SHEET 2

SHEET IDENTIFICATION
C-3.2
SHEET 4 OF 16

RECOMMENDED GRASS SEED

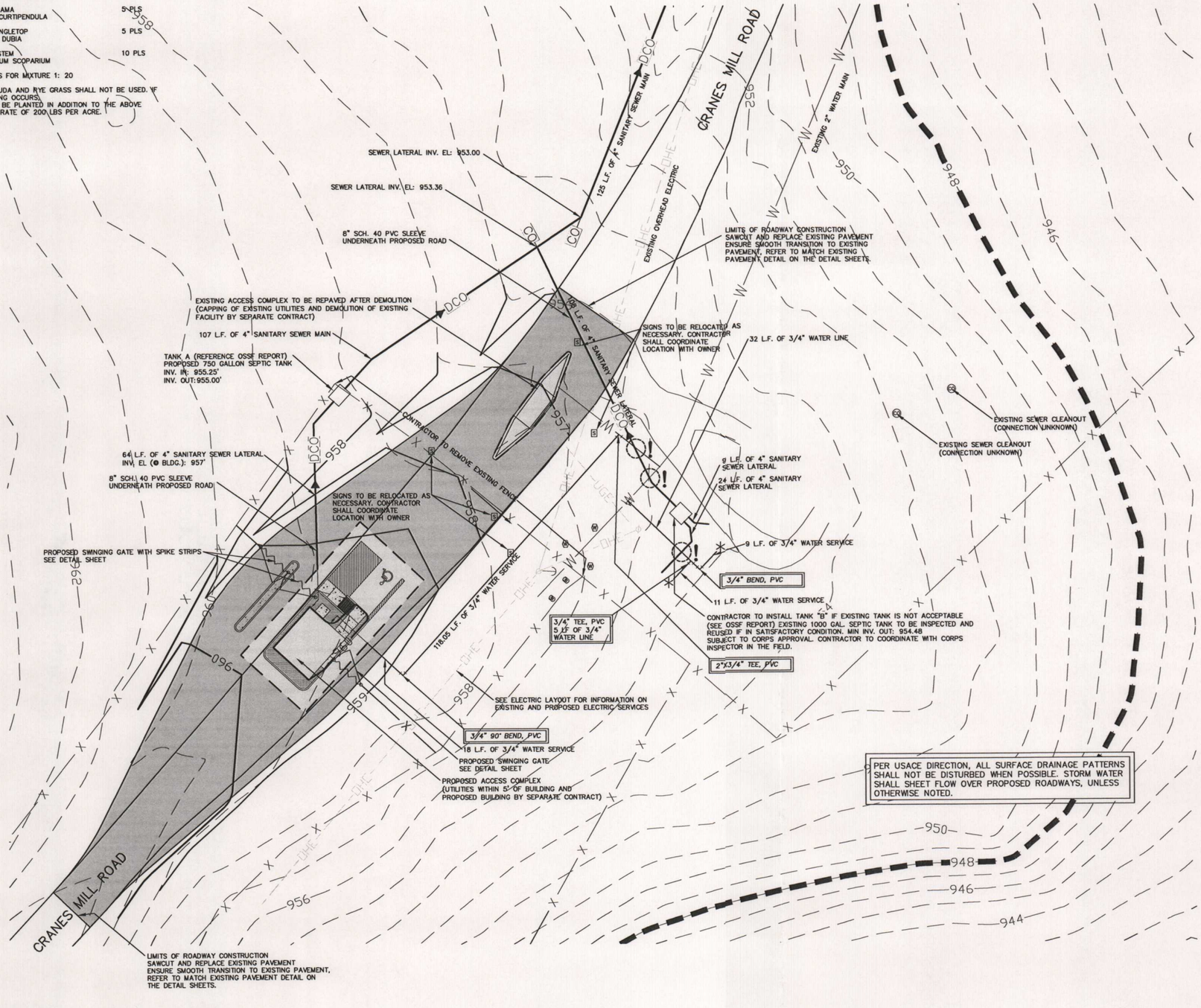
TABLE "A"
ALL AREAS THAT REQUIRE FREQUENT MOWING OR SPECIFIED

MIXTURE 1

SPECIES	SEEDING RATE PER ACRE
BUFFALO GRASS BUCHOLE DACTYLOIDES	10 PLS
SIDEOATS GRAMA BOUTELOUA CURTIPENDULA	5 PLS
GREEN SPRANGLETOP LEPTOCHLOA DUBIA	5 PLS
LITTLE BLUESTEM SCHIZACHYRIUM SCOPARIUM	10 PLS

TOTAL ACRES FOR MIXTURE 1: 20

NOTE: BERMUDA AND RYE GRASS SHALL NOT BE USED. IF FALL PLANTING OCCURS, OATS SHALL BE PLANTED IN ADDITION TO THE ABOVE MIXTURE AT RATE OF 200 LBS PER ACRE.



LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	X
PROPOSED FENCE	X
EXISTING WATER LINE	W
EXISTING OVERHEAD ELECTRIC	OHE
EXISTING UNDERGROUND ELECTRIC	UGE
EXISTING COVERED PICNIC AREA	
PROPOSED SEWER CLEANOUT	CO
PROPOSED SEWER DOUBLE CLEANOUT	DCO
EXISTING POWER POLE	
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	
EXISTING SEWER CLEANOUT/INLET	
PROPOSED ASPHALT PAVEMENT	
PROPOSED UTILITY CROSSING SEE DETAIL SHEET	
PROPOSED WATER RISER	

NOTES:

* ACTUAL LOCATIONS FOR THE INSTALLATION OF WATER RISERS SHALL BE AS INDICATED ON THE GROUND BY GOVERNMENT PERSONNEL BY USE OF COLORED WIRE FLAGS, WOODEN STAKES, OR OTHER IDENTIFIABLE MARKERS.

1. SEE ELECTRIC LAYOUT FOR INFORMATION ON EXISTING AND PROPOSED ELECTRIC SERVICES.

2. SEE DETAIL SHEET FOR SEWER AND WATER DETAILS REGARDING SIZING, TURNING RADII, MINIMUM SLOPES, ETC.

3. STORM WATER IS TO BE CONVEYED ACROSS ROADS TO AVOID CONCENTRATION IN BAR DITCHES AS DIRECTED BY U.S. ARMY CORPS OF ENGINEERS.

4. TRAFFIC CONTROL STRIPING AND SIGNAGE TO BE PROVIDED BY OTHERS.

5. ENSURE AT LEAST 10 FOOT HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, EXCEPT WHERE THE BOTTOM OF THE WATER LINE IS AT LEAST 12 INCHES ABOVE THE TOP OF THE SEWER LINE THE HORIZONTAL SEPARATION CAN BE MINIMUM OF 6 FEET. WHERE THE SEWER AND WATER LINES CROSS, THE SEWER LINE MUST BE SLEEVED CONCRETE PRESSURE PIPE WITH THE APPROPRIATE JOINTS AND THE SLEEVE SEALED AT EACH END WITH A PLUG OF CONCRETE 4" THICK.

NOTE: ALL DIMENSIONS ARE TO THE FACE OF CURB.

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.

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MATTHEW B. MATKIN 95797 LICENSED PROFESSIONAL ENGINEER

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DESIGNED BY: JOSHMARK MATKIN
DRWN BY: JDV
CKD BY: GDK
SUBMITTED BY: JIM BEHL
PLOT SCALE: 1
PLOT DATE:
DATE: 09/15/2010
SOLICITATION NO.: W9126G-08-R-0116
CONTRACT NO.: W9126G-10-C-0066
FILE NUMBER: 2415.00
SIZE: ANSI D
FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS

SITE PLAN
ACCESS COMPLEX

SHEET IDENTIFICATION
C-4.1
SHEET 5 OF 16

PER USACE DIRECTION, ALL SURFACE DRAINAGE PATTERNS SHALL NOT BE DISTURBED WHEN POSSIBLE. STORM WATER SHALL SHEET FLOW OVER PROPOSED ROADWAYS, UNLESS OTHERWISE NOTED.

CRANES MILL ROAD

EXISTING SEWER LIFT MAIN

PROPOSED FUTURE RV PARKING AREAS (BY SEPARATE CONTRACT)

2054 L.F. OF 2" WATER MAIN (LOOP)

PROPOSED 3/4 WATER SERVICE (TYPICAL)

1-2"x3/4" TEE, PVC
1-2" BALL VALVE W/ BOX, COMPLETE

8" SCH. 40 PVC SLEEVE UNDERNEATH PROPOSED ROAD

PROPOSED RESTROOM A
(UTILITIES WITHIN 5' OF BUILDING AND PROPOSED BUILDING BY SEPARATE CONTRACT)

PROPOSED 1000 GALLON LIFT STATION WITH DUPLEX PUMPS
INV. IN: 929.50

4" YELLOW CENTER STRIP. REFER TO STRIPING DETAIL ON DETAIL SHEET

478 L.F. OF 2" WATER MAIN

453 L.F. OF 2" WATER MAIN

232 L.F. OF 2" SEWER FORCE MAIN

1-2"x3/4" TEE, PVC
1-3/4" BALL VALVE W/ BOX, COMPLETE

8" SCH. 40 PVC SLEEVE UNDERNEATH PROPOSED ROAD

DOUBLE BACK FLOW PREVENTER

1-3/4" 90° BEND, PVC

TANK D (REFERENCE OSSF REPORT)
3-PROPOSED 1000 GALLON SEPTIC TANK

8" SCH. 40 PVC SLEEVE UNDERNEATH PROPOSED ROAD

PROPOSED 3/4 WATER SERVICE (TYPICAL)

EXISTING SEWER FORCE MAIN

2054 L.F. OF 2" WATER MAIN (LOOP)

PROPOSED FUTURE RV PARKING AREAS (BY SEPARATE CONTRACT)

1-2"x3/4" TEE, PVC
2-2" BALL VALVE, W/ BOX, COMPLETE

LIMITS OF ROADWAY CONSTRUCTION SAWCUT AND REPLACE EXISTING PAVEMENT ENSURE SMOOTH TRANSITION TO EXISTING PAVEMENT, REFER TO MATCH EXISTING PAVEMENT DETAIL ON THE DETAIL SHEETS.

2-17"X13" 16 GAUGE CORRUGATED GALVANIZED METAL ARCHED PIPES. ENDS MITERED TO 3:1 SLOPE. MINIMUM 2.0% CROSS-SLOPE WITH MINIMUM OF 18" COVER UNDER PROPOSED ROADWAY. CONCRETE END TREATMENTS BOTH SIDES, SEE DETAIL.

EXISTING OVERHEAD ELECTRIC

EXISTING 2" WATER MAIN

1-2"x3/4" TEE, PVC
1-2" BALL VALVE W/ BOX, COMPLETE

1=2" AIR RELEASE VALVE. SEE DETAIL SHEET C-5.2

430 L.F. OF 4" SANITARY SEWER MAIN

4" YELLOW CENTER STRIP. REFER TO STRIPING DETAIL ON DETAIL SHEET

LIMITS OF ROADWAY CONSTRUCTION SAWCUT AND REPLACE EXISTING PAVEMENT ENSURE SMOOTH TRANSITION TO EXISTING PAVEMENT, REFER TO MATCH EXISTING PAVEMENT DETAIL ON THE DETAIL SHEETS.

TANK C (REFERENCE OSSF REPORT)
3- PROPOSED 1000 GALLON SEPTIC TANK

1-2"x3/4" TEE, PVC
1-2" BALL VALVE W/ BOX, COMPLETE

49 L.F. OF 3/4" WATER SERVICE

8" SCH. 40 PVC SLEEVE UNDERNEATH PROPOSED ROAD

DUMP STATION COLLECTION AREA SEE DETAIL SHEET

1-3/4" 90° BEND, PVC

948 CONTOUR ELEVATION

40 L.F. OF 3/4" WATER SERVICE

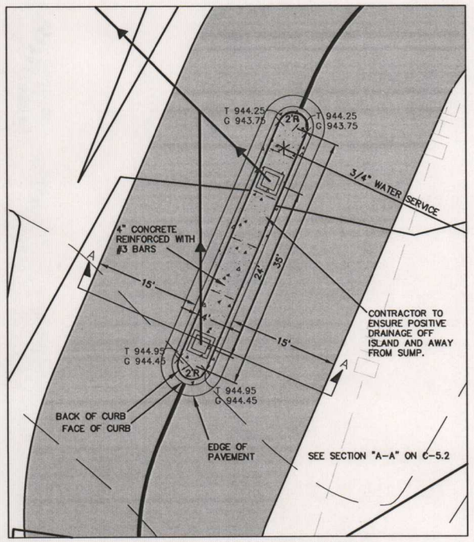
245 L.F. OF 4" SANITARY SEWER MAIN

SEWER LATERAL INV. EL: 947.75

LIMITS OF ROADWAY CONSTRUCTION SAWCUT AND REPLACE EXISTING PAVEMENT ENSURE SMOOTH TRANSITION TO EXISTING PAVEMENT, REFER TO MATCH EXISTING PAVEMENT DETAIL ON THE DETAIL SHEETS.

125 L.F. OF 4" SANITARY SEWER MAIN

CRANES MILL ROAD



DUMP STATION ISLAND DETAIL

SCALE: 1"=10'

N

SCALE: 1" = 50'

0 25 50 100 200

GRAPHIC SCALE

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING WATER LINE
- EXISTING OVERHEAD ELECTRIC
- EXISTING LIFT MAIN
- EXISTING COVERED PICNIC AREA
- PROPOSED SEWER CLEANOUT
- PROPOSED SEWER DOUBLE CLEANOUT
- EXISTING POWER POLE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- EXISTING WATER METER/OUTLET
- EXISTING SEWER CLEANOUT/INLET
- PROPOSED ASPHALT PAVEMENT
- PROPOSED UTILITY CROSSING SEE DETAIL SHEET
- PROPOSED WATER RISER
- AIR RELEASE VALVE

NOTES:

* ACTUAL LOCATIONS FOR THE INSTALLATION OF WATER RISERS SHALL BE AS INDICATED ON THE GROUND BY GOVERNMENT PERSONNEL BY USE OF COLORED WIRE FLAGS, WOODEN STAKES, OR OTHER IDENTIFIABLE MARKERS.

1. SEE ELECTRIC LAYOUT FOR INFORMATION ON EXISTING AND PROPOSED ELECTRIC SERVICES.

2. SEE DETAIL SHEET FOR SEWER AND WATER DETAILS REGARDING SIZING, TURNING RADII, MINIMUM SLOPES, ETC.

3. STORM WATER IS TO BE CONVEYED ACROSS ROADS TO AVOID CONCENTRATION IN BAR DITCHES AS DIRECTED BY U.S. ARMY CORPS OF ENGINEERS.

4. TRAFFIC CONTROL STRIPING AND SIGNAGE TO BE PROVIDED BY OTHERS.

5. ENSURE AT LEAST 10 FOOT HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, EXCEPT WHERE THE BOTTOM OF THE WATER LINE IS AT LEAST 12 INCHES ABOVE THE TOP OF THE SEWER LINE THE HORIZONTAL SEPARATION CAN BE MINIMUM OF 6 FEET. WHERE THE SEWER AND WATER LINES CROSS, THE SEWER LINE MUST BE SLEEVED CONCRETE PRESSURE PIPE WITH THE APPROPRIATE JOINTS AND THE SLEEVE SEALED AT EACH END WITH A PLUG OF CONCRETE 4" THICK.

NOTE: ALL DIMENSIONS ARE TO THE FACE OF CURB.

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CIVIL ENGINEERS SURVEYORS LAND PLANNERS CONSTRUCTION MANAGERS CONSULTANTS

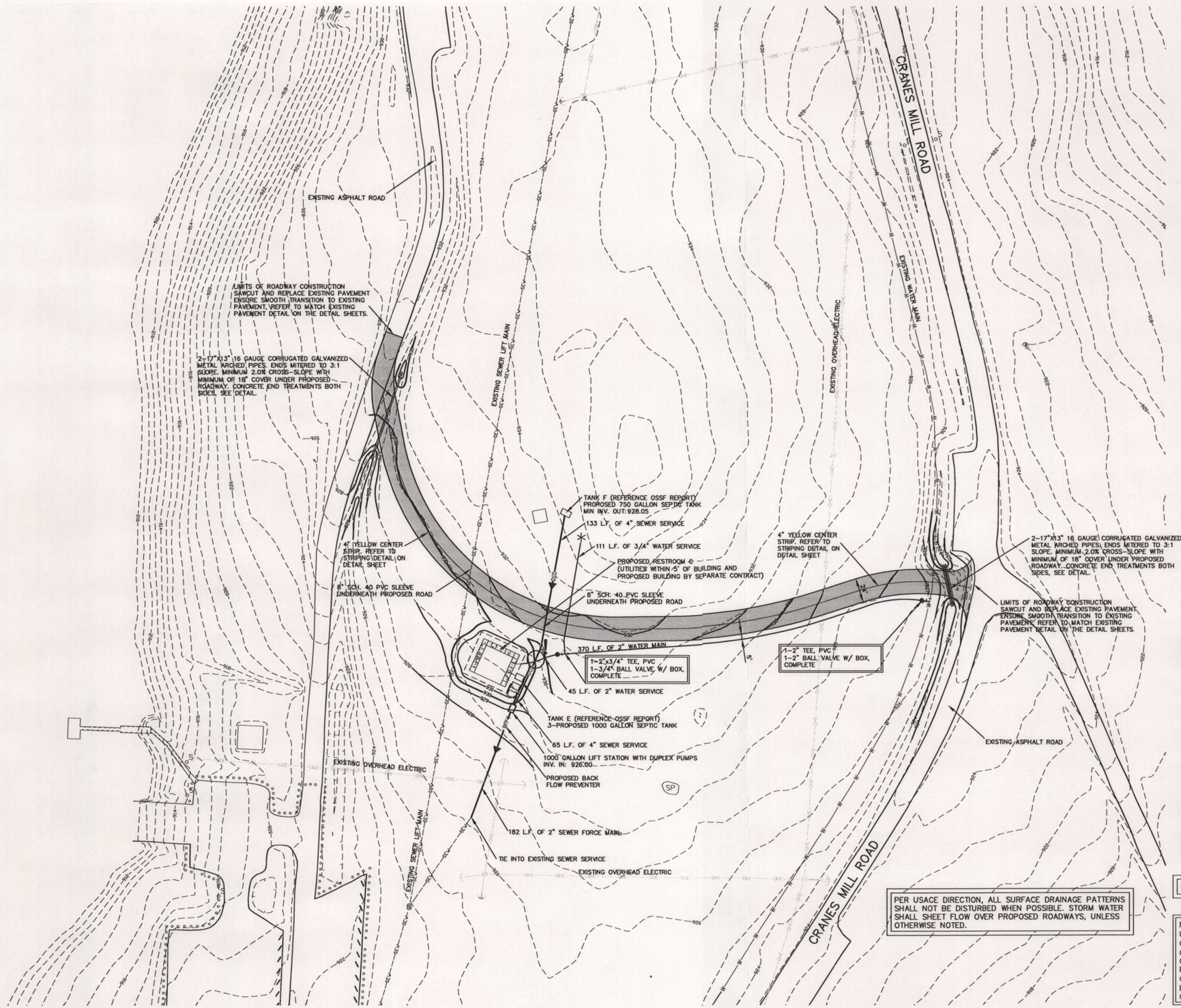
STATE OF TEXAS
MATTHEW S. McCORMICK
95757
1/7/11

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN-MARK MATKIN
DRWN BY: JDV
CKD BY: GDK
SUBMITTED BY: JMM/SEM
DATE: 08/15/2010
SOLICITATION NO.: W912BG-08-R-0116
CONTRACT NO.: W9286G-10-C-0086
PLOT SCALE: 1
PLOT DATE: TILE NUMBER: 24 X 36
SIZE: ANSI D
FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL
UTILITIES AND ROADS
CANYON LAKE, TEXAS
SITE PLAN
DUMP STATION CAMPSITE AREA 1

SHEET IDENTIFICATION
C-4.2
SHEET 6 OF 16



N

SCALE: 1" = 50'

0 25 50 100 200

GRAPHIC SCALE

LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	x x x x
PROPOSED FENCE	x x x x
EXISTING WATER LINE	W W W
EXISTING OVERHEAD ELECTRIC	OHE OHE OHE
EXISTING LIFT MAIN	SEV SEV SEV
EXISTING COVERED PICNIC AREA	◻
PROPOSED SEWER CLEANOUT	CO
PROPOSED SEWER DOUBLE CLEANOUT	DCO
EXISTING POWER POLE	ϕ
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	W
EXISTING SEWER CLEANOUT/INLET	S
PROPOSED ASPHALT PAVEMENT	
PROPOSED UTILITY CROSSING SEE DETAIL SHEET	○!
PROPOSED WATER RISER	*
AIR RELEASE VALVE	◁

NOTES:

* ACTUAL LOCATIONS FOR THE INSTALLATION OF WATER RISERS SHALL BE AS INDICATED ON THE GROUND BY GOVERNMENT PERSONNEL BY USE OF COLORED WIRE FLAGS, WOODEN STAKES, OR OTHER IDENTIFIABLE MARKERS.

1. SEE ELECTRIC LAYOUT FOR INFORMATION ON EXISTING AND PROPOSED ELECTRIC SERVICES.

2. SEE DETAIL SHEET FOR SEWER AND WATER DETAILS REGARDING SIZING, TURNING RADII, MINIMUM SLOPES, ETC.

3. STORM WATER IS TO BE CONVEYED ACROSS ROADS TO AVOID CONCENTRATION IN BAR DITCHES AS DIRECTED BY U.S. ARMY CORPS OF ENGINEERS.

4. TRAFFIC CONTROL STRIPING AND SIGNAGE TO BE PROVIDED BY OTHERS.

5. ENSURE AT LEAST 10 FOOT HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, EXCEPT WHERE THE BOTTOM OF THE WATER LINE IS AT LEAST 12 INCHES ABOVE THE TOP OF THE SEWER LINE THE HORIZONTAL SEPARATION CAN BE MINIMUM OF 6 FEET. WHERE THE SEWER AND WATER LINES CROSS, THE SEWER LINE MUST BE SLEEVED CONCRETE PRESSURE PIPE WITH THE APPROPRIATE JOINTS AND THE SLEEVE SEALED AT EACH END WITH A PLUG OF CONCRETE 4" THICK.

NOTE: ALL DIMENSIONS ARE TO THE FACE OF CURB.

PER USACE DIRECTION, ALL SURFACE DRAINAGE PATTERNS SHALL NOT BE DISTURBED WHEN POSSIBLE. STORM WATER SHALL SHEET FLOW OVER PROPOSED ROADWAYS, UNLESS OTHERWISE NOTED.

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.

US Army Corps of Engineers®

MATKIN HOOVER ENGINEERING & SURVEYING
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8 SPENCER ROAD, SUITE 100, BOERNE, TEXAS 78006
OFFICE 210.545.0600 FAX 830.249.0099
TBPE FIRM REGISTRATION #F-9756 TBPLS FIRM REGISTRATION #10194150
CIVIL ENGINEERS SURVEYORS LAND PLANNERS CONSTRUCTION MANAGERS CONSULTANTS
STATE OF TEXAS MATTHEW B. MACKEMER 95797 LICENSED PROFESSIONAL ENGINEER

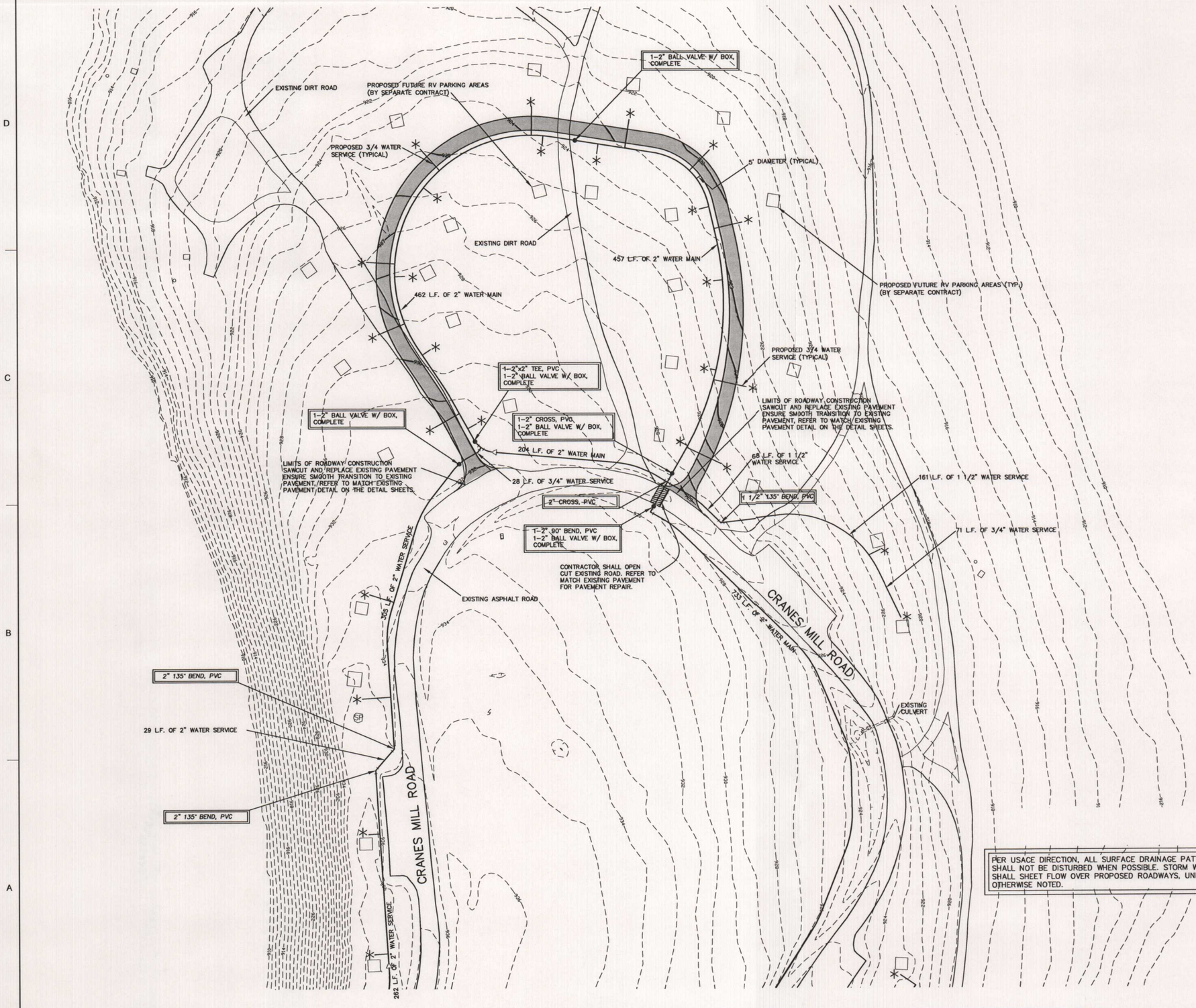
MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: DRAWN BY: JDV | CKD BY: GDK | SUBMITTED BY: JIM BEHL
DATE: DEC 2010 | SOLICITATION NO.: W91285-08-R-0116 | CONTRACT NO.: W91285-10-C-0066
PLOT SCALE: | PLOT DATE: | FILE NUMBER: 2415.00
SIZE: ANSI D | FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS

SITE PLAN
CONNECTING ROAD

SHEET IDENTIFICATION
C-4.3
SHEET 7 OF 16



SCALE: 1" = 50'

0 25 50 100 200

GRAPHIC SCALE

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING WATER LINE
- EXISTING OVERHEAD ELECTRIC
- EXISTING LIFT MAIN
- EXISTING COVERED PICNIC AREA
- PROPOSED SEWER CLEANOUT
- EXISTING POWER POLE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- EXISTING WATER METER/OUTLET
- EXISTING SEWER CLEANOUT/INLET
- PROPOSED ASPHALT PAVEMENT
- PROPOSED UTILITY CROSSING SEE DETAIL SHEET
- PROPOSED WATER RISER
- AIR RELEASE VALVE

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CIVIL ENGINEERS SURVEYORS LAND PLANNERS CONSTRUCTION MANAGERS CONSULTANTS

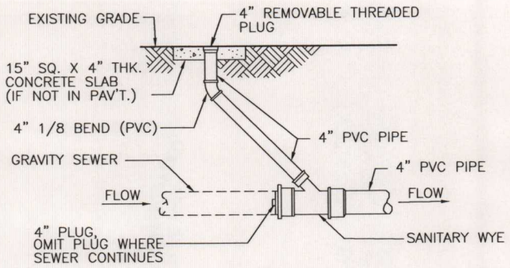
MATTHEW D. MATKIN 95797 LICENSED PROFESSIONAL ENGINEER

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN-MARK MATKIN
DWN BY: JDV
CKD BY: GDK
SUBMITTED BY: JIM BEHL
DATE: 09/15/2010
SOLICITATION NO.: W9126D-08-R-0116
CONTRACT NO.: W9126G-10-C-0088
PLOT SCALE:
PLOT DATE:
FILE NUMBER: 2416.00
SIZE: ANSI D
FILE NAME:

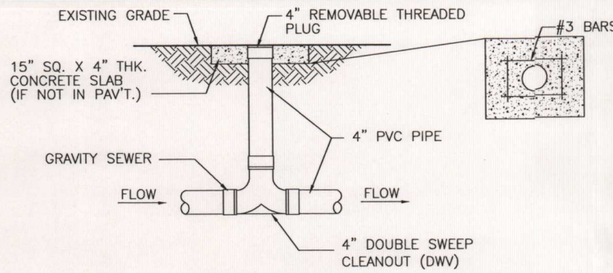
CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS
SITE PLAN
CAMPSITE AREA 2

SHEET IDENTIFICATION
C-4.4
SHEET 8 OF 16



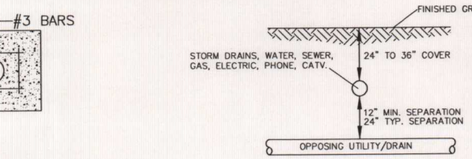
SINGLE SEWER CLEANOUT DETAIL

N.T.S.



DOUBLE SEWER CLEANOUT DETAIL

N.T.S.



NOTE:
1. IF EITHER UTILITY SHOWN IS SEWER, REFER TO 30 TAC CHAPTER. 290.44(e) AND 217.13 APPENDIX E FOR TCEQ SEPARATION DISTANCE AND PROTECTION REQUIREMENTS.

2. IF SEPARATION CANNOT BE ATTAINED, CONTRACTOR SHALL COORDINATE WITH PROJECT ENGINEER AND APPLICABLE UTILITY COMPANY FOR ALTERNATE MEASURES.

NOTES FOR WATER/SEWER CROSSINGS:
1. CROSSING SHALL BE APPROXIMATELY PERPENDICULAR (±90')

2. SLEEVE WATER PIPE WITH SCH 80 PVC PIPE 2 PIPE SIZES LARGER THAN MAIN LINE.

3. CENTER THE CROSSING BETWEEN JOINTS FOR BOTH WATER AND SEWER LINES.

4. SEWER PIPE SHALL BE SCHEDULE 80 OR SDR-26 (150 PSI RATED) AT A MINIMUM.

TYPICAL UTILITY CROSSING DETAIL

N.T.S.

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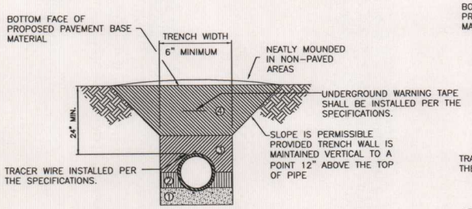
1, 2, 3 EMBEDMENT MATERIAL – 3" LAYER OF TOP SOIL OR SANDY LOAM REQUIRED AROUND PIPE WHEN TRENCH BOTTOM IS ROCK

4 SECONDARY BACKFILL – SECONDARY BACK– FILL SHALL GENERALLY CONSIST OF MATERIALS REMOVED FROM THE TRENCH AND SHALL BE FREE OF BRUSH, DEBRIS, TRASH AND CONTAIN NO ROCKERS LARGER THAN 2" IN DIAMETER. COMPACT IN 6" LIFTS USING HAND OPERATED EQUIPMENT.



WATERLINE TRENCH DETAIL

N.T.S.

1, 2, 3 EMBEDMENT MATERIAL – 3" LAYER OF TOP SOIL OR SANDY LOAM REQUIRED AROUND PIPE WHEN TRENCH BOTTOM IS ROCK

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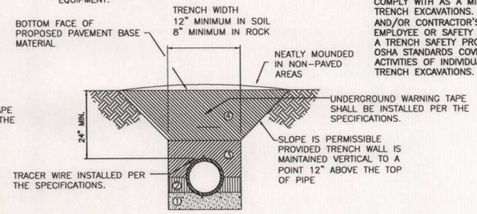
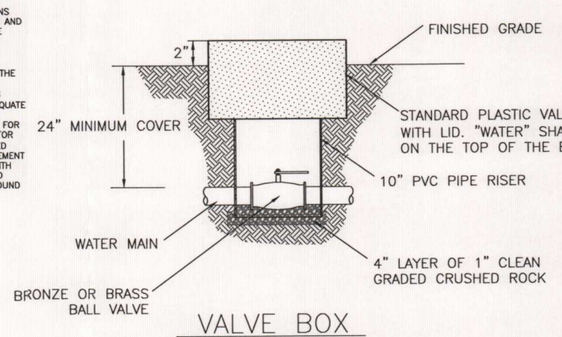


SEWER LINE TRENCH DETAIL

N.T.S.

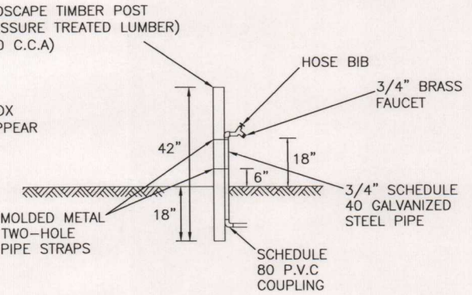
TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS COVERING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATIONS.



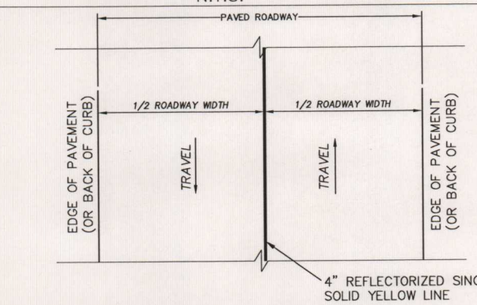
VALVE BOX

N.T.S.



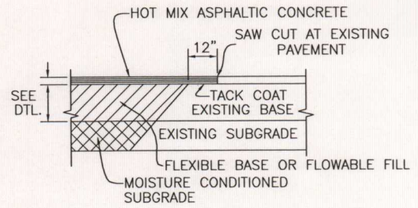
WATER RISER DETAIL

N.T.S.



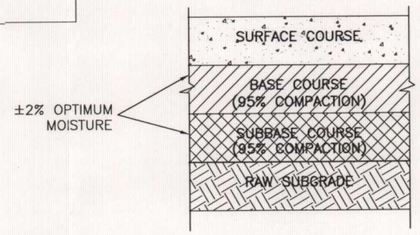
TYPICAL ROADWAY STRIPING DETAIL

N.T.S.



MATCH EXISTING PAVEMENT

N.T.S.



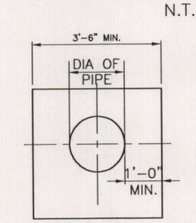
LAYER/ COURSE	MATERIAL	ROADWAY TYPE	
		OPTION 1	OPTION 2
SURFACE	TYPE D ASPHALT	2.5"	3"
BASE	CRUSHED LIMESTONE	10"	8.5"
SUBBASE	MOISTURE CONDITIONED	8"	8"

PAVEMENT DETAIL

N.T.S.

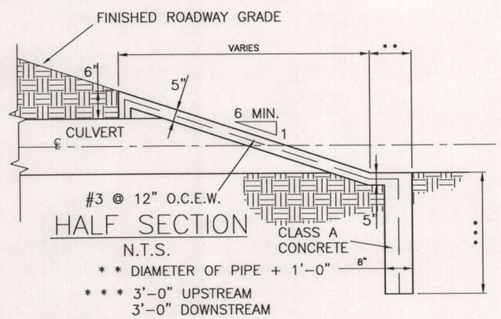
CONTRACTOR SHALL REFERENCE TO THE RECOMMENDATIONS CONTAINED WITHIN THE GEOTECHNICAL INVESTIGATION REPORTS PREPARED BY:

FROST GEOSCIENCES
13402 WESTERN OAK
HELOTES, TEXAS 78023
(SEPTEMBER, 2010)
REPORT NO. FGS–P–G10090



END VIEW

N.T.S.

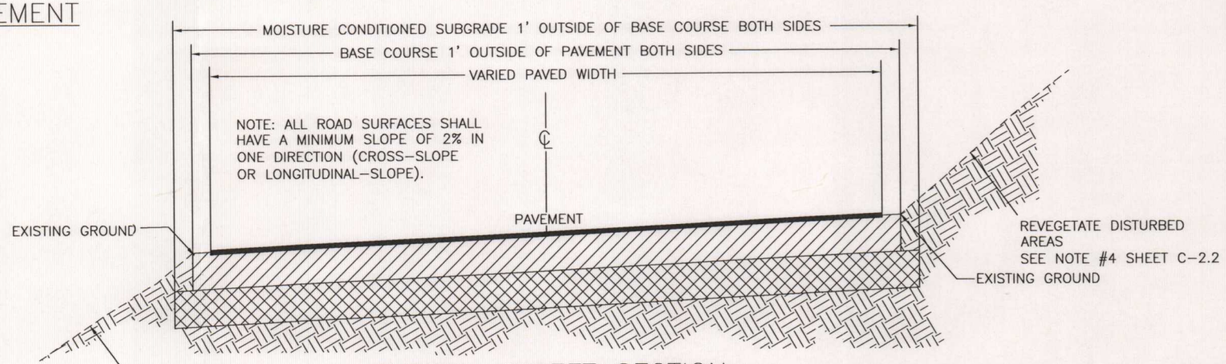


HALF SECTION

N.T.S.

CONCRETE PIPE END TREATMENT IN TXDOT ROW

N.T.S.



TYPICAL STREET SECTION

N.T.S.

US Army Corps of Engineers®

MATKINHOOVER ENGINEERING & SURVEYING
CIVIL ENGINEERS SURVEYORS LAND PLANNERS CONSTRUCTION MANAGERS CONSULTANTS
TEXAS REGISTERED ENGINEERING FIRM F-8043

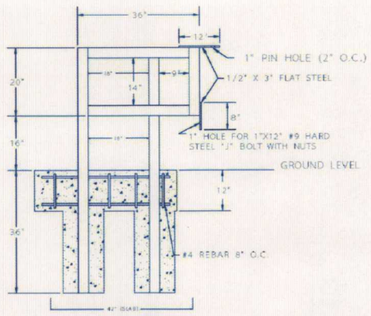
STATE OF TEXAS
MATTHEW D. MACKOWIAK
95797
SURVEYOR

MARK	DESCRIPTION	DATE	APPR.

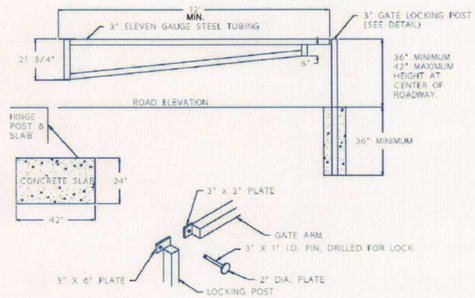
DESIGNED BY: JOHN-MARK MATKIN
DWN BY: JDV
CKD BY: GDK
SUBMITTED BY: JIM BEHL
DATE: 09/15/2010
SOLICITATION NO.: W9126G-08-R-0116
CONTRACT NO.: W9126G-10-C-0066
PLOT SCALE:
PLOT DATE:
FILE NUMBER: 2415.00
SIZE: ANSI D
FILE NAME:

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS
DETAIL SHEET SHEET 1

SHEET IDENTIFICATION
C-5.1
SHEET 9 OF 16

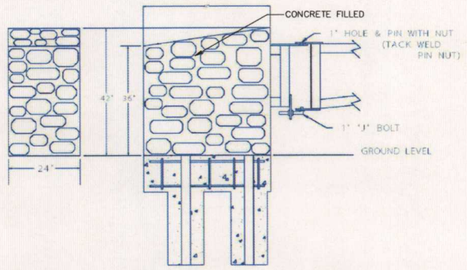


AREA ACCESS GATE - HINGE POST ASSEMBLY



NOTE:
CONTRACTOR SHALL FIT GATE TO MATCH FIELD CONDITIONS.

AREA ACCESS GATE - GATE AND LOCKING POST DETAIL



AREA ACCESS GATE - STONE & HINGE ASSEMBLY DETAIL

NTS

CANYON LAKE
CANYON LAKE, TEXAS

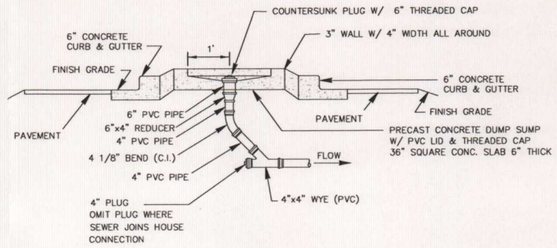
TYPICAL ACCESS CONTROL GATE

U.S. ARMY ENGINEER DISTRICT, FORT WORTH

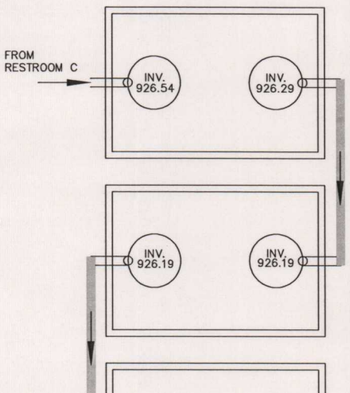
UPDATED

ACCESS GATES NOTES:

1. GOVERNMENT PERSONNEL WILL STAKE OR OTHERWISE INDICATE THE DESIRED LOCATION, ALIGNMENT, FINISHED ELEVATION, AND DESIRED LENGTH. GATE LENGTH IS USUALLY 14', BUT SPECIAL CONDITIONS MAY REQUIRE SHORTER OR LONGER LENGTHS. EXACT LENGTHS WILL BE DETERMINED DURING FABRICATION.
2. HINGE POST ASSEMBLIES AND LOCK POSTS SHALL BE CONSTRUCTED USING SCH. 40 3" SQUARE STEEL TUBING..
3. SWING GATE UNITS SHALL BE 11 GAUGE 3" SQUARE STEEL TUBING.
4. ALL FLAT STEEL FOR SUPPORTS AND HINGES SHALL BE CONSTRUCTED OF $\frac{1}{2}$"X3" FLAT OR STRAP STOCK.
5. ALL J-BOLTS SHALL BE 1" ROUND, HARDENED STEEL.
6. ALL CUTS AND WELD JOINTS SHALL BE AS SHOWN ON THE DRAWINGS, AND ALL TUBING ENDS WILL BE CAPPED AND GROUND SMOOTH TO LEAVE BURR FREE FINISH.
7. NATURAL STONE MASONRY SHALL BE ACCOMPLISHED WITH WHITE CHOPPED STONE UNITS, APPROXIMATELY 12" LONG BY 4" WIDE BY 6" TO 8" HIGH, PER UNIT.
8. THE ENTIRE HINGE POST ASSEMBLY CONCRETE SUPPORT SLAB SHALL BE SET BELOW GROUND LEVEL, WITH 2" CLEARANCE FROM ALL CONCRETE EDGES.
9. CONCRETE MIX DESIGN SHALL BE 3" TO 4" SLUMP, WITH 3% TO 5% ENTRAINED AIR. CONCRETE MIX DESIGN SHALL HAVE 1-$1\frac{1}{2}$" CRUSHED STONE AGGREGATE AND OBTAIN 3000 PSI IN COMPRESSIVE STRENGTH AT 28 DAYS.



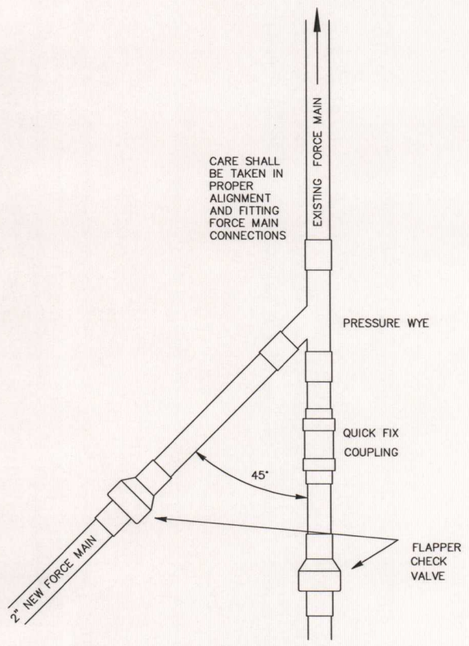
DUMP STATION ISLAND DETAIL
CROSS SECTION "A"-"A"
N.T.S.



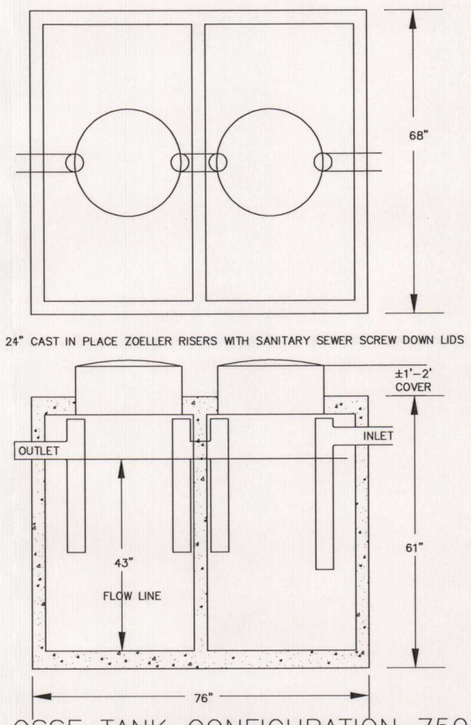
OSSF TANK E CONFIGURATION THREE
1000 GALLON TANKS PLUS 1000
GALLON PUMP TANK
RESTROOM C

GENERAL UTILITY NOTES:

1. ALL NEW UTILITY CONNECTIONS TO TERMINATE AT 5' FROM PROPOSED BUILDING LINE. LINE TO BE PLUGGED AND CAPPED.
2. UTILITY INSTALLATIONS SHALL BE MADE IN SUCH A MANNER AS NOT TO DISRUPT SERVICE TO EXISTING CUSTOMERS.
3. ALL MATERIALS AND CONSTRUCTION PROCEDURES WITHIN THE SCOPE OF THIS PROJECT SHALL APPROVED BY THE USAGE.
4. ALL UTILITIES, SERVICE LATERALS, AND DRAINAGE STRUCTURES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND DEPTHS OF UNDERGROUND UTILITIES.
5. ALL SEWER LATERALS ARE TO BE INSTALLED PER THE PLUMBING CODE.
6. ANY DAMAGE THAT OCCURS DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION FROM DAMAGE DONE TO EXISTING FENCES, CURBS, STREETS, DRIVEWAYS, LANDSCAPING AND STRUCTURES.
7. ALL WATER MAINS SHALL BE PER THE SPECIFICATIONS.
8. THE CONTRACTOR SHALL AVOID CUTTING ROOTS LARGER THAN ONE INCH IN DIAMETER WHEN EXCAVATING NEAR EXISTING TREES. EXCAVATION IN VICINITY OF TREES SHALL PROCEED WITH CAUTION.
9. ALL GARBAGE OR SPOIL MATERIAL FROM THIS WORK SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR, AT HIS EXPENSE.
10. ALL BASE, CITY, COUNTY AND STATE PERMITS, TESTS, APPROVALS AND ACCEPTANCES SHALL BE AQUIRED TO COMPLETE CONSTRUCTION OF THIS PROJECT.
11. ALL ITEMS NOT SPECIFICALLY CALLED FOR ON THE PLANS, OR IN THE SPECIFICATIONS, BUT NECESSARY TO REASONABLY CONSTRUCT THE FACILITY OR IMPROVEMENT, SHALL BE COORDINATED WITH THE GOVERNMENT FOR SEPARATE PAYMENTS.
12. DEPTH OF BURY FOR ALL STORM DRAIN PIPING SHALL BE A MINIMUM OF 18" WHERE POSSIBLE. DEPTHS MAY BE GREATER IF REQUIRED BY LOCAL CODES AND AGENCIES.
13. THE SITE SHALL BE GRADED TO WITHIN +/- 0.04' BEFORE THE INSTALLATION OF UTILITIES TO ENSURE PROPER COVER IS ACHIEVED.
14. EXCAVATE AROUND EXISTING UTILITIES WHICH INTERSECT THE PROPOSED ALIGNMENT OF THE SERVICES AND NOTIFY THE ENGINEER OF POTENTIAL CONFLICTS, PRIOR TO ANY CONSTRUCTION IN THE AREA.
15. USE SPECIAL CARE AND MINIMIZE ANY DISTURBANCE WHEN EXCAVATING NEAR OR WITHIN THE DRIPLINE OF TREES TO REMAIN.
16. ENSURE AT LEAST 10 FOOT HORIZONTAL SEPARATION BETWEEN SEWER AND WATER LINES, EXCEPT WHERE THE BOTTOM OF THE WATER LINE IS AT LEAST 12 INCHES ABOVE THE TOP OF THE SEWER LINE THE HORIZONTAL SEPARATION CAN BE MINIMUM OF 6 FEET. WHERE THE SEWER AND WATER LINES CROSS, THE SEWER LINE MUST BE SLEEVED CONCRETE PRESSURE PIPE WITH THE APPROPRIATE JOINTS AND THE SLEEVE SEALED AT EACH END WITH A PLUG OF CONCRETE 4" THICK. ALSO, THE SEWER LINE MUST BE CONCRETE ENCASED FOR 10 FEET ON EACH SIDE OF THE CROSSING.
17. ALL UTILITY CONNECTIONS SHALL BE COORDINATED THROUGH THE CONTRACTING OFFICER'S REPRESENTATIVE.
18. ALL EXISTING PUBLIC AND PRIVATE UTILITIES SHALL BE PROTECTED THROUGHOUT THE CONSTRUCTION OF THIS PROJECT. CONTRACTOR SHALL CONTACT THE APPROPRIATE UTILITY COMPANIES FOR LINE LOCATIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
19. ALL 2" WATER LINES SHALL HAVE A MINIMUM BEND RADIUS OF 60 FEET.



FORCE MAIN CONNECTION



OSSF TANK CONFIGURATION 750
GALLON TWO COMPARTMENT

NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.

US Army Corps of Engineers®

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STATE OF TEXAS
MATTHEW B. MACKRIDER
95797
11-15-10

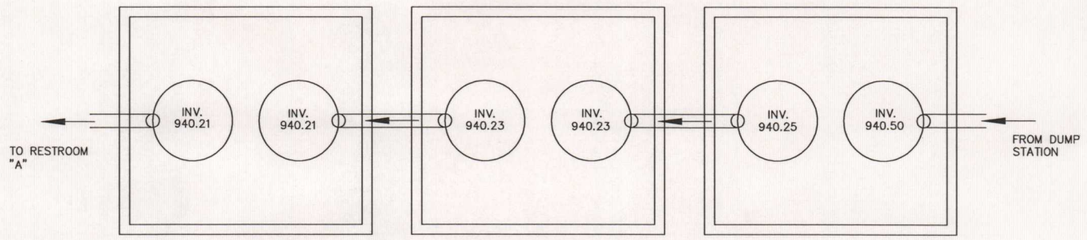
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN-MARK MATKIN
DWN BY: DDK
CKD BY: DDK
SUBMITTED BY: JIM BEHL
PLOT SCALE:
PLOT DATE:
SIZE: ANSI D
FILE NAME:
DATE: 08/15/2010
SOLICITATION NO.: W912QA-08-R-0116
CONTRACT NO.: W912QA-10-C-0068
FILE NUMBER: 2415.00

CRANES MILL PARK
FURNISH AND INSTALL UTILITIES AND ROADS
CANYON LAKE, TEXAS
DETAIL SHEET SHEET 2

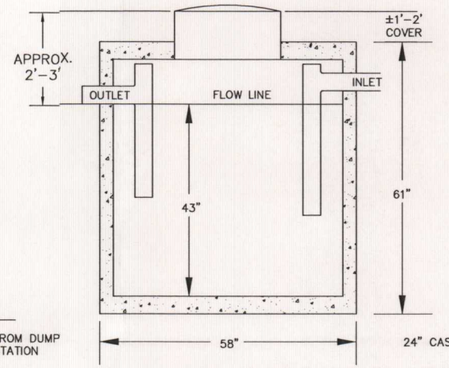
SHEET IDENTIFICATION
C-5.2
SHEET 10 OF 16

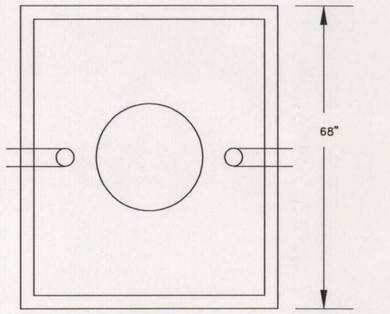
NOTE: THESE CONSTRUCTION DOCUMENTS, "INSTALLATION OF UTILITIES AND ACCESS ROADWAYS," ARE DESIGNED IN CONJUNCTION WITH THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS. CONSTRUCTION OF IMPROVEMENTS SHOWN WITHIN THESE PLANS MUST BE COORDINATED WITH THE SITE CONSTRUCTOR OF THE "MODERNIZE PARK FACILITIES, ACCESS COMPLEX & RESTROOMS" CONSTRUCTION DOCUMENTS AND THE GENERAL CONTRACTOR.



OSSF TANK C CONFIGURATION
THREE 1000 GALLON TANKS
CONNECTED IN SERIES
DUMP STATION

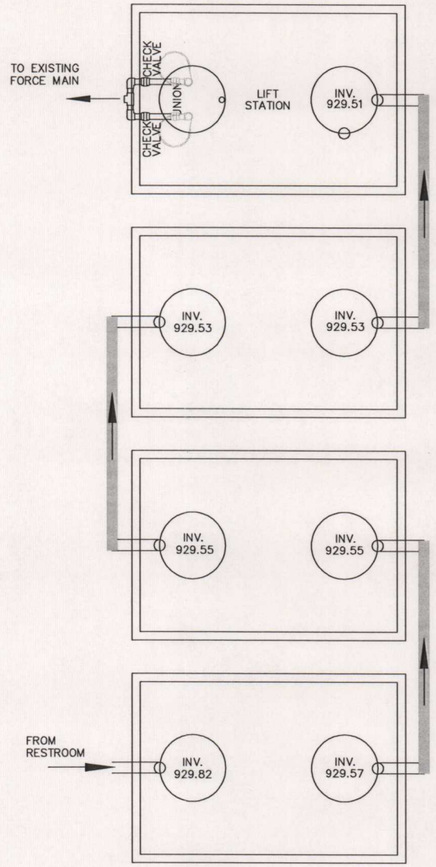
RECEIVED
FEB 24 2011
COUNTY ENGINEER



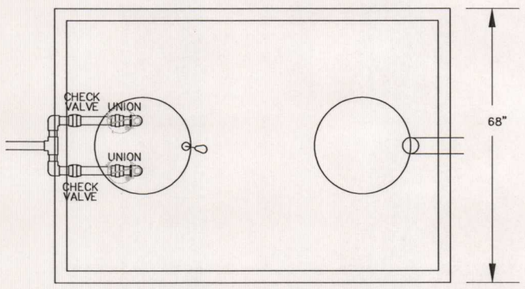


24" CAST IN PLACE ZOELLER RISERS WITH SANITARY SEWER SCREW DOWN LIDS

OSSF TANK CONFIGURATION 500
GALLON ONE COMPARTMENT



OSSF TANK D CONFIGURATION THREE
1000 GALLON TANKS PLUS 1000
GALLON PUMP TANK
RESTROOM A



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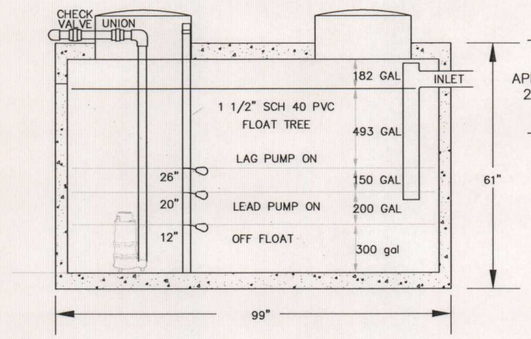
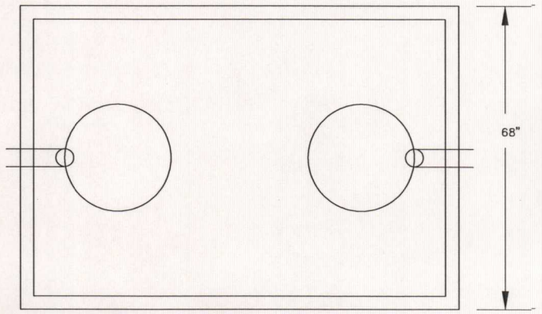


DUPLEX HYDROMATIC MOD. SKHD
150 EFFLUENT PUMPS 1000
GALLON DUPLEX LIFT STATION



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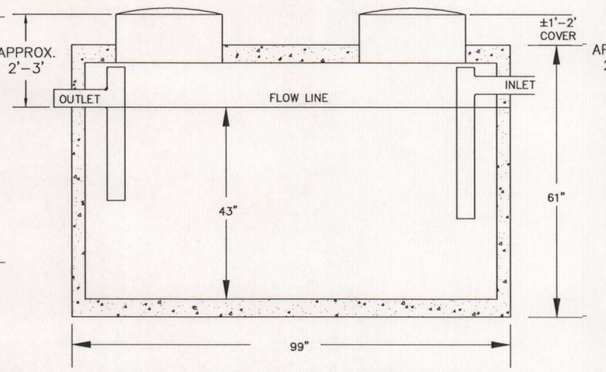
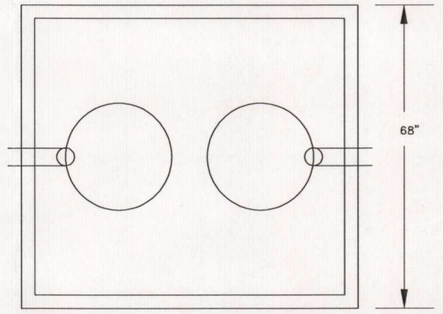
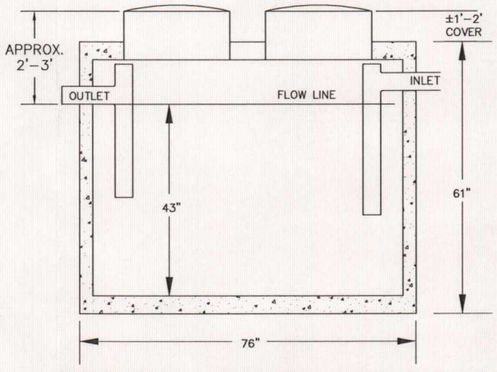


OSSF TANK CONFIGURATION 1000
GALLON ONE COMPARTMENT



24" CAST IN PLACE ZOELLER RISERS WITH SANITARY SEWER SCREW DOWN LIDS



OSSF TANK CONFIGURATION 750
GALLON ONE COMPARTMENT

US Army Corps of Engineers®

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REGISTERED WITH TBPE AS F-8043 AND TBPLS AS F-10194400

STATE OF TEXAS
MATTHEW B. MACKENZIE
95797
1/14

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN-MARK MATKIN
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CRANES MILL PARK
FURNISH AND INSTALL
UTILITIES AND ROADS
CANYON LAKE, TEXAS
DETAIL SHEET
SHEET 3

SHEET IDENTIFICATION
C-5.3
SHEET 11 OF 16

LEGEND

(NOTE: ALL SYMBOLS SHOWN ARE NOT NECESSARILY USED ON DRAWINGS)

LIGHTING

- FA — FLUORESCENT LIGHT FIXTURE, LETTER(S) DENOTES TYPE.
- O_B — INCANDESCENT, FLUORESCENT OR HIGH INTENSITY DISCHARGE LIGHT FIXTURE, LETTER(S) DENOTES TYPE. BRACKET "B" WHEN USED INDICATES WALL MOUNTED.
- XA — EXIT LIGHT FIXTURE, LETTER(S) DENOTES TYPE. ARROW(S) WHEN USED, INDICATE DIRECTION OF CHEVRONS. SHADED AREAS INDICATE FACE(S). BRACKET "B" WHEN USED INDICATES WALL MOUNTED.
- FIXTURE EQUIPPED WITH BATTERY PACK.
- XB — EMERGENCY BATTERY BACKED UNIT EQUIPMENT, W/HEADS AS INDICATED.
- $ — SINGLE POLE SWITCH, INSTALL 48" AFF UON.
- $K — KEYED SINGLE POLE SWITCH, INSTALL 48" AFF UON.
- $2 — DOUBLE POLE SWITCH, INSTALL 48" AFF UON.
- $3 — THREE-WAY SWITCH, INSTALL 48" AFF UON.
- $4 — FOUR-WAY SWITCH, INSTALL 48" AFF UON.
- $P — SWITCH AS DESCRIBED ABOVE WITH RED PILOT LIGHT, LIGHTED WHEN "ON" UON, INSTALL 48" AFF UON.
- $WP — SWITCH WITH WEATHER PROOF COVER. INSTALL 48" AFF UON.
- $D — DIMMER, 600W UON, INSTALL 48" AFF UON.
- OS — OCCUPANCY SENSOR SWITCH. WATT STOPPER DT-355 360° OR APPROVED EQUAL, UON. CEILING MOUNTED, UON.

WIRING DEVICES

- C — DUPLEX RECEPTACLE, 18" AFF UON. ('C' INDICATES CEILING MOUNTED). NEMA 5-20R, UON.
- GFI WP — DUPLEX RECEPTACLE WITH INTERNAL GROUND FAULT PROTECTION, INSTALL 18" AFF UON. ('WP' INDICATES WEATHERPROOF).
- IG — ISOLATED GROUND DUPLEX RECEPTACLE, INSTALL 18" AFF UON.
- SS — TRANSIENT VOLTAGE SURGE SUPPRESSION DUPLEX RECEPTACLE, INSTALL 18" AFF UON.
- # — QUADRUPLEX RECEPTACLE AS DESCRIBED ABOVE, 18" AFF UON.
- CLK — SIMPLEX RECEPTACLE, INSTALL 96" AFF UON. 'CLK' INDICATES CLOCK HANGER RECEPTACLE, INSTALL 84" AFF UON.
- SPECIAL PURPOSE RECEPTACLE, SIZE AND NEMA CONFIGURATION AS INDICATED, INSTALL 96" AFF UON.
- RECEPTACLE AS DESCRIBED ABOVE, INSTALLED IN A FLUSH FLOOR BOX.
- DUPLEX RECEPTACLE HORIZONTALLY MOUNTED 6" ABOVE COUNTER TOP, UON.
- CTV — COMBINATION RECEPTACLE AND TELE/DATA OUTLET INSTALLED IN FLUSH FLOOR BOX.
- E — DUPLEX RECEPTACLE SERVED BY AN EMERGENCY BACKUP GENERATOR
- VGA — VGA WALL PLATE WITH FEMALE CONNECTION, INSTALL 18" AFF UON.

CONDUIT AND WIRE

- CONDUIT RUN CONCEALED IN CEILING, WALL, FLOOR, OR ABOVE SUSPENDED CEILING.
- CONDUIT RUN IN OR BELOW SLAB OR GROUND.
- SWITCH LEG.
- LA-1 — HOMERUN TO PANEL AND CIRCUIT DESIGNATION. SINGLE-BRANCH CIRCUITS SHALL BE MINIMUM 2#12 AWG AND #12 AWG GROUND, 3/4"C. U.O.N. ON DRAWINGS OR SPECIFICATIONS.
- E — EMPTY CONDUIT WITH PULLING LINE, SIZE AS INDICATED.
- CAPPED CONDUIT.
- CONDUIT TURNED UP.
- CONDUIT TURNED DOWN.
- SURFACE MOUNTED MULTI-OUTLET ASSEMBLY, 6" ABOVE COUNTER TOP, UON.
- CABLE TRAY
- FP — POWER/DATA POLE

CIRCUIT WIRING NOTATION

- GROUND CONDUCTOR
- NEUTRAL CONDUCTOR
- PHASE CONDUCTOR(S)
- INDICATES HOMERUN TO POWER PANELBOARD

MISC. SYMBOLS

- EQUIPMENT, PANELS, ECT. TO BE REMOVED
- CONDUIT, CIRCUITRY, APPURTENANCES, ETC. TO BE REMOVED

GROUNDING

- 3/4" DIAMETER BY 10'-0" LONG COPPER CLAD GROUND ROD.
- G — GROUND CONDUCTOR. SIZE AS INDICATED.
- GROUND CONNECTION.
- G — GROUND BUS AS NOTED ON DRAWINGS AND SPECIFICATIONS

DISTRIBUTION & CONTROLS

- ELECTRICAL PANELBOARD (480Y/277 VOLT).
- ELECTRICAL PANELBOARD (208Y/120 VOLT).
- B — ENCLOSED CIRCUIT BREAKER, RATING AND NO OF POLES AS INDICATED.
- NON-FUSED DISCONNECT SWITCH. 30A/3P NEMA 1 UON. 30A = SWITCH RATING, 3P = NO OF POLES, NEMA 1 = ENCLOSURE STYLE.
- FUSED DISCONNECT SWITCH. 30A/3P NEMA 1 UON. FUSE SIZE AS NOTED. 30A = SWITCH RATING, 3P = NO OF POLES, NEMA 1 = ENCLOSURE STYLE.
- MAGNETIC MOTOR STARTER. SIZE 1, NEMA 1 UON.
- COMBINATION DISCONNECT AND MAGNETIC STARTER. SIZE 1, NEMA 1 UON.
- CONTROLLER PROVIDED WITH EQUIPMENT (HVAC, ELEVATOR, ETC.) INSTALLED BY DIVISION 16.
- $M — MANUAL MOTOR STARTER WITH THERMAL OVERLOAD(S) UON, SIZED PER ACTUAL NAMEPLATE RATING.
- C — CONTRACTOR, RATING AND NO OF POLES AS INDICATED.
- PE — PHOTO-ELECTRIC SWITCH. INSTALL WITH SENSOR ELEMENT FACING NORTH, FLUSH MOUNTED WHERE POSSIBLE, UON.
- TS — TIME SWITCH.
- JUNCTION BOX.
- M — MOTOR.
- MD — MOTORIZED DAMPER.
- T — TRANSFORMER, RATING AS INDICATED.
- CURRENT TRANSFORMER, RATING AND NO AS INDICATED.
- DRAW-OUT POWER CIRCUIT BREAKER, RATING AND NO. OF POLES, AS INDICATED.
- THERMAL AND/OR MAGNETIC CIRCUIT BREAKER, RATING AND NO OF POLES AS INDICATED.
- FUSE, RATING AS INDICATED.
- SURGE ARRESTER, RATING AS INDICATED.
- MPM — DIGITAL SOLID STATE MULTI-FUNCTION METER.
- M — UTILITY COMPANY REVENUE METER UON.
- PUSHBUTTON, TYPE AS SPECIFIED ON DRAWING.
- SELECTOR SWITCH.
- E — EQUIPMENT CONNECTION. COORDINATE WITH MANUFACTURERS' REPRESENTATIVE.
- TVSS — TRANSIENT VOLTAGE SURGE SUPPRESSOR SYSTEM.
- PB — PULL BOX, SIZE PER NEC, UON.

FIRE ALARM SYSTEM

- FACP — FIRE ALARM CONTROL PANEL.
- F — FIRE ALARM MANUAL STATION, INSTALL 48" AFF.
- F — FIRE ALARM AREA SMOKE DETECTOR, INSTALL ON CEILING UON. "F", INDICATES UNDER RAISED FLOOR.
- AV — CEILING OR WALL MOUNTED FIRE ALARM AUDIO/VISUAL DEVICE, INSTALL THE WALL MOUNTED AT 84" AFF, TO THE CENTERLINE OF THE DEVICE UON.
- D — DUCT MOUNTED SMOKE DETECTOR
- V — CEILING OR WALL MOUNTED FIRE ALARM VISUAL DEVICE, INSTALL THE WALL MOUNTED AT 84" AFF, TO THE CENTERLINE OF THE DEVICE UON.

COMMUNICATIONS AND DATA

- TELEPHONE TERMINAL BOARD, 4' X 8' X 3/4" THICK, UON.
- P — TELEPHONE OUTLET. INSTALL 18" AFF UON. 4" SQUARE BOX WITH A SINGLE DEVICE PLASTER RING AND 1"C WITH PULLING LINE STUBBED OUT TO ABOVE NEAREST ACCESSIBLE CEILING. P = PAYPHONE WITH OUTLET @ 44" AFF; W = WALL MOUNTED @ 48" AFF.
- TELE/ DATA OUTLET. INSTALL 18" AFF UON. 4" SQUARE BOX WITH A SINGLE DEVICE PLASTER RING AND 1"C WITH PULLING LINE STUBBED OUT TO ABOVE NEAREST ACCESSIBLE CEILING.
- COMBINATION (1) TELEPHONE AND (2) DATA OUTLETS. INSTALL 18" AFF UON. 4" SQUARE BOX WITH A SINGLE DEVICE PLASTER RING AND 1"C WITH PULLING LINE STUBBED OUT TO ABOVE NEAREST ACCESSIBLE CEILING.
- TV — OUTLET AS DESCRIBED ABOVE, INSTALLED IN A FLUSH FLOOR BOX.
- TV — OUTLET BOX WITH 1" CONDUIT WITH PULLING LINE STUBBED OUT TO ABOVE ACCESSIBLE CEILING FOR CATV, INSTALL 18" AFF, UON.
- CR — OUTLET BOX WITH 1" CONDUIT WITH PULLING LINE STUBBED OUT TO ABOVE ACCESSIBLE CEILING FOR CARD READER, INSTALL 96" AFF, UON.

ABBREVIATIONS

A	A	AMPERE
	AF	AMP FRAME/AMP FUSE
	AFF	ABOVE FINISHED FLOOR
	AFG	ABOVE FINISHED GRADE
	AHU	AIR HANDLING UNIT
	AIC	AMPERE INTERRUPTING CAPACITY
	ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
	AWG	AMERICAN WIRE GAUGE
B	BFG	BELOW FINISHED GRADE
C	C	CONDUIT
	CB	CIRCUIT BREAKER
	CCTV	CLOSED CIRCUIT TELEVISION
	CF	COMPACT FLUORESCENT CIRCUIT
	CKT	CEILING
	CLG	CLOCK
	CLK	CITY PUBLIC SERVICE (SA PROJECTS)
	CPS	CURRENT TRANSFORMERS
	CTS	CONDENSING UNIT OR COPPER
	CU	
D	DISC SW	DISCONNECT SWITCH
E	EA	EACH
	EC	EMPTY CONDUIT
	EDF	ELECTRIC DRINKING FOUNTAIN
	EWC	ELECTRIC WATER COOLER
	EF	EXHAUST FAN
	ELEC	ELECTRICAL
	EMT	ELECTRICAL METALLIC TUBING
	EQUIP	EQUIPMENT
	EWH	ELECTRIC WATER HEATER
F	FACP	FIRE ALARM CONTROL PANEL
	FCU	FAN COIL UNIT
	FLA	FULL LOAD AMPS
G	GEC	GROUNDING ELECTRODE CONDUCTOR
	GEN	GENERATOR OR GENERAL
	GFI/GFCI	GROUND FAULT CIRCUIT INTERRUPTER
	GND	GROUND
H	HID	HIGH INTENSITY DISCHARGE
	HPS	HIGH PRESSURE SODIUM
I	IDS	INTRUSION DETECTION SYSTEM
	IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
	IMC	INTERMEDIATE METAL CONDUIT
	INC	INCANDESCENT
	IPS	INTERRUPTIBLE POWER SUPPLY
K	KAIC	THOUSAND AMP INTERRUPTING CAPACITY RMS SYMMETRICAL
	MCM/KCMIL	THOUSAND CIRCULAR MILS
	KVA	THOUSAND VOLT AMPERE
	KW	KILOWATT
L	LRA	LOCKED ROTOR AMPS
	LSI	LONG TIME/SHORT TIME/INSTANTANEOUS TRIP SETTINGS INCLUDED WITH CIRCUIT BREAKER
	LSIG	L.T./S.T./I.T./GROUND FAULT TRIP SETTINGS INCLUDED WITH CIRCUIT BREAKER.
M	MCA	MINIMUM CIRCUIT AMPERES
	MCB	MAIN CIRCUIT BREAKER
	MCC	MOTOR CONTROL CENTER
	MCCB	MOLDED CASE CIRCUIT BREAKER
	MFR	MANUFACTURER
	MH	METAL HALIDE
	MLO	MAIN LUGS ONLY
	MOCP	MAXIMUM OVERCURRENT PROTECTION
	MTD	MOUNTED
	MTG HT	MOUNTING HEIGHT
	MV	MERCURY VAPOR
N	NC	NORMALLY CLOSED
	NEC	NATIONAL ELECTRICAL CODE
	NECA	NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
	NIC	NOT IN CONTRACT
	NL	NIGHT LIGHT
	NO	NUMBER OR NORMALLY OPEN
	NTS	NOT TO SCALE
O	OCPD	OVER CURRENT PROTECTIVE DEVICE
	OFOI	OWNER FURNISHED, OWNER INSTALLED
	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
P	PH	PHASE
	PNL	PANELBOARD
R	RCPT	RECEPTACLE
	REP	REPRESENTATIVE
	REQD	REQUIRED
	RLA	RUNNING LOAD AMPERES
	RTU	ROOF TOP UNIT
S	SC	SPLIT BRANCH CIRCUIT INDICATES REFERENCED BRANCH CIRCUIT HAS MORE
T	TEL	TELEPHONE
	TV	TELEVISION
	TYP	TYPICAL
U	UH	UNIT HEATER
	UON	UNLESS OTHERWISE NOTED
	UPS	UNINTERRUPTIBLE POWER SUPPLY
V	V	VOLT
	VA	VOLT AMPERE
	VFD/VSD	VARIABLE FREQUENCY/SPEED DRIVE
W	W	WIRE
	W/	WITH
	W/O	WITHOUT
	WP	WEATHERPROOF
X	XFMR	TRANSFORMER
	XMTR	TRANSMITTER
	XFER SW	TRANSFER SWITCH
Z	%Z	PERCENT IMPEDANCE

EQUIPMENT IDENTIFICATION SCHEDULE

THE FOLLOWING LABELS SHALL BE INSTALLED ON NEW ELECTRICAL EQUIPMENT AND EXISTING EQUIPMENT AFFECTED BY THE NEW CONSTRUCTION. IDENTIFICATION LABELS SHALL BE LAMINATED BLACK PHENOLIC RESIN WITH A WHITE CORE AND ENGRAVED LETTERING, A MINIMUM OF 1/4" HIGH.

PANELBOARDS/ENCLOSED CIRCUIT BREAKERS:

PNL - PANEL NAME
AMPS/Ø TO N VOLTAGE/Ø TO Ø VOLTAGE/NO. OF Ø/NO. OF WIRES
FED FROM: DEVICE NAME

EXAMPLE:

PNL - L2K
225A/277/480Y/3Ø/4W
FED FROM: PNL - LDP-2

SAFETY SWITCHES/MOTOR STARTERS/VSD:

DEVICE SERVED: DEVICE NAME
AMPS/VOLTAGE/Ø/NO. OF WIRES/AF OR NF
FED FROM: DEVICE NAME

EXAMPLE:

DEVICE SERVED : AHU-1
30A/600V/3Ø/3W/25AF
FED FROM: MCC-B1

SITE

- OE — OVERHEAD ELECTRIC
- OS — OVERHEAD SECONDARY
- UP — UNDERGROUND PRIMARY ELECTRIC UTILITY
- US — UNDERGROUND SECONDARY ELECTRIC UTILITY
- AT — AERIAL TELEPHONE UTILITY
- UC — UNDERGROUND COMMUNICATIONS
- HA — LIGHTING STANDARD WITH ALUMINIZE. LETTERS DENOTE TYPE.
- UTILITY POLE
- DOWN GUY
- TRANSFORMER POLE

GENERAL ELECTRICAL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2009 INTERNATIONAL CODES AND THE REQUIREMENTS STATED IN THE APPLICABLE SECTIONS OF THE NATIONAL FIRE CODES (NFPA STANDARDS) CURRENT AT THE TIME OF ISSUANCE OF THE CONSTRUCTION DOCUMENTS. AMENDMENTS TO THESE CODES AS SET FORTH BY THE AUTHORITY HAVING JURISDICTION SHALL SUPERSEDE THE INTERNATIONAL CODES AND NFPA STANDARDS AS ISSUED.
2. INTERRELATION BETWEEN THE DRAWINGS AND THE SPECIFICATIONS: IN GENERAL, THE DRAWINGS INDICATE LOCATIONS, QUANTITIES AND CAPACITIES AND THE SPECIFICATIONS INDICATE QUALITY, OPTIONS, WARRANTIES AND COMPLIANCE STANDARDS. IN THE EVENT THERE IS A CONFLICT BETWEEN THE SPECIFICATIONS AND THE DRAWINGS, THE GREATER QUALITY OR QUANTITY SHALL BE REQUIRED. IN ALL CASES, THE ENGINEER OF RECORD SHALL BE THE INTERPRETER OF THE DOCUMENTS.
3. INTERRELATION BETWEEN THE DRAWINGS: IN THE EVENT OF A CONFLICT BETWEEN A DETAIL AND A FLOOR PLAN, THE LARGER SIZE, QUANTITY, LENGTH OR OPTIONS SHALL BE REQUIRED. IN THE EVENT OF A CONFLICT BETWEEN WHAT IS SHOWN ON THE FLOOR PLAN AND A KEYED NOTE, THE KEYED NOTE SHALL GOVERN. IN ALL CASES, THE ENGINEER OF RECORD SHALL BE THE INTERPRETER OF THE DOCUMENTS.
4. PRIOR TO BIDDING, THE DIVISION 26 INSTALLER SHALL VISIT THE JOB SITE TO FAMILIARIZE HIMSELF WITH EXISTING CONDITIONS AND TO VERIFY LOCATIONS AND SIZES OF EXISTING EQUIPMENT, CONDUCTORS, ETC. SUBMITTAL OF HIS BID SHALL SIGNIFY HIS WILLINGNESS TO COMPLY WITH THE CONSTRUCTION DOCUMENTS AND HIS ACCEPTANCE OF ON-SITE CONDITIONS AS THEY EXIST.
5. THE EXISTENCE AND LOCATION OF UTILITIES, MECHANICAL SYSTEMS, ELECTRICAL SYSTEMS AND OTHER CONSTRUCTION INDICATED AS EXISTING ARE NOT GUARANTEED. BEFORE BEGINNING WORK, INVESTIGATE AND VERIFY THE EXISTENCE AND LOCATION OF MECHANICAL AND ELECTRICAL SYSTEMS AND OTHER CONSTRUCTION AFFECTING THE WORK.
6. COOPERATE FULLY WITH SEPARATE CONTRACTORS SO WORK ON THOSE CONTRACTS MAY BE CARRIED OUT SMOOTHLY, WITHOUT INTERFERING WITH OR DELAYING WORK UNDER THIS CONTRACT. COORDINATE THE WORK OF THIS CONTRACT WITH WORK PERFORMED UNDER SEPARATE CONTRACTS.
7. DO NOT INTERRUPT UTILITIES SERVING FACILITIES OCCUPIED BY THE GOVERNMENT OR OTHERS UNLESS PERMITTED BY THE GOVERNMENT. NOTIFY THE CONTRACTING OFFICER A MINIMUM OF 72 HOURS PRIOR TO ANY OUTAGE.
8. THE DRAWINGS ARE DIAGRAMMATIC ONLY AND SHALL NOT BE SCALED. THE INSTALLER IS RESPONSIBLE FOR COORDINATING WITH OTHER TRADES AND WITH EXISTING CONDITIONS. THE INSTALLER SHALL NOT INSTALL OR FABRICATE ANY WORK SHOWN UNTIL ALL SUCH WORK IS FULLY COORDINATED.
9. TAKE FIELD MEASUREMENTS AS REQUIRED TO FIT THE WORK PROPERLY. RECHECK MEASUREMENTS BEFORE INSTALLING EACH PRODUCT. WHERE PORTIONS OF THE WORK ARE INDICATED TO FIT TO OTHER CONSTRUCTION, VERIFY DIMENSIONS OF OTHER CONSTRUCTION BY FIELD MEASUREMENTS BEFORE FABRICATION. COORDINATE FABRICATION SCHEDULE WITH CONSTRUCTION PROGRESS TO AVOID DELAYING THE WORK.
10. CLEAN AND PROTECT CONSTRUCTION IN PROGRESS AND ADJOINING MATERIALS ALREADY IN PLACE. APPLY PROTECTIVE COVERING WHERE REQUIRED TO ENSURE PROTECTION FROM DAMAGE OR DETERIORATION. DAMAGED EQUIPMENT OR MATERIALS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED AT NO COST TO THE OWNER.
11. SUPERVISE CONSTRUCTION OPERATIONS TO ASSURE THAT ALL WORK IS INSTALLED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.
12. MECHANICAL EQUIPMENT SIZES ARE AS DESIGNED, BREAKERS, CONDUIT, STARTERS, CONDUCTORS, ETC., SHALL BE ADJUSTED TO THE EQUIPMENT SUBMITTED AND APPROVED FOR INSTALLATION ON THIS PROJECT.
13. REMOTE MOUNTED MOTORS SHALL BE PROVIDED WITH RECEPTACLES AND PLUGS OR DISCONNECT SWITCHES TO BE COMPATIBLE WITH THE CONSTRUCTION TYPE AND THE NEC.
14. EACH MOTOR BEING INSTALLED ON THIS CONTRACT SHALL BE PROVIDED WITH THERMAL PROTECTION IN EITHER A MANUAL OR MAGNETIC STARTER. THERMAL ELEMENTS SHALL BE SIZED AND INSTALLED ACCORDING TO THE NAMEPLATE FULL LOAD AMP RATING OF THE MOTOR.
15. KILOWATT (KW) RATINGS FOR EQUIPMENT MOTOR LOADS ARE AS DESIGNED WITH 90% POWER FACTOR RATING ASSUMED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INCREASING THE SIZE, AS REQUIRED, OF ALL FEEDERS AND PROTECTIVE DEVICES SERVING ANY ITEMS OF EQUIPMENT SUPPLIED WITH POWER FACTOR RATINGS LESS THAN 90% EFFICIENCY.
16. A CIRCUIT SHALL BE DEFINED TO INCLUDE ALL OF THE FOLLOWING: CONDUIT, CONDUCTORS, BOXES, WIRING DEVICES, COVERPLATES, WIREWAYS, ETC.
17. MULTIWIRE BRANCH CIRCUITS AS DEFINED BY THE NATIONAL ELECTRICAL CODE SHALL NOT BE USED. A DEDICATED NEUTRAL CONDUCTOR SHALL BE RUN FOR EACH BRANCH CIRCUIT, UON.
18. THE CONTRACTOR SHALL LABEL EACH JUNCTION/PULL BOX COVER PLATE WITH THE CIRCUIT NUMBER OF THE CIRCUITS IT CONTAINS.

NOTE:
ALL MATERIAL & EQUIPMENT MUST COMPLY WITH THE BUY AMERICAN ACT.

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8140 WALNUT HILL LANE, SUITE 310 DALLAS, TEXAS 75231 (214) 343-8200
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CIVIL ENGINEERING SURVEYING LAND PLANNING CONSTRUCTION MANAGERS CONSULTANTS

STATE OF TEXAS — ROBERT W. WARD — 101010 — LICENSED PROFESSIONAL ENGINEER — 01/31/11

MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: BARKER & ASSOCIATES | DATE: 01/31/2011
DWN BY: RC | CKD BY: DB | SOLICITATION NO.: W5F2R3-10-R-0042
SUBMITTED BY: | CONTRACT NO.: W5F2R3-10-D-0011
PLOT SCALE: | PLOT DATE: | FILE NUMBER:
SIZE: ARCH D | FILE NAME:

ROADS & UTILITIES
CRANES MILL PARK
CANYON LAKE, TEXAS

ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES

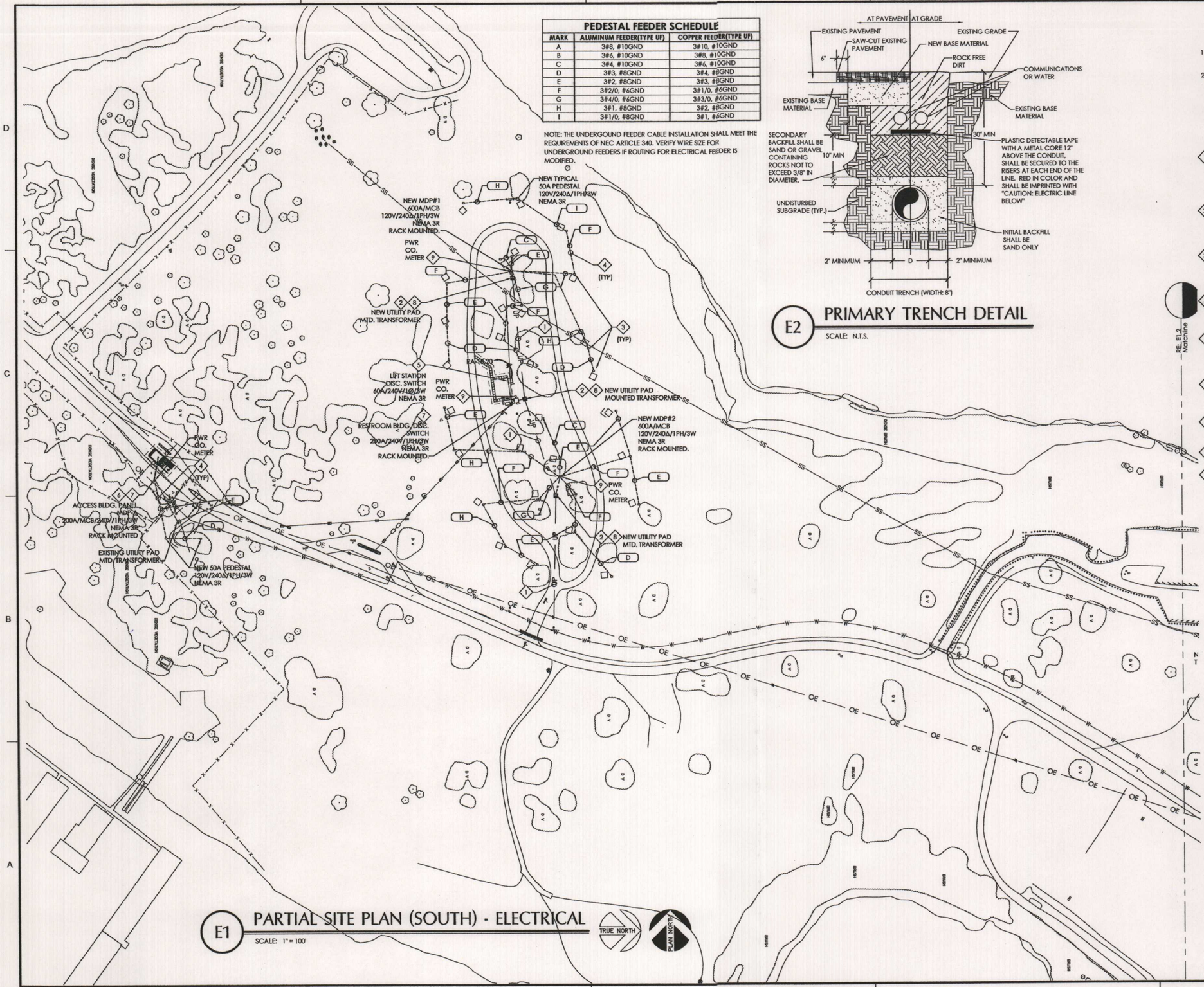
SHEET IDENTIFICATION
E0.1
SHEET 12 OF 18

PEDESTAL FEEDER SCHEDULE		
MARK	ALUMINUM FEEDER(TYPE UF)	COPPER FEEDER(TYPE UF)
A	3#8, #10GND	3#10, #10GND
B	3#6, #10GND	3#8, #10GND
C	3#4, #10GND	3#6, #10GND
D	3#3, #8GND	3#4, #8GND
E	3#2, #8GND	3#3, #8GND
F	3#2/0, #6GND	3#1/0, #6GND
G	3#4/0, #6GND	3#3/0, #6GND
H	3#1, #8GND	3#2, #8GND
I	3#1/0, #8GND	3#1, #6GND

NOTE: THE UNDERGROUND FEEDER CABLE INSTALLATION SHALL MEET THE REQUIREMENTS OF NEC ARTICLE 340. VERIFY WIRE SIZE FOR UNDERGROUND FEEDERS IF ROUTING FOR ELECTRICAL FEEDER IS MODIFIED.

E2 PRIMARY TRENCH DETAIL

SCALE: N.T.S.



E1 PARTIAL SITE PLAN (SOUTH) - ELECTRICAL

SCALE: 1" = 100'

TRUE NORTH

PLAN NORTH

GENERAL NOTES:

1. REFERENCE SHEET E0.1 FOR LEGEND, SYMBOLS, ABBREVIATIONS AND FURTHER GENERAL NOTES.
2. THE EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. THE LOCATIONS SHOWN WERE DEVELOPED FROM RECORD DRAWINGS AND FROM THE BEST INFORMATION AVAILABLE. THESE UTILITY LOCATIONS ARE NOT GUARANTEED. UTILITIES NOT SHOWN ON THIS DRAWING MAY EXIST. THE CONTRACTOR SHALL FIELD VERIFY EACH UTILITY LOCATION AND COORDINATE THE CROSSING OF THE EXISTING UTILITY WITH COE AT LEAST 72HRS PRIOR TO THE EXCAVATION.

KEYED NOTES:

1. FURNISH AND INSTALL A 3"C FOR THE ELECTRICAL PRIMARY RUN TO SERVE THE NEW PAD MOUNTED TRANSFORMER. COORDINATE THE INSTALLATION AND EXTENSION OF THE PRIMARIES WITH PEDERNALES ELECTRIC COMPANY (CONTACT LISA AHMAD 830-964-3346 EXT 76211). REFERENCE DETAIL E2/E1.1 FOR PRIMARY TRENCHING DETAIL.
2. NEW UTILITY PAD MOUNTED TRANSFORMER WITH SECONDARY OF 120V/240Δ/1PH/3W TO SERVE THE NEW ELECTRICAL SERVICES AT CRANES MILL PARK FURNISHED AND INSTALLED BY PEDERNALES ELECTRIC COMPANY. COORDINATE THE NEW TRANSFORMERS LOCATION AND INSTALLATION REQUIREMENTS WITH PEC.
3. FURNISH AND INSTALL A NEW 50A/120V/240Δ/1PH/3W ELECTRICAL OUTLET PEDESTAL (MIDWEST MODEL U075CP6010 OR EQUAL) TO SERVE THE RV PARKING SPACE. COORDINATE THE PEDESTAL LOCATIONS WITH USACE PRIOR TO ROUGH-IN. THE NEW PEDESTAL LOCATIONS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 551.77.
4. FURNISH AND INSTALL A NEW FEEDER TO SERVE THE ELECTRICAL PEDESTALS. FOR WIRE SIZE REFERENCE FEEDER SCHEDULE SHOWN ON THIS SHEET. FOR UNDERGROUND CABLE INSTALLATION REFERENCE DETAIL E2/E1.2 AND NEC ARTICLE 340.
5. FURNISH AND INSTALL A NEW 60A/240/1Ø/3W/NEMA 3R NON-FUSED DISCONNECT TO SERVE THE NEW LIFT STATION; 2#8, #10GND, 3/4"C. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR POWER REQUIREMENTS.
6. FURNISH AND INSTALL A 80A/2P CIRCUIT BREAKER IN THE NEW MDP-A PANEL TO SERVE THE NEW RV PEDESTAL BRANCH CIRCUIT. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR ADDITIONAL INFORMATION.
7. ELECTRICAL EQUIPMENT INSTALLED UNDER A SEPARATE CONTRACT. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR ADDITIONAL INFORMATION.
8. FURNISH AND INSTALL A NEW 3000 PSI CONCRETE TRANSFORMER PAD IN ACCORDANCE WITH PEC REQUIREMENTS.
9. INSTALL THE NEW METER SOCKET ENCLOSURE FURNISHED BY PEC TO SERVE THE NEW SERVICE ENTRANCE EQUIPMENT. THE NEW METER ENCLOSURE SHALL BE INSTALLED IN ACCORDANCE WITH THE PEC SERVICE STANDARDS.

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CIVIL ENGINEERS CERTIFIED LAND SURVEYORS LANDSCAPE ARCHITECTS CONSTRUCTION MANAGERS CONSULTANTS
TEXAS REGISTERED

STATE OF TEXAS — ROBIN CALLIS — 101010 — LICENSED PROFESSIONAL ENGINEER — 01/31/11

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: BARKER & ASSOCIATES
DRAWN BY: RD
CKD BY: DB
SUBMITTED BY:
DATE: DECEMBER 2011
SOLICITATION NO.: W912RG-10-R-0042
CONTRACT NO.: W912RG-10-R-0011
PLOT SCALE:
PLOT DATE:
FILE NUMBER:
SIZE: ARCH D
FILE NAME:

ROADS & UTILITIES
CRANES MILL PARK
CANYON LAKE, TEXAS

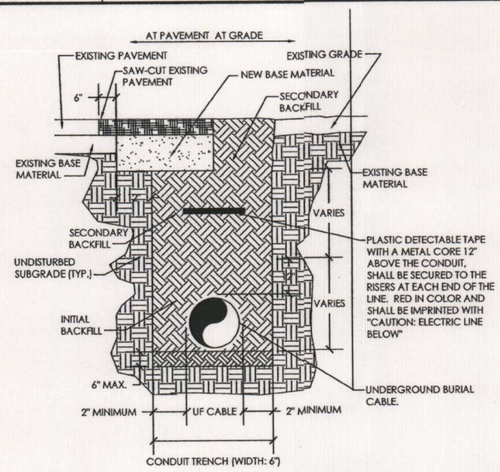
PARTIAL SITE PLAN (SOUTH) - ELECTRICAL

SHEET IDENTIFICATION
E1.1
SHEET 13 OF 16

PEDESTAL FEEDER SCHEDULE

MARK	ALUMINUM FEEDER(TYPE UF)	COPPER FEEDER(TYPE UF)
A	3#8, #10GND	3#10, #10GND
B	3#6, #10GND	3#8, #10GND
C	3#4, #10GND	3#6, #10GND
D	3#3, #8GND	3#4, #8GND
E	3#2, #8GND	3#3, #8GND
F	3#2/0, #6GND	3#1/0, #6GND
G	3#4/0, #6GND	3#3/0, #6GND
H	3#1, #8GND	3#2, #8GND
I	3#1/0, #8GND	3#1, #6GND

NOTE: THE UNDERGOUND FEEDER CABLE INSTALLATION SHALL MEET THE REQUIREMENTS OF NEC ARTICLE 340. VERIFY WIRE SIZE FOR UNDERGROUND FEEDERS IF ROUTING FOR ELECTRICAL FEEDER IS MODIFIED.



E2 FEEDER TRENCH DETAIL

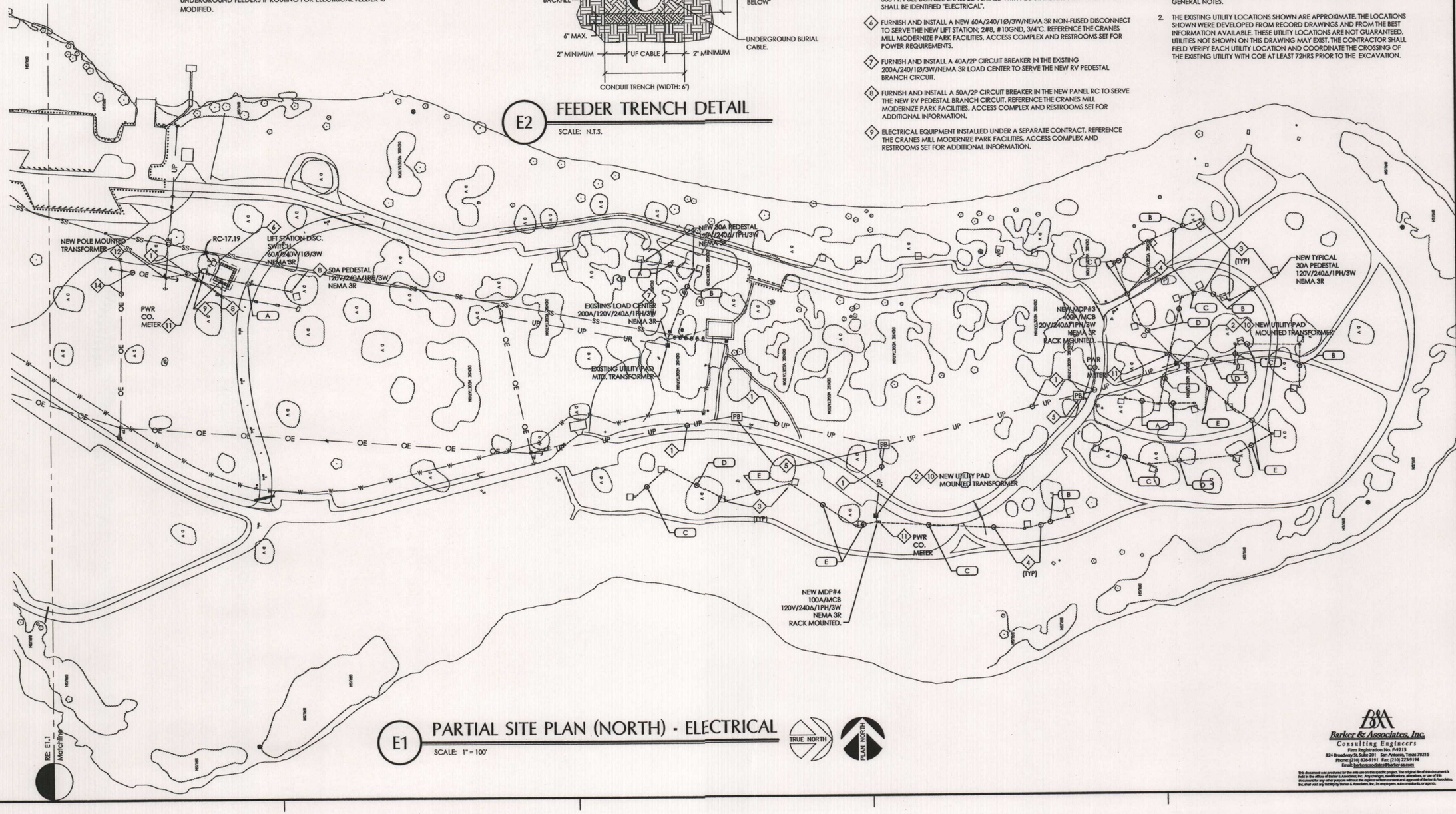
SCALE: N.T.S.

KEYED NOTES:

1. FURNISH AND INSTALL A 3"C FOR THE ELECTRICAL PRIMARY RUN TO SERVE THE NEW PAD MOUNTED TRANSFORMER. COORDINATE THE INSTALLATION AND EXTENSION OF THE PRIMARIES WITH PEDERNALES ELECTRIC COMPANY (CONTACT LISA AHMAD 830-964-3346 EXT 7621). REFERENCE DETAIL E2/E1.1 FOR PRIMARY TRENCHING DETAIL.
2. NEW UTILITY PAD MOUNTED TRANSFORMER WITH SECONDARY OF 120V/240Δ/1PH/3W TO SERVE THE NEW ELECTRICAL SERVICES AT CRANES MILL PARK FURNISHED AND INSTALLED BY PEC. COORDINATE THE NEW TRANSFORMERS LOCATION AND INSTALLATION REQUIREMENTS WITH PEC.
3. FURNISH AND INSTALL A NEW 30A/120V/240Δ/1PH/3W ELECTRICAL OUTLET PEDESTAL (MIDWEST MODEL U041CP6010 OR EQUAL) TO SERVE THE RV PARKING SPACE. COORDINATE THE PEDESTAL LOCATIONS WITH USACE PRIOR TO ROUGH-IN. THE NEW PEDESTAL LOCATIONS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 551.77.
4. FURNISH AND INSTALL A NEW FEEDER TO SERVE THE ELECTRICAL PEDESTALS. FOR WIRE SIZE REFERENCE FEEDER SCHEDULE SHOWN ON THIS SHEET. FOR UNDERGROUND CABLE INSTALLATION REFERENCE DETAIL E2/E1.2 AND NEC ARTICLE 340.
5. FURNISH AND INSTALL THE REQUIRED NUMBER PULL BOXES IN ACCORDANCE WITH THE PEDERNALES ELECTRIC STANDARDS. PULL BOXES SHALL BE INSTALLED EVERY 500 FT. PULL BOX SIZE SHALL BE VERIFIED WITH PEC STANDARDS. PULL BOX COVER SHALL BE IDENTIFIED "ELECTRICAL".
6. FURNISH AND INSTALL A NEW 60A/240/1Ø/3W/NEMA 3R NON-FUSED DISCONNECT TO SERVE THE NEW LIFT STATION; 2#8, #10GND, 3/4"C. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR POWER REQUIREMENTS.
7. FURNISH AND INSTALL A 40A/2P CIRCUIT BREAKER IN THE EXISTING 200A/240/1Ø/3W/NEMA 3R LOAD CENTER TO SERVE THE NEW RV PEDESTAL BRANCH CIRCUIT.
8. FURNISH AND INSTALL A 50A/2P CIRCUIT BREAKER IN THE NEW PANEL RC TO SERVE THE NEW RV PEDESTAL BRANCH CIRCUIT. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR ADDITIONAL INFORMATION.
9. ELECTRICAL EQUIPMENT INSTALLED UNDER A SEPARATE CONTRACT. REFERENCE THE CRANES MILL MODERNIZE PARK FACILITIES, ACCESS COMPLEX AND RESTROOMS SET FOR ADDITIONAL INFORMATION.
10. FURNISH AND INSTALL A NEW 3000 PSI CONCRETE TRANSFORMER PAD IN ACCORDANCE WITH PEC REQUIREMENTS.
11. INSTALL THE NEW METER SOCKET ENCLOSURE FURNISHED BY PEC TO SERVE THE NEW SERVICE ENTRANCE EQUIPMENT. THE NEW METER ENCLOSURE SHALL BE INSTALLED IN ACCORDANCE WITH THE PEC SERVICE STANDARDS.
12. NEW UTILITY POLE MOUNTED TRANSFORMER WITH SECONDARY OF 120V/240A/1PH/3W TO SERVE THE NEW ELECTRICAL SERVICE AT RESTROOM C FURNISHED AND INSTALLED BY PEC. COORDINATE THE INSTALLATION OF THE SECONDARY RISER FOR THE NEW SERVICE WITH PEC.
13. FURNISH AND INSTALL A NEW 2"C FOR THE INSTALLATION OF THE NEW SECONDARY SERVING THE ELECTRICAL SERVICE FOR RESTROOM C.
14. THE OVERHEAD ELECTRICAL LINE SHALL BE UPGRADED BY PEC FOR THE NEW ELECTRICAL SERVICE FOR RESTROOM C. COORDINATE THE INSTALLATION AND EXTENSION OF THE OVERHEAD PRIMARIES WITH PEC.

GENERAL NOTES:

1. REFERENCE SHEET E0.1 FOR LEGEND, SYMBOLS, ABBREVIATIONS AND FURTHER GENERAL NOTES.
2. THE EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. THE LOCATIONS SHOWN WERE DEVELOPED FROM RECORD DRAWINGS AND FROM THE BEST INFORMATION AVAILABLE. THESE UTILITY LOCATIONS ARE NOT GUARANTEED. UTILITIES NOT SHOWN ON THIS DRAWING MAY EXIST. THE CONTRACTOR SHALL FIELD VERIFY EACH UTILITY LOCATION AND COORDINATE THE CROSSING OF THE EXISTING UTILITY WITH COE AT LEAST 72HRS PRIOR TO THE EXCAVATION.



E1 PARTIAL SITE PLAN (NORTH) - ELECTRICAL

SCALE: 1" = 100'

TRUE NORTH

PLAN NORTH

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MATKINHOOVER ENGINEERING & SURVEYING

STATE OF TEXAS — RUBEN GALLEGOS — 101010 — LICENSED PROFESSIONAL ENGINEER — 01-20-11

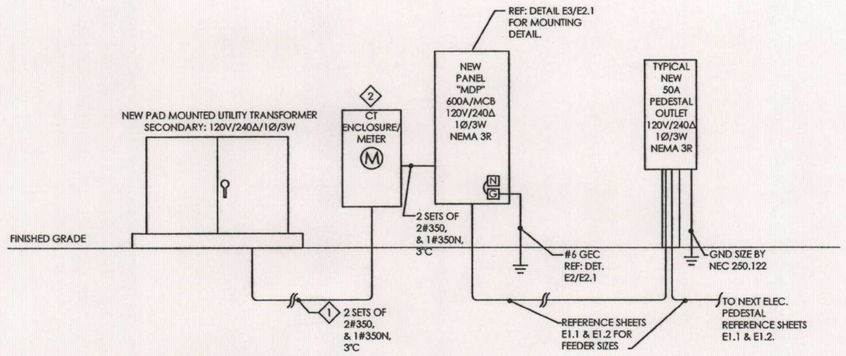
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: BARKER & ASSOCIATES
DWN BY: RC
CHD BY: DB
SUBMITTED BY:
DATE: 01/31/2011
SOLICITATION NO.: W91269-10-R-0042
CONTRACT NO.: W91269-11-D-5021
PLOT SCALE:
PLOT DATE:
FILE NUMBER:
SIZE: ARCH D
FILE NAME:

ROADS & UTILITIES
CRANES MILL PARK
CANYON LAKE, TEXAS

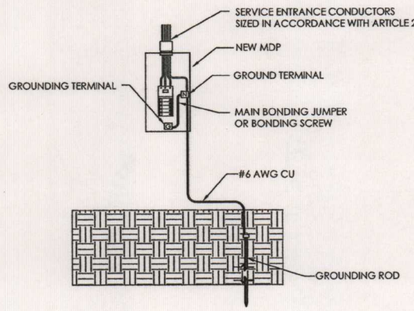
PARTIAL SITE PLAN (NORTH) - ELECTRICAL

SHEET IDENTIFICATION
E1.2
SHEET 14 OF 16



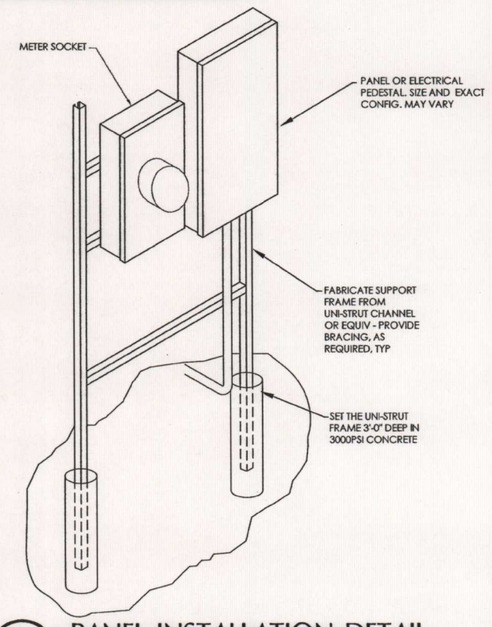
E1 ONE LINE RISER - MDP#1 & 2 - ELECTRICAL

SCALE: N.T.S.



E2 GROUNDING ELECTRODE DETAIL

SCALE: N.T.S.



E3 PANEL INSTALLATION DETAIL

SCALE: N.T.S.

SHORT CIRCUIT ANALYSIS

SERVICE ENTRANCE

VOLTAGE:	240 V
PHASE:	1
SIZE OF TRANSFORMER:	167 kVA
TRANSFORMER IMPEDENCE:	1.6%
FIRST POINT: MAIN DISTRIBUTION PANEL "MDP1"	
TRANSFORMER FLA:	695.8 Amps
TRANSFORMER MULTIPLIER:	69.4
TRANSFORMER AVAILABLE FAULT CURRENT:	48321.8 Amps
LENGTH OF CONDUIT TO THE FAULT:	20.0 Feet
CONDUCTOR CONSTANT:	22737.0
No. OF CONDUCTORS OF PHASE:	2.0
f FACTOR:	0.2
M FACTOR:	0.8
AVAILABLE SHORT CIRCUIT CURRENT:	41,051.4 Amps
NOTE: GEAR SHALL BE RATED FOR A MINIMUM	42,000.0 Amps

SHORT CIRCUIT ANALYSIS

SERVICE ENTRANCE

VOLTAGE:	240 V
PHASE:	1
SIZE OF TRANSFORMER:	167 kVA
TRANSFORMER IMPEDENCE:	1.6%
FIRST POINT: MAIN DISTRIBUTION PANEL "MDP2"	
TRANSFORMER FLA:	695.8 Amps
TRANSFORMER MULTIPLIER:	69.4
TRANSFORMER AVAILABLE FAULT CURRENT:	48321.8 Amps
LENGTH OF CONDUIT TO THE FAULT:	40.0 Feet
CONDUCTOR CONSTANT:	22737.0
No. OF CONDUCTORS OF PHASE:	2.0
f FACTOR:	0.4
M FACTOR:	0.7
AVAILABLE SHORT CIRCUIT CURRENT:	35,682.7 Amps
NOTE: GEAR SHALL BE RATED FOR A MINIMUM	42,000.0 Amps

NOTE: ARC FLASH HAZARD EXISTS ON ENERGIZED ELECTRICAL DISTRIBUTION EQUIPMENT. THE CONTRACTOR SHALL ENSURE THAT THE ELECTRICAL DEMOLITION/INSTALLATION REQUIRED BY THESE CONSTRUCTION DOCUMENTS IS PERFORMED WITH THE EQUIPMENT DE-ENRGIZED. TESTING, ADJUSTMENTS AND MAINTENANCE THAT REQUIRES THE ELECTRICAL DISTRIBUTION EQUIPMENT TO REMAIN ENERGIZED SHALL BE DONE BY A QUALIFIED PERSON IN COMPLIANCE WITH NFPA 70E STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE.

NOTE: THE CONTRACTOR SHALL FURNISH AND INSTALL THE FOLLOWING LABEL ON THE DISCONNECTS AND PANELS SHOWN IN THIS ONE-LINE RISER DIAGRAM: "WARNING ARC FLASH HAZARD - CONTACT DPW PRIOR TO WORKING ENERGIZED". THE LABEL SHALL HAVE 1/4" HIGH BLACK LETTERS WITH AN ORANGE BACKGROUND.

ELECTRICAL LOAD ANALYSIS FOR RV PARK MDP#1

SERVICE ENTRANCE:		120V/240Δ/1Ø/3W
OCCUPANCY:		RV PARK
30 RV PARKING SPACES		
RV PARK LOAD DEMANDS BASED ON NEC ARTICLE 551.73		
RV PEDESTAL RATING	QUATITY	TOTAL VA
50A PEDESTAL @ 9600VA EA	15	144,000
30A PEDESTAL @ 3600VA EA	0	0
20A PEDESTAL @ 2400VA EA	0	0
TOTAL VA		144,000
DEMAND FACTOR FOR SITE SERVICE BASED ON TABLE 551.73		87%
TOTAL VA DEMAND		125,280
TOTAL SERVICE AMPERAGE		522
MDP#1 SERVED BY (2) SETS OF 3#350 KCMIL CU		
MDP#1 MAXIMUM ALLOWABLE AMPACITY		600
MDP #1 SPARE AMPREAGE CAPACITY		78

ELECTRICAL LOAD ANALYSIS FOR RV PARK MDP#2

SERVICE ENTRANCE:		120V/240Δ/1Ø/3W
OCCUPANCY:		RV PARK
30 RV PARKING SPACES		
RV PARK LOAD DEMANDS BASED ON NEC ARTICLE 551.73		
RV PEDESTAL RATING	QUATITY	TOTAL VA
50A PEDESTAL @ 9600VA EA	15	144,000
30A PEDESTAL @ 3600VA EA	0	0
20A PEDESTAL @ 2400VA EA	0	0
TOTAL VA		144,000
DEMAND FACTOR FOR SITE SERVICE BASED ON TABLE 551.73		87%
TOTAL VA DEMAND		125,280
TOTAL SERVICE AMPERAGE		522
MDP#2 SERVED BY (2) SETS OF 3#350 KCMIL CU		
MDP#2 MAXIMUM ALLOWABLE AMPACITY		600
MDP#2 SPARE AMPREAGE CAPACITY		78

NEW PANEL MDP 1

VOLTAGE: 120V/240Δ/1ø/3W
600 MAIN CIRCUIT BREAKER
BUSES: 600A ; NEUTRAL - 100%; EQUIPMENT GROUND.

LOCATION: OUTSIDE
MOUNTING: RACK MOUNTED
Isc = 42kA RMS SYM BRACING
ENCLOSURE: NEMA 3R

VA:L	VA:R	VA:A/C	VA:O	LOAD	BKR	CKT	A	B	CKT	BKR	LOAD	VA:L	VA:R	VA:A/C	VA:O
			17280	4-50A RV PEDESTALS	150/2	1	X		2	150/2	4-50A RV PEDESTALS				17280
			17280			3		X	4						17280
			8640	2-50A RV PEDESTALS	80/2	5	X		6	125/2	3-50A RV PEDESTALS				12960
			8640			7		X	8						12960
			8640	2-50A RV PEDESTALS	80/2	9	X		10		BUS SPACE				
			8640			11		X	12		BUS SPACE				
				BUS SPACE		13	X		14		BUS SPACE				
				BUS SPACE		15		X	16		BUS SPACE				
				BUS SPACE		17	X		18		BUS SPACE				
				BUS SPACE		19		X	20		BUS SPACE				
				BUS SPACE		21	X		22		BUS SPACE				
				BUS SPACE		23		X	24		BUS SPACE				

VA:L (LIGHTING)	0 CONNECTED
VA:R (RECEPTACLES)	0 CONNECTED
VA:A/C(HVAC EQUIPT)	0 CONNECTED
VA:O (MISC.)	129600 CONNECTED
VA: TOTAL	129600 CONNECTED
AMPS: TOTAL	540 CONNECTED

125280 **NEC 551.73 DEMAND**
522 **AMPERAGE DEMAND**

L	R	A/C	O	TOTAL			
0	0	0	64800	VA CONNECTED TO A PHASE	64800 VA =	540	AMPS CONNECTED TO A PHASE @ 120 VOLTS
0	0	0	64800	VA CONNECTED TO B PHASE	64800 VA =	540	AMPS CONNECTED TO B PHASE @ 120 VOLTS
0	0	0	129600	**TOTAL CONNECTED LOAD**	129600		
					129.6 KVA		

NEW PANEL MDP 2

VOLTAGE: 120V/240Δ/1ø/3W
600 MAIN CIRCUIT BREAKER
BUSES: 600A ; NEUTRAL - 100%; EQUIPMENT GROUND.

LOCATION: OUTSIDE
MOUNTING: RACK MOUNTED
Isc = 42kA RMS SYM BRACING
ENCLOSURE: NEMA 3R

VA:L	VA:R	VA:A/C	VA:O	LOAD	BKR	CKT	A	B	CKT	BKR	LOAD	VA:L	VA:R	VA:A/C	VA:O
			12960	3-50A RV PEDESTALS	125/2	1	X		2	150/2	4-50A RV PEDESTALS				17280
			12960			3		X	4						17280
			12960	3-50A RV PEDESTALS	125/2	5	X		6	125/2	3-50A RV PEDESTALS				12960
			12960			7		X	8						12960
			8640	2-50A RV PEDESTALS	80/2	9	X		10		BUS SPACE				
			8640			11		X	12		BUS SPACE				
				BUS SPACE		13	X		14		BUS SPACE				
				BUS SPACE		15		X	16		BUS SPACE				
				BUS SPACE		17	X		18		BUS SPACE				
				BUS SPACE		19		X	20		BUS SPACE				
				BUS SPACE		21	X		22		BUS SPACE				
				BUS SPACE		23		X	24		BUS SPACE				

VA:L (LIGHTING)	0 CONNECTED
VA:R (RECEPTACLES)	0 CONNECTED
VA:A/C(HVAC EQUIPT)	0 CONNECTED
VA:O (MISC.)	129600 CONNECTED
VA: TOTAL	129600 CONNECTED
AMPS: TOTAL	540 CONNECTED

125280 **NEC 551.73 DEMAND**
522 **AMPERAGE DEMAND**

L	R	A/C	O	TOTAL			
0	0	0	64800	VA CONNECTED TO A PHASE	64800 VA =	540	AMPS CONNECTED TO A PHASE @ 120 VOLTS
0	0	0	64800	VA CONNECTED TO B PHASE	64800 VA =	540	AMPS CONNECTED TO B PHASE @ 120 VOLTS
0	0	0	129600	**TOTAL CONNECTED LOAD**	129600		
					129.6 KVA		

GENERAL NOTES:

1. REFERENCE SHEET E0.1 FOR LEGEND, SYMBOLS, ABBREVIATIONS AND FURTHER GENERAL NOTES.

KEYED NOTES:

1. FURNISH AND INSTALL THE SERVICE ENTRANCE CONDUCTORS AND CONDUIT TO SERVE THE NEW PANEL MDP; 2 SETS OF 3#350, 3"C. COORDINATE THE INSTALLATION OF THE NEW SECONDARY WITH PEC.
2. INSTALL THE NEW METER SOCKET ENCLOSURE FURNISHED BY PEC TO SERVE THE NEW SERVICE ENTRANCE EQUIPMENT. THE NEW METER ENCLOSURE SHALL BE INSTALLED IN ACCORDANCE WITH THE PEC SERVICE STANDARDS.

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STATE OF TEXAS — BRIAN C. LUES — 101010 — LICENSED PROFESSIONAL ENGINEER — 01-31-11

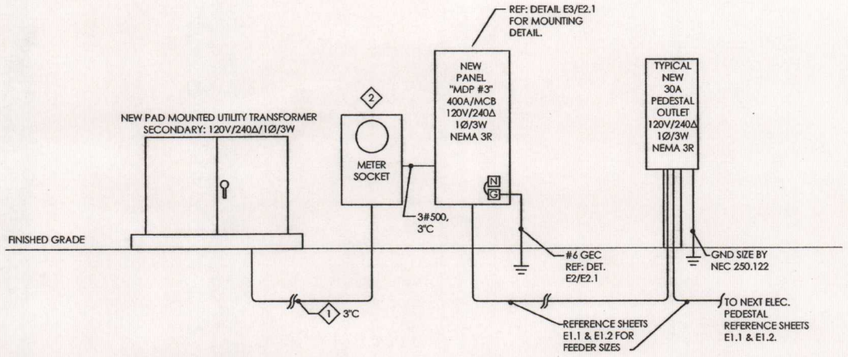
MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: BARKER & ASSOCIATES
DWN BY: RC
CHD BY: DB
SUBMITTED BY:
DATE: 01/31/2011
SOLICITATION NO.: W912BG-10-R-0042
CONTRACT NO.: W912BG-10-C-0011
PLOT SCALE:
PLOT DATE:
FILE NUMBER:
SIZE: ARCH D
FILE NAME:

ROADS & UTILITIES
CRANES MILL PARK
CANYON LAKE, TEXAS

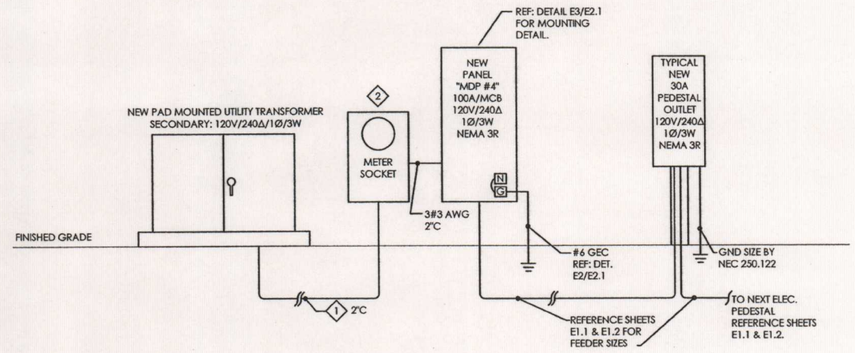
ONE LINE RISER AND ELECTRICAL CALCULATIONS FOR RV PARK

SHEET IDENTIFICATION
E2.1
SHEET 15 OF 18



E1 ONE LINE RISER - MDP#3 - ELECTRICAL

SCALE: N.T.S.



E2 ONE LINE RISER - MDP#4 - ELECTRICAL

SCALE: N.T.S.

SHORT CIRCUIT ANALYSIS

SERVICE ENTRANCE	
VOLTAGE:	240 V
PHASE:	1
SIZE OF TRANSFORMER:	75 kVA
TRANSFORMER IMPEDENCE:	1.5%
FIRST POINT: MAIN DISTRIBUTION PANEL "MDP3"	
TRANSFORMER FLA:	312.5 Amps
TRANSFORMER MULTIPLIER:	74.1
TRANSFORMER AVAILABLE FAULT CURRENT:	23148.1 Amps
LENGTH OF CONDUIT TO THE FAULT:	40.0 Feet
CONDUCTOR CONSTANT:	26706.0
No. OF CONDUCTORS OF PHASE:	1.0
f FACTOR:	0.3
M FACTOR:	0.8
AVAILABLE SHORT CIRCUIT CURRENT:	17,959.3 Amps
NOTE: GEAR SHALL BE RATED FOR A MINIMUM	22,000.0 Amps

SHORT CIRCUIT ANALYSIS

SERVICE ENTRANCE	
VOLTAGE:	240 V
PHASE:	1
SIZE OF TRANSFORMER:	25 kVA
TRANSFORMER IMPEDENCE:	1.5%
FIRST POINT: MAIN DISTRIBUTION PANEL "MDP3"	
TRANSFORMER FLA:	104.2 Amps
TRANSFORMER MULTIPLIER:	74.1
TRANSFORMER AVAILABLE FAULT CURRENT:	7716.0 Amps
LENGTH OF CONDUIT TO THE FAULT:	15.0 Feet
CONDUCTOR CONSTANT:	26706.0
No. OF CONDUCTORS OF PHASE:	1.0
f FACTOR:	0.0
M FACTOR:	1.0
AVAILABLE SHORT CIRCUIT CURRENT:	7,447.1 Amps
NOTE: GEAR SHALL BE RATED FOR A MINIMUM	10,000.0 Amps

NOTE: THE CONTRACTOR SHALL FURNISH AND INSTALL THE FOLLOWING LABEL ON THE DISCONNECTS AND PANELS SHOWN IN THIS ONE-LINE RISER DIAGRAM: "WARNING ARC FLASH HAZARD - CONTACT DPW PRIOR TO WORKING ENERGIZED". THE LABEL SHALL HAVE 1/4" HIGH BLACK LETTERS WITH AN ORANGE BACKGROUND.

NOTE: ARC FLASH HAZARD EXISTS ON ENERGIZED ELECTRICAL DISTRIBUTION EQUIPMENT. THE CONTRACTOR SHALL ENSURE THAT THE ELECTRICAL DEMOLITION/INSTALLATION REQUIRED BY THESE CONSTRUCTION DOCUMENTS IS PERFORMED WITH THE EQUIPMENT DE-ENRGIZED. TESTING, ADJUSTMENTS AND MAINTENANCE THAT REQUIRES THE ELECTRICAL DISTRIBUTION EQUIPMENT TO REMAIN ENERGIZED SHALL BE DONE BY A QUALIFIED PERSON IN COMPLIANCE WITH NFPA 70E STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE.

ELECTRICAL LOAD ANALYSIS FOR RV PARK MDP#3

SERVICE ENTRANCE:	120V/240Δ/1Ø/3W
OCCUPANCY:	TENT SITE
20 TENT SPACES	
RV PARK LOAD DEMANDS BASED ON NEC ARTICLE 551.73	
RV PEDESTAL RATING — QUATITY — TOTAL VA	
50A PEDESTAL @ 9600VA EA — 0 — 0	
30A PEDESTAL @ 3600VA EA — 20 — 72,000	
20A PEDESTAL @ 2400VA EA — 0 — 0	
TOTAL VA	72,000
DEMAND FACTOR FOR SITE SERVICE BASED ON TABLE 551.73	87%
TOTAL VA DEMAND	62,640
TOTAL SERVICE AMPERAGE	261
MDP#3 SERVED BY 3#500 KCMIL CU	
MDP#3 MAXIMUM ALLOWABLE AMPACITY	380
MDP#3 SPARE AMPREAGE CAPACITY	119

ELECTRICAL LOAD ANALYSIS FOR RV PARK MDP#4

SERVICE ENTRANCE:	120V/240Δ/1Ø/3W
OCCUPANCY:	TENT SITE
6 TENT SPACES	
RV PARK LOAD DEMANDS BASED ON NEC ARTICLE 551.73	
RV PEDESTAL RATING — QUATITY — TOTAL VA	
50A PEDESTAL @ 9600VA EA — 0 — 0	
30A PEDESTAL @ 3600VA EA — 6 — 21,600	
20A PEDESTAL @ 2400VA EA — 0 — 0	
TOTAL VA	21,600
DEMAND FACTOR FOR SITE SERVICE BASED ON TABLE 551.73	87%
TOTAL VA DEMAND	18,792
TOTAL SERVICE AMPERAGE	78
MDP#4 SERVED BY 3#3 AWG CU	
MDP#4 MAXIMUM ALLOWABLE AMPACITY	100
MDP#4 SPARE AMPREAGE CAPACITY	22

GENERAL NOTES:

1. REFERENCE SHEET E0.1 FOR LEGEND, SYMBOLS, ABBREVIATIONS AND FURTHER GENERAL NOTES.

KEYED NOTES:

1. FURNISH AND INSTALL A NEW 3" CONDUIT FOR THE NEW SERVICE ENTRANCE CIRCUIT. SERVICE ENTRANCE CONDUCTORS FURNISHED BY PEC.
2. INSTALL THE NEW METER SOCKET ENCLOSURE FURNISHED BY PEC TO SERVE THE NEW SERVICE ENTRANCE EQUIPMENT. THE NEW METER ENCLOSURE SHALL BE INSTALLED IN ACCORDANCE WITH THE PEC SERVICE STANDARDS.
3. FURNISH AND INSTALL A NEW 2" CONDUIT FOR THE NEW SERVICE ENTRANCE CIRCUIT. SERVICE ENTRANCE CONDUCTORS FURNISHED BY PEC.

NEW PANEL MDP 3

VOLTAGE: 120V/240Δ/1ø/3W
400 MAIN CIRCUIT BREAKER
BUSES: 400A ; NEUTRAL - 100%; EQUIPMENT GROUND.

LOCATION: OUTSIDE
MOUNTING: RACK MOUNTED
Isc = 22kA RMS SYM BRACING
ENCLOSURE: NEMA 3R

VA:L	VA:R	VA:A/C	VA:O	LOAD	BKR	CKT	A	B	CKT	BKR	LOAD	VA:L	VA:R	VA:A/C	VA:O
			6480	4-30A TENT PEDESTALS	60/2	1	X		2	60/2	4-30A TENT PEDESTALS				6480
			6480			3		X	4						6480
			6480	4-30A TENT PEDESTALS	60/2	5	X		6	80/2	5-30A TENT PEDESTALS				8100
			6480			7		X	8						8100
			4860	3-30A TENT PEDESTALS	50/2	9	X		10		BUS SPACE				
			4860			11		X	12		BUS SPACE				
				BUS SPACE		13	X		14		BUS SPACE				
				BUS SPACE		15		X	16		BUS SPACE				
				BUS SPACE		17	X		18		BUS SPACE				
				BUS SPACE		19		X	20		BUS SPACE				
				BUS SPACE		21	X		22		BUS SPACE				
				BUS SPACE		23		X	24		BUS SPACE				

VA:L (LIGHTING)	0 CONNECTED
VA:R (RECEPTACLES)	0 CONNECTED
VA:A/C(HVAC EQUIPT)	0 CONNECTED
VA:O (MISC.)	64800 CONNECTED
VA: TOTAL	64800 CONNECTED
AMPS: TOTAL	270 CONNECTED

62640 **NEC 551.73 DEMAND**
261 **AMPERAGE DEMAND**

L	R	A/C	O	TOTAL			
0	0	0	32400	VA CONNECTED TO A PHASE	32400 VA =	270	AMPS CONNECTED TO A PHASE @ 120 VOLTS
0	0	0	32400	VA CONNECTED TO B PHASE	32400 VA =	270	AMPS CONNECTED TO B PHASE @ 120 VOLTS
0	0	0	64800	**TOTAL CONNECTED LOAD**	64800		
					64.8 KVA		

NEW PANEL MDP 4

VOLTAGE: 120V/240Δ/1ø/3W
100 MAIN CIRCUIT BREAKER
BUSES: 100A ; NEUTRAL - 100%; EQUIPMENT GROUND.

LOCATION: OUTSIDE
MOUNTING: RACK MOUNTED
Isc = 10kA RMS SYM BRACING
ENCLOSURE: NEMA 3R

VA:L	VA:R	VA:A/C	VA:O	LOAD	BKR	CKT	A	B	CKT	BKR	LOAD	VA:L	VA:R	VA:A/C	VA:O
			6480	5-30A TENT PEDESTALS	80/2	1	X		2	40/2	2-30A TENT PEDESTALS				3240
			6480			3		X	4						3240
				BUS SPACE		5	X		6		BUS SPACE				
				BUS SPACE		7		X	8		BUS SPACE				
				BUS SPACE		9	X		10		BUS SPACE				
				BUS SPACE		11		X	12		BUS SPACE				
				BUS SPACE		13	X		14		BUS SPACE				
				BUS SPACE		15		X	16		BUS SPACE				
				BUS SPACE		17	X		18		BUS SPACE				
				BUS SPACE		19		X	20		BUS SPACE				
				BUS SPACE		21	X		22		BUS SPACE				
				BUS SPACE		23		X	24		BUS SPACE				

VA:L (LIGHTING)	0 CONNECTED
VA:R (RECEPTACLES)	0 CONNECTED
VA:A/C(HVAC EQUIPT)	0 CONNECTED
VA:O (MISC.)	19440 CONNECTED
VA: TOTAL	19440 CONNECTED
AMPS: TOTAL	81 CONNECTED

18792 **NEC 551.73 DEMAND**
78 **AMPERAGE DEMAND**

L	R	A/C	O	TOTAL			
0	0	0	9720	VA CONNECTED TO A PHASE	9720 VA =	81	AMPS CONNECTED TO A PHASE @ 120 VOLTS
0	0	0	9720	VA CONNECTED TO B PHASE	9720 VA =	81	AMPS CONNECTED TO B PHASE @ 120 VOLTS
0	0	0	19440	**TOTAL CONNECTED LOAD**	19440		
					19.44 KVA		

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STATE OF TEXAS — RUBEN CALLEJO — 106010 — LICENSED PROFESSIONAL ENGINEER — 01/31/12

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: BARKER & ASSOCIATES
DWN BY: RC
CKD BY: DB
DATE: 01/01/2011
SOLICITATION NO.: W912BG-10-R-0042
CONTRACT NO.: W912BG-10-R-0011
SUBMITTED BY:
FILE NUMBER:
PLOT SCALE:
PLOT DATE:
SIZE: ARCH D
FILE NAME:

ROADS & UTILITIES
CRANES MILL PARK
CANYON LAKE, TEXAS

ONE LINE RISER AND ELECTRICAL CALCULATIONS FOR TENT AREA

SHEET IDENTIFICATION
E2.2
SHEET 16 OF 16

Attachment N

Inspection, Maintenance, Repair and Retrofit Plan

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

Vegetative Buffer Strips shall be inspected as follows: GK 2-18-11

- Inspection shall be performed on a bi-annually basis as a minimum.
- Inspections shall be performed after significant rainfall events (precipitation that results in 0.50 inches of rain within a 24 hour time period).
- Inspections shall be made to ensure the following performance objectives are being met:
    - Vegetated cover within strips continues to meet or exceed project specifications.
    - Erosion sediment is not being discharged in surface runoff (inspections will be made periodically, to the extent possible, during rainfall events to determine operational efficiency).
    - Undesirable plant species are not invading and adversely impacting native vegetation and that vegetation is not covered by sediment deposits.
    - The condition and density of the ground cover will be inspected on a weekly basis. The inspection will check that adequate germination of planted seed has occurred and exposed soil is being covered by vegetative. Areas lacking vegetative cover will be re-seeded to fill in any voids.

Appropriate corrective measures shall be taken to ensure that the above specified performance objective are being accomplished.

Robert G. Adams
ROBERT G. ADAMS
NATURAL RESOURCE
BUSINESS LINE MANAGER
CAPITAL REGIONAL OFFICE
USACE

CRANE'S MILL PARK

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 14 DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR MORE

INSPECTOR:_____ DATE:_____

INSPECTOR'S INFORMATION:_____

_____

_____

DAYS SINCE LAST RAINFALL:_____ AMOUNT OF LAST RAINFALL:_____ INCHES

STABILIZATION MEASURES

AREA	DATE LAST DISTURBED	EST. DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION

STABILIZATION REQUIRED: _____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

CRANE'S MILL PARK

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

SILT FENCE

DATE: _____

FROM MARKER #	TO MARKER #	IS SILT FENCE STABILIZED?	EVIDENCE OF WASHOUT OR OVER-TOPPING?

MAINTENANCE REQUIRED FOR SILT FENCE: _____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

INSPECTOR: _____

CRANE'S MILL PARK

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

STABILIZED CONSTRUCTION ENTRANCE

DATE: _____

LOCATION OF SCE: _____

IS SEDIMENT TRACKED ONTO ROAD?	IS GRAVEL CLEAN?	DOES TRAFFIC USE SCE?	CULVERT OPERATIONAL?

MAINTENANCE REQUIRED FOR SCE: _____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

INSPECTOR: _____

CRANE'S MILL PARK

STORWATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

HAY BALE DIKE

DATE: _____

LOCATION OF HAY BALE DIKE: _____

DIKE BALES DAMAGED?	HAS DIKE BEEN OVERRUN?	HAS DIKE BEEN UNDERCUT?	DEBRIS/SEDIMENT NEED REMOVING?

MAINTENANCE REQUIRED FOR HAY BALE DIKE: _____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

INSPECTOR: _____

1.4.3 Silt Fence

A silt fence is a barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. When properly used, silt fences can be highly effective at controlling sediment from disturbed areas. They cause runoff to pond, allowing heavier solids to settle out. If not properly installed, silt fences are not likely to be effective. A schematic illustration of a silt fence is shown in Figure 1.26.

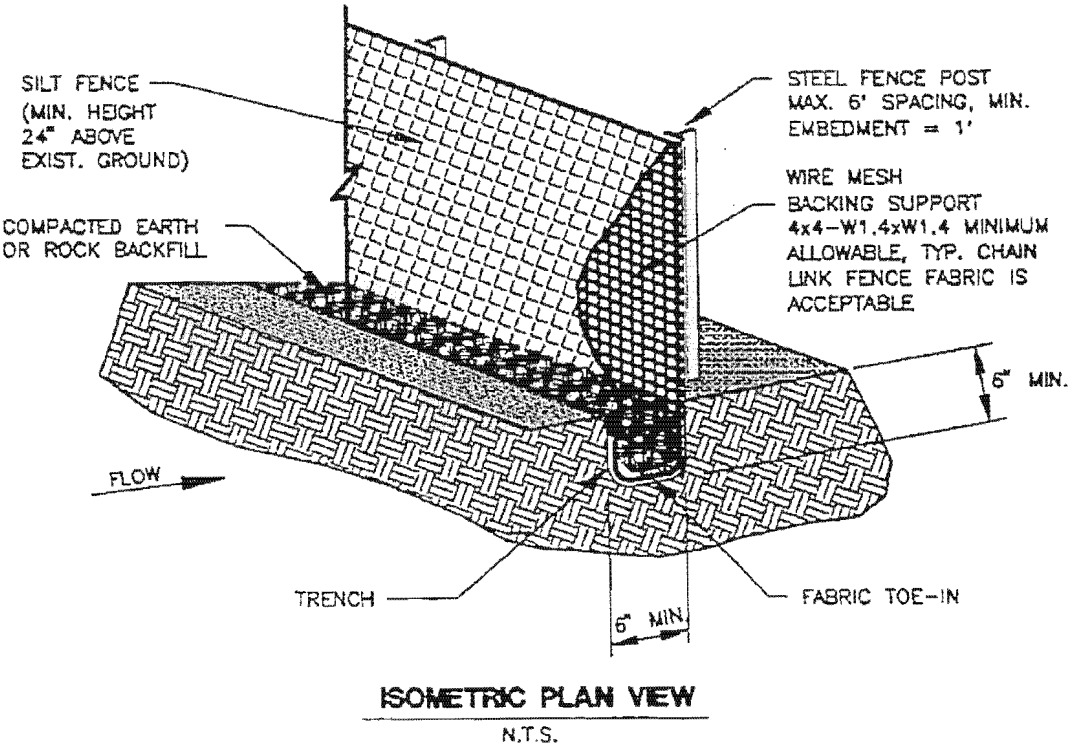


Figure 1.26 Schematic of a Silt Fence Installation (NCTCOG, 1993b)

The purpose of a silt fence is to intercept and detain water-borne sediment from unprotected areas of a limited extent. Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way. If concentrated flow occurs after installation, corrective action must be taken such as placing a rock berm in the areas of concentrated flow.

Silt fencing within the site may be temporarily moved during the day to allow construction activity provided it is replaced and properly anchored to the ground at the end of the day. Silt fences on the perimeter of the site or around drainage ways should not be moved at any time.

Materials:

(1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in^2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.

(2) Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or Y-bar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft^2, and Brindell hardness exceeding 140.

(3) Woven wire backing to support the fabric should be galvanized 2" x 4" welded wire, 12 gauge minimum.

Installation:

(1) Steel posts, which support the silt fence, should be installed on a slight angle toward the anticipated runoff source. Post must be embedded a minimum of 1 foot deep and spaced not more than 8 feet on center. Where water concentrates, the maximum spacing should be 6 feet.

(2) Lay out fencing down-slope of disturbed area, following the contour as closely as possible. The fence should be sited so that the maximum drainage area is ¼ acre/100 feet of fence.

(3) The toe of the silt fence should be trenched in with a spade or mechanical trencher, so that the down-slope face of the trench is flat and perpendicular to the line of flow. Where fence cannot be trenched in (e.g., pavement or rock outcrop), weight fabric flap with 3 inches of pea gravel on uphill side to prevent flow from seeping under fence.

(4) The trench must be a minimum of 6 inches deep and 6 inches wide to allow for the silt fence fabric to be laid in the ground and backfilled with compacted material.

(5) Silt fence should be securely fastened to each steel support post or to woven wire, which is in turn attached to the steel fence post. There should be a 3-foot overlap, securely fastened where ends of fabric meet.

1.4.2 Temporary Construction Entrance/Exit

The purpose of a temporary gravel construction entrance is to provide a stable entrance/exit condition from the construction site and keep mud and sediment off public roads. A stabilized construction entrance is a stabilized pad of crushed stone located at any point traffic will be entering or leaving the construction site from a public right-of-way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or flowing of sediment onto public rights-of-way. This practice should be used at all points of construction ingress and egress. Schematic diagrams of a construction entrance/exit are shown in Figure 1.24 and Figure 1.25.

Excessive amounts of mud can also present a safety hazard to roadway users. To minimize the amount of sediment loss to nearby roads, access to the construction site should be limited to as few points as possible and vegetation around the perimeter should be protected were access is not necessary. A rock stabilized construction entrance should be used at all designated access points.

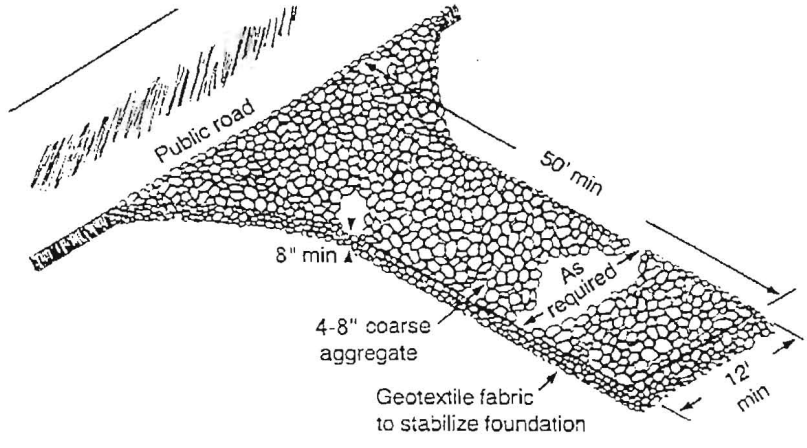


Figure 1.24 Schematic of Temporary Construction Entrance/Exit (after NC, 1993)

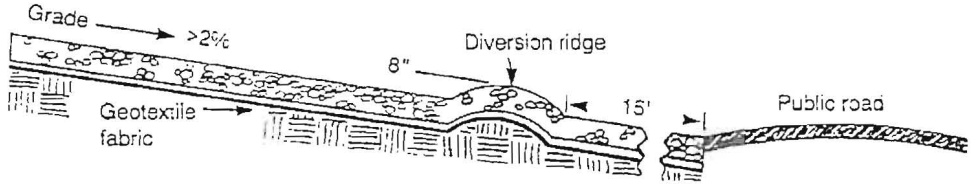


Figure 1.25 Cross-section of a Construction Entrance/Exit (NC, 1993)

Materials:

The aggregate should consist of 4 to 8 inch washed stone over a stable foundation as specified in the plan.

The aggregate should be placed with a minimum thickness of 8 inches.

The geotextile fabric should be designed specifically for use as a soil filtration media with an approximate weight of 6 oz/yd2, a mullen burst rating of 140 lb/in2, and an equivalent opening size greater than a number 50 sieve.

If a washing facility is required, a level area with a minimum of 4 inch washed stone or commercial rack should be included in the plans. Divert wastewater to a sediment trap or basin.

Installation: (North Carolina, 1993)

Avoid curves on public roads and steep slopes. Remove vegetation and other objectionable material from the foundation area. Grade crown foundation for positive drainage.

The minimum width of the entrance/exit should be 12 feet or the full width of exit roadway, whichever is greater.

The construction entrance should be at least 50 feet long.

If the slope toward the road exceeds 2%, construct a ridge, 6 to 8 inches high with 3: 1 (H: V) side slopes, across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.

Place geotextile fabric and grade foundation to improve stability, especially where wet conditions are anticipated.

Place stone to dimensions and grade shown on plans. Leave surface smooth and slope for drainage.

Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.

Install pipe under pad as needed to maintain proper public road drainage.

Vegetative Buffers

Buffer zones are undisturbed strips of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities. Natural buffer zones are used along streams and other bodies of water that need protection from erosion and sedimentation. Vegetative buffers can be used to protect natural swales and be incorporated into natural landscaping of an area. They can provide critical habitat adjacent to streams and wetlands, as well as assisting in controlling erosion, especially on unstable steep slopes.

The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted. If buffer zones are preserved, existing vegetation, good planning, and site management are needed to prevent disturbances such as grade changes, excavation, damage from equipment, and other activities. The creation of new buffer strips requires the establishment of a good dense turf, trees, and shrubs.

Guidelines for installation:

Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.

All unstable steep slopes should be left in natural vegetation.

Fence or flag clearing limits and keep all equipment and construction debris out of the natural areas.

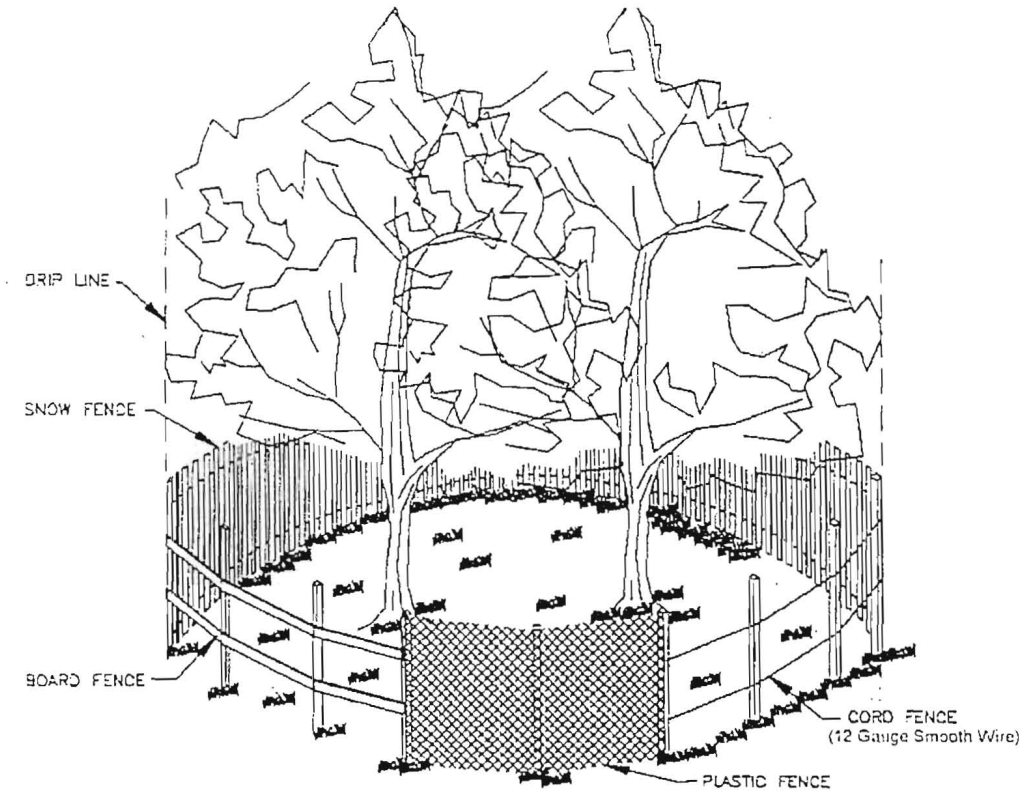
Keep all excavations outside the drip line of trees and shrubs.

Debris or extra soil should not be pushed into the buffer zone area because it will cause damage from burying and smothering.

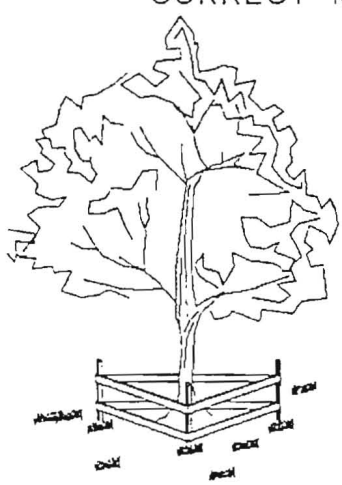
The minimum width of a vegetative buffer used for sediment control should be 50 feet.

Inspection and Maintenance Guidelines:

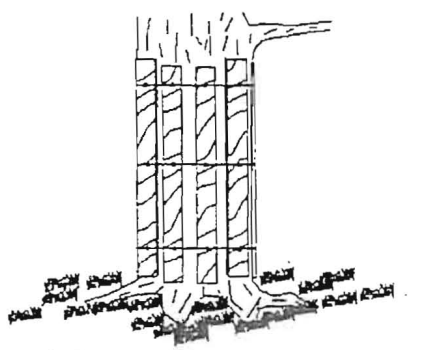
Inspection and careful maintenance are important to ensure healthy vegetation. The need for routine maintenance such as mowing, fertilizing, irrigating, and weed and pest control will depend on the species of plants and trees, soil types, location and climatic conditions.



CORRECT METHODS OF TREE FENCING



TRIANGULAR BOARD FENCE



CORRECT TRUNK ARMORING

Figure 2.1 Examples of Tree Fencing (VA Dept of Conservation, 1992)

(11) Should a tree intended and marked to be retained be damaged seriously enough that survival and normal growth are not possible, the tree should be removed. If replacement is desirable and or required, the replacement

Attachment O

Pilot-Scale Field Testing Plan

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(No pilot-scale testing is proposed as part of the project. – Not Applicable.)

Attachment P

Measures for Minimizing Surface Stream Contamination

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(This project does not contain any surface streams. All runoff goes directly into receiving waters. – Not Applicable.)

SWPPP

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

See SWPPP binder

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Texas Pollutant Discharge Elimination System
Storm Water Construction General Permit

The Notice of Intent (NOI) for the facility listed below was received on October 28, 2010. The intent to discharge storm water associated with construction activity under the terms and conditions imposed by the Texas Pollutant Discharge Elimination System (TPDES) storm water construction general permit TXR150000 is acknowledged. Your facility's TPDES construction storm water general permit number is:

TXR15RA17

Coverage Effective: November 2, 2010

TCEQ's storm water construction general permit requires certain storm water pollution prevention and control measures, possible monitoring and reporting, and periodic inspections. Among the conditions and requirements of this permit, you must have prepared and implemented a storm water pollution prevention plan (SWP3) that is tailored to your construction site. As a facility authorized to discharge under the storm water construction general permit, all terms and conditions must be complied with to maintain coverage and avoid possible penalties.

Project/Site Information:
RN106048184
CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS
NORTH OF THE INTERSECTION OF CRANES MILL RD AND CRANES MILL MAI
CANYON LAKE, TX 78133
COMAL COUNTY

OPERATOR:
CN603576323
JSR INC
PO BOX 870
SCHERTZ, TX 78154-0870

This permit expires on March 05, 2013, unless otherwise amended. If you have any questions related to processing you may contact the Storm Water Processing Center by **email at SWPERMIT@tceq.state.tx.us or by telephone at (512) 239-3700.** For technical issues, you may contact the storm water technical staff by email at swgp@tceq.state.tx.us or by telephone at (512) 239-4671. Also, you may obtain information on the storm water web site at http://www5.tceq.state.tx.us/wq_dpa/. A copy of this document should be kept with your SWP3.

Issued Date: December 30, 2010

FOR THE COMMISSION

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 30, 2010

Dear Applicant:

Re: TPDES General Permit for Construction Storm Water Runoff (TXR150000)
Notice of Intent Authorization

Your Notice of Intent application for authorization under the general permit for discharge of storm water associated with construction activities has been received. Pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Division Director of the Water Quality Division has issued the enclosed Certificate.

Please refer to the attached certificate for the identification number that was assigned to your project/site and the coverage effective date. Please use this number to reference this project/site for future communications with the Texas Commission on Environmental Quality (TCEQ).

Authorization under the Edwards Aquifer Protection Program is required before construction can begin where the site is located within the Edwards Aquifer Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone. See http://www.tceq.state.tx.us/compliance/field_ops/eapp/program.html for additional information.

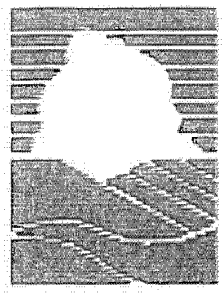
A Notice of Termination must be submitted when permit coverage is no longer needed. You may obtain a Notice of Termination form at the web site listed below.

For questions related to the status or processing of your application you may contact the Storm Water Processing Center by email at SWPERMIT@tceq.state.tx.us or by telephone at (512) 239-3700.

If you have any questions regarding coverage under this general permit or other technical issues, you may contact the storm water technical staff at (512) 239-4671 or by email at swgp@tceq.state.tx.us. Also, you may obtain information on the storm water web site at www.tceq.state.tx.us. Permit and application status information can be found on the TCEQ web site at http://www5.tceq.state.tx.us/wq_dpa/.

Sincerely,

Charles W. Maguire, Director
Water Quality Division
Texas Commission on Environmental Quality



LARGE CONSTRUCTION SITE NOTICE

FOR THE

Texas Commission on Environmental Quality (TCEQ)

Storm Water Program

TPDES GENERAL PERMIT TXR150000

"PRIMARY OPERATOR" NOTICE

This notice applies to construction sites operating under Part II.E.3 of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.D.2. of the general permit. This notice shall be posted along with a copy of the signed Notice of Intent (NOI), as applicable. Additional information regarding the TCEQ storm water permit program may be found on the internet at: http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	TXR15 ____
Operator Name:	JSR, Inc.
Contact Name and Phone Number:	Bobby D. Greaves 210-653-7772
Project Description: *(Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized)*	Cranes Mill Park – Installation of Utilities and Access Roadways North and northeast of the intersection of Cranes Mill Park Road and Cranes Mill Marina Canyon Lake, Texas 78133 ~ 10 Acres Disturbed October 2010 – October 212
Location of Storm Water Pollution Prevention Plan:	8534 Greaves Lane Schertz, Texas 78154

LARGE CONSTRUCTION SITE NOTICE

FOR THE

Texas Commission on Environmental Quality (TCEQ)

Storm Water Program

TPDES GENERAL PERMIT TXR150000

"SECONDARY OPERATOR" NOTICE

This notice applies to secondary operators of construction sites operating under Part II.E.3. of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.D.2. of the general permit. Additional information regarding the TCEQ storm water permit program may be found on the internet at:

http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	TXR150000
Operator Name:	U.S. Army Corps of Engineers
Contact Name and Phone Number:	Robert G. Adams 254-939-1829
Project Description: *Physical address or description of the site's location, and estimated start date and projected end date, or date that disturbed soils will be stabilized.*	Crane's Mill Park Canyon Lake Comal County, Texas
Location of Storm Water Pollution Prevention Plan (SWP3):	Project Field Office at construction site

For Large Construction Activities Authorized Under Part II.E.3. (Obtaining Authorization to Discharge) the following certification must be completed:

I Robert G. Adams (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.3. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A storm water pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title ADAMS.ROBERT.G.1231001499 Date 3 FEB 2011

Date Notice Removed

MS4 operator notified per Part II.F.3.

1 February 2011

Reference: Park Modernization Project – Crane's Mill Park, Canyon Lake.

The U.S. Army Corps of Engineers (USACE) is a secondary operator with the ability to approve and disapprove changes to plans and specifications. USACE will comply will all provisions of the Texas Pollution Discharge Elimination System (TPDES) General Permit TXR150000 and the Storm Water Pollution Prevention Plan (SWPPP) developed for the project. The SWPPP and its provisions shall be implemented by JSR, Inc. as Primary Operator.

ADAMS.ROBERT.G.1231001499

Digitally signed by ADAMS.ROBERT.G.1231001499
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499
Date: 2011.02.03 14:57:50 -06'00'

Robert G. Adams

Natural Resource Management

Business Line Manager

Capital Regional Office

U.S. Army Corps of Engineers

Attachment H

AST Containment Structure Drawings

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

(No alternative secondary containment methods are proposed as part of the project. – Not Applicable.)

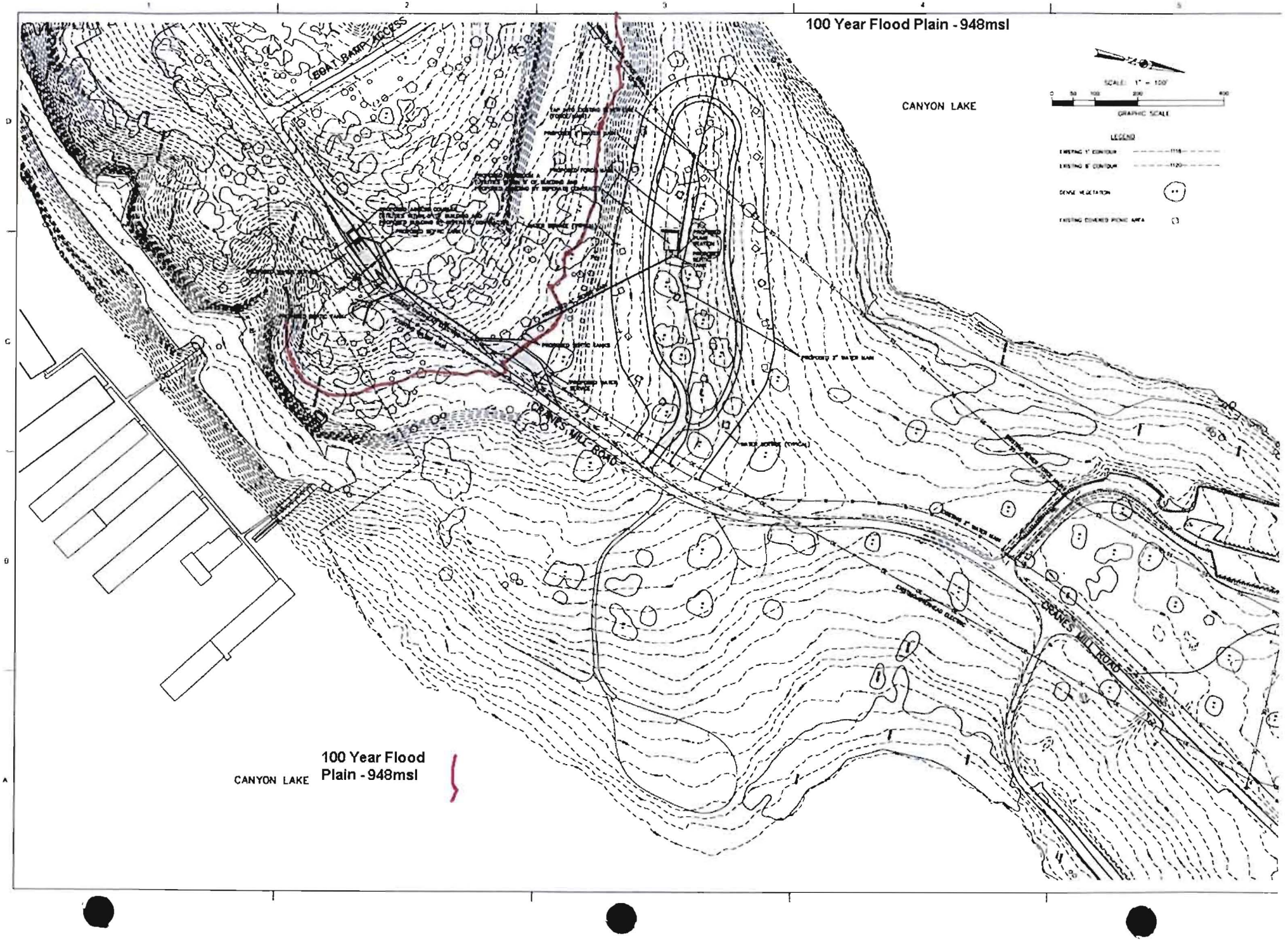
SITE PLAN

CANYON LAKE

CRANE'S MILL PARK

CONTRIBUTING ZONE PLAN

Included in Construction Plans


100 Year Flood Plain - 948msl
CANYON LAKE
BOAT RAMP ACCESS
CRANES MILL ROAD
100 Year Flood Plain - 948msl
CANYON LAKE

SCALE: 1" = 100'

0 50 100 200 400

GRAPHIC SCALE

LEGEND

EXISTING 1' CONTOUR ——1116——

EXISTING 5' CONTOUR ——1120——

DENSE VEGETATION

EXISTING COVERED PICNIC AREA

BOAT RAMP ACCESS

EXISTING SEWER FORCE MAIN

TAP INTO EXISTING SEWER LINE (FORCE MAIN)

PROPOSED 8" WATER MAIN

PROPOSED FORCE MAIN

PROPOSED RESTROOM A (UTILITIES WITHIN 5' OF BUILDING AND PROPOSED BUILDING BY SEPERATE CONTRACT)

PROPOSED ACCESS COMPLEX (UTILITIES WITHIN 5' OF BUILDING AND PROPOSED BUILDING BY SEPERATE CONTRACT)

PROPOSED SEPTIC TANK

WATER SERVICE (TYPICAL)

PROPOSED PUMP STATION

PROPOSED SEPTIC TANK

PROPOSED WATER SERVICE

PROPOSED SEPTIC TANK

EXISTING OVERHEAD ELECTRIC

EXISTING WATER MAIN

PROPOSED 8" SEWER MAIN

PROPOSED SEPTIC TANKS

PROPOSED WATER SERVICE

CRANES MILL ROAD

PROPOSED 2" WATER MAIN

WATER SERVICE (TYPICAL)

EXISTING SEWER FORCE MAIN

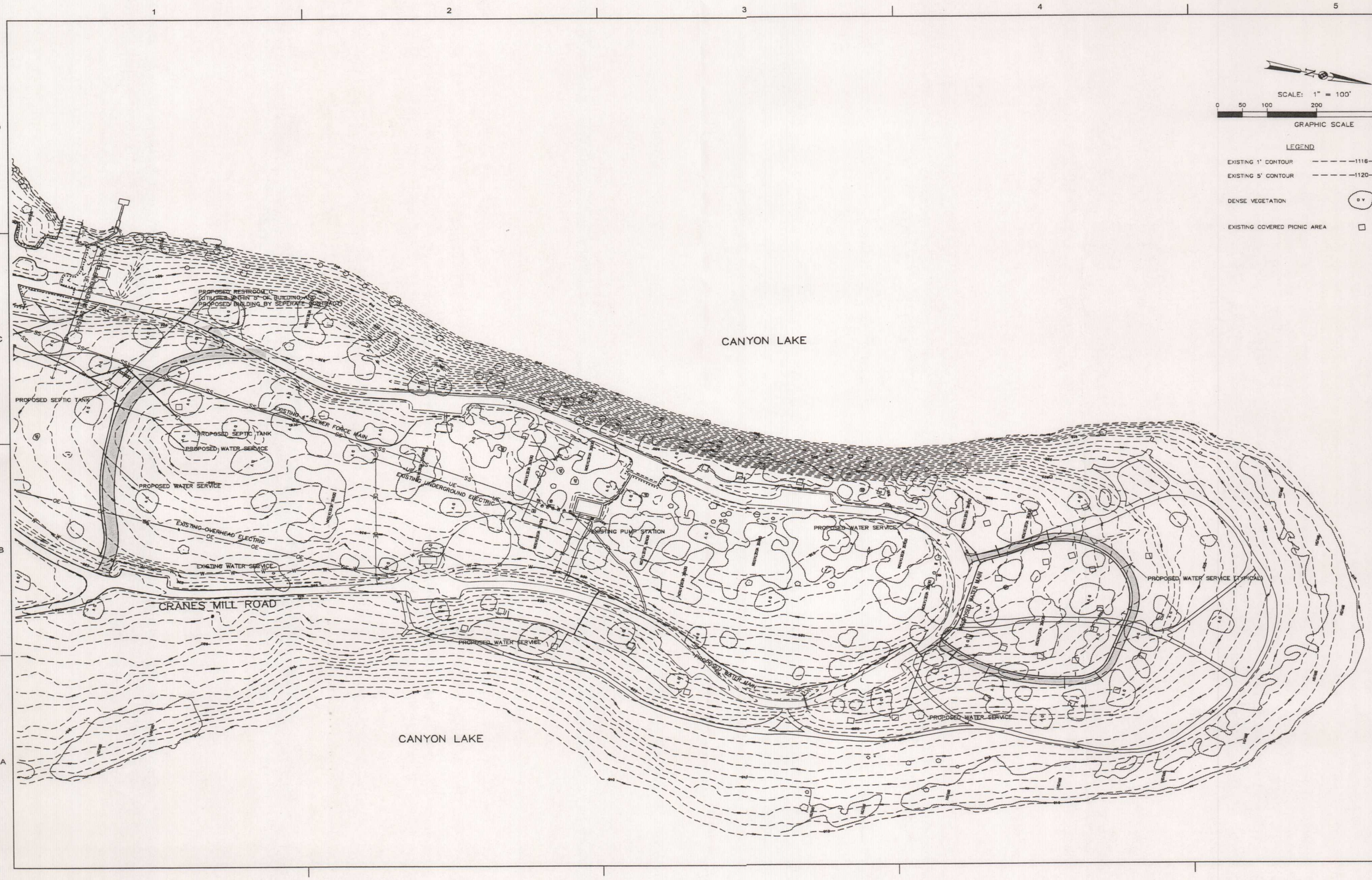
EXISTING 2" WATER MAIN

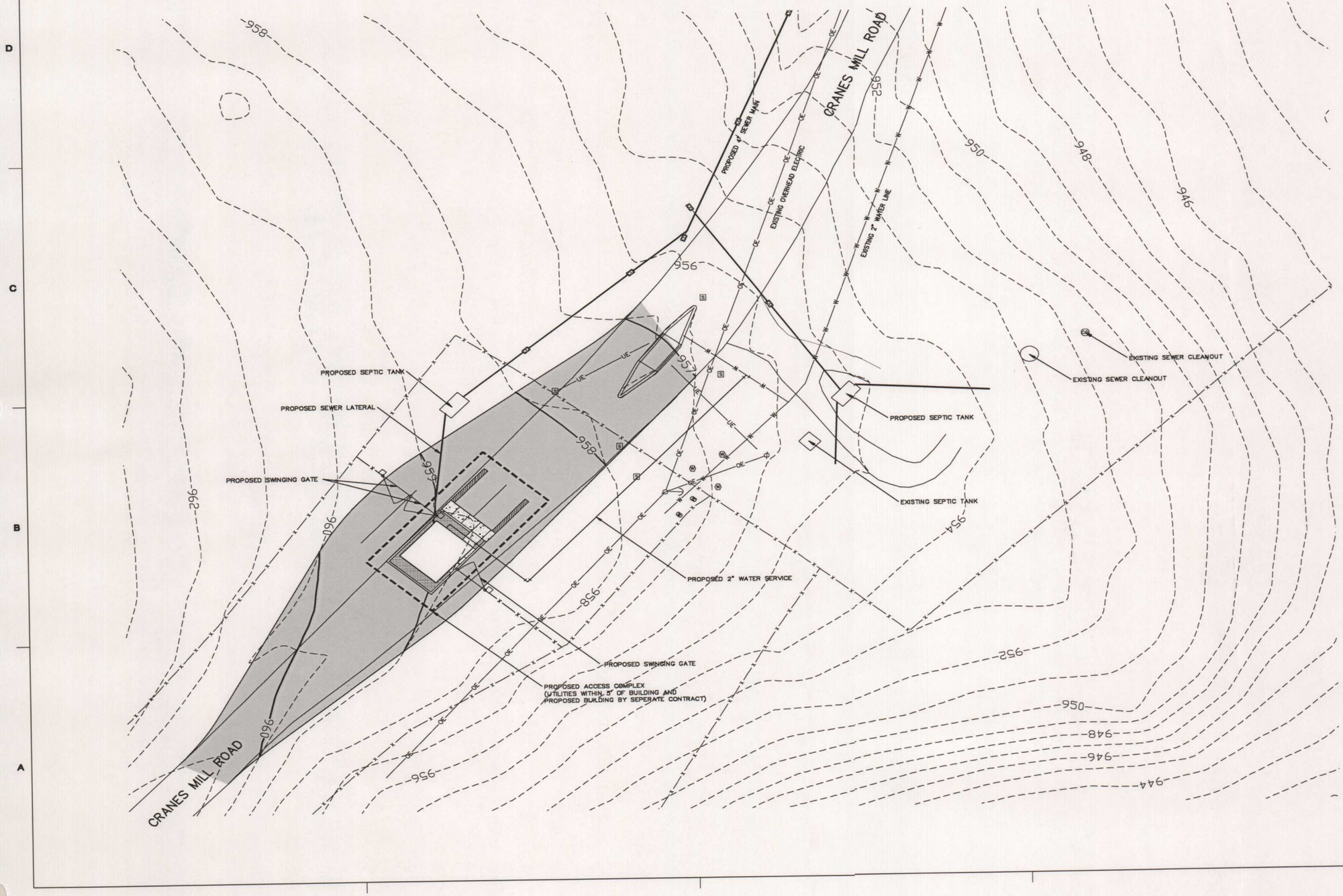
EXISTING OVERHEAD ELECTRIC

CRANES MILL ROAD

CANYON LAKE

CANYON LAKE


1
2
3
4
5
A
B
C
D
SCALE: 1" = 100'
0 50 100 200 400
GRAPHIC SCALE
LEGEND
EXISTING 1' CONTOUR 1116
EXISTING 5' CONTOUR 1120
DENSE VEGETATION DV
EXISTING COVERED PICNIC AREA
CANYON LAKE
PROPOSED RESTROOM C, UTILITIES WITHIN 5' OF BUILDING AND PROPOSED BUILDING BY SEPERATE CONTRACT
PROPOSED SEPTIC TANK
PROPOSED SEPTIC TANK
PROPOSED WATER SERVICE
PROPOSED WATER SERVICE
EXISTING 4" SEWER FORCE MAIN
EXISTING UNDERGROUND ELECTRIC
EXISTING OVERHEAD ELECTRIC
EXISTING WATER SERVICE
EXISTING PUMP STATION
PROPOSED WATER SERVICE
PROPOSED WATER MAIN
PROPOSED WATER SERVICE (TYPICAL)
CRANES MILL ROAD
PROPOSED WATER SERVICE
PROPOSED WATER MAIN
PROPOSED WATER SERVICE
CANYON LAKE



N

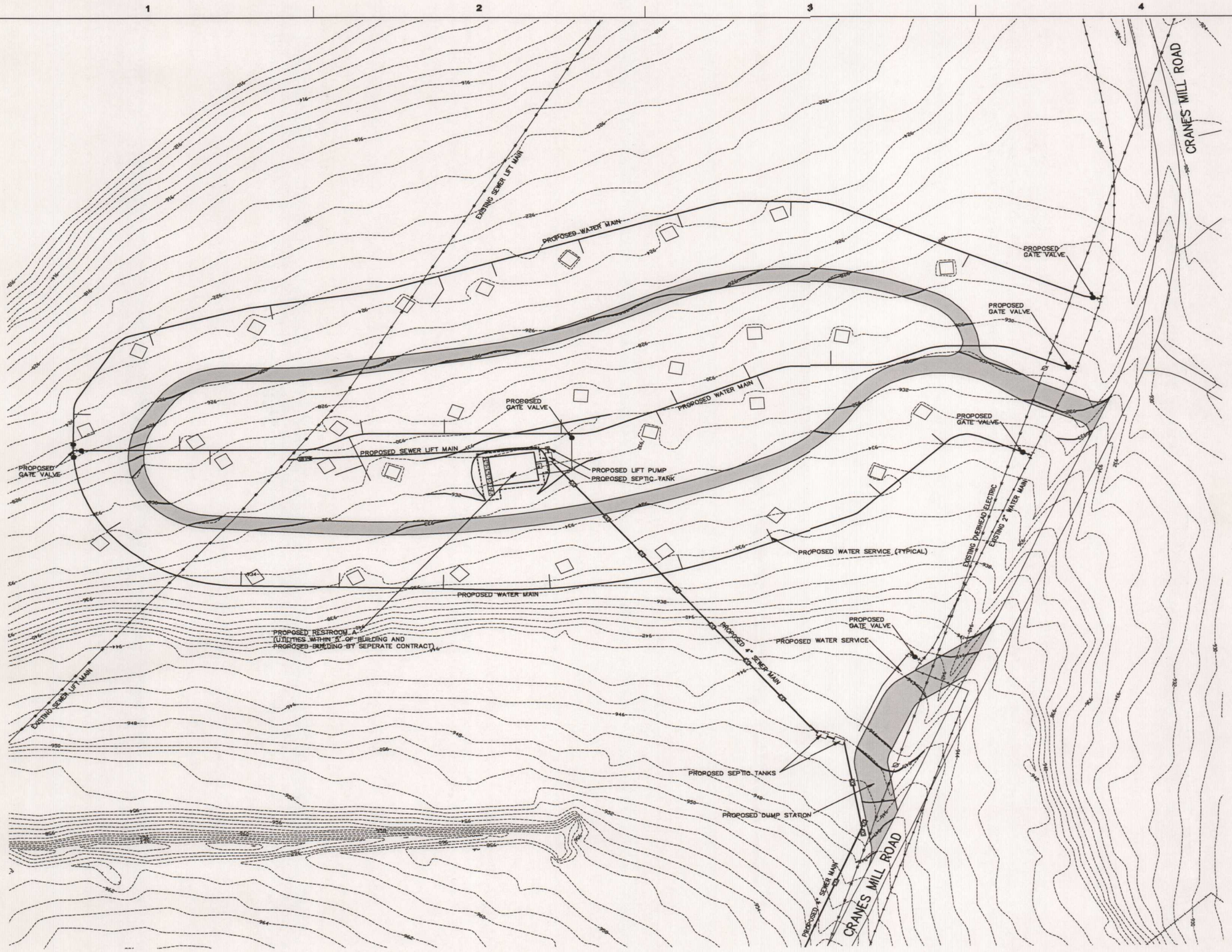
SCALE: 1" = 20'

0 10 20 40 80

GRAPHIC SCALE

LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	
PROPOSED FENCE	
DENSE VEGETATION	
EXISTING COVERED PICNIC AREA	
PROPOSED SEWER CLEANOUT	
EXISTING POWER POLE	
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	
EXISTING SEWER CLEANOUT/INLET	



N

SCALE: 1" = 50'

0 25 50 100 200

GRAPHIC SCALE

LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	
PROPOSED FENCE	
DENSE VEGETATION	
EXISTING COVERED PICNIC AREA	
PROPOSED SEWER CLEANOUT	
EXISTING POWER POLE	
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	
EXISTING SEWER CLEANOUT/INLET	
BACKFLOW PREVENTER	

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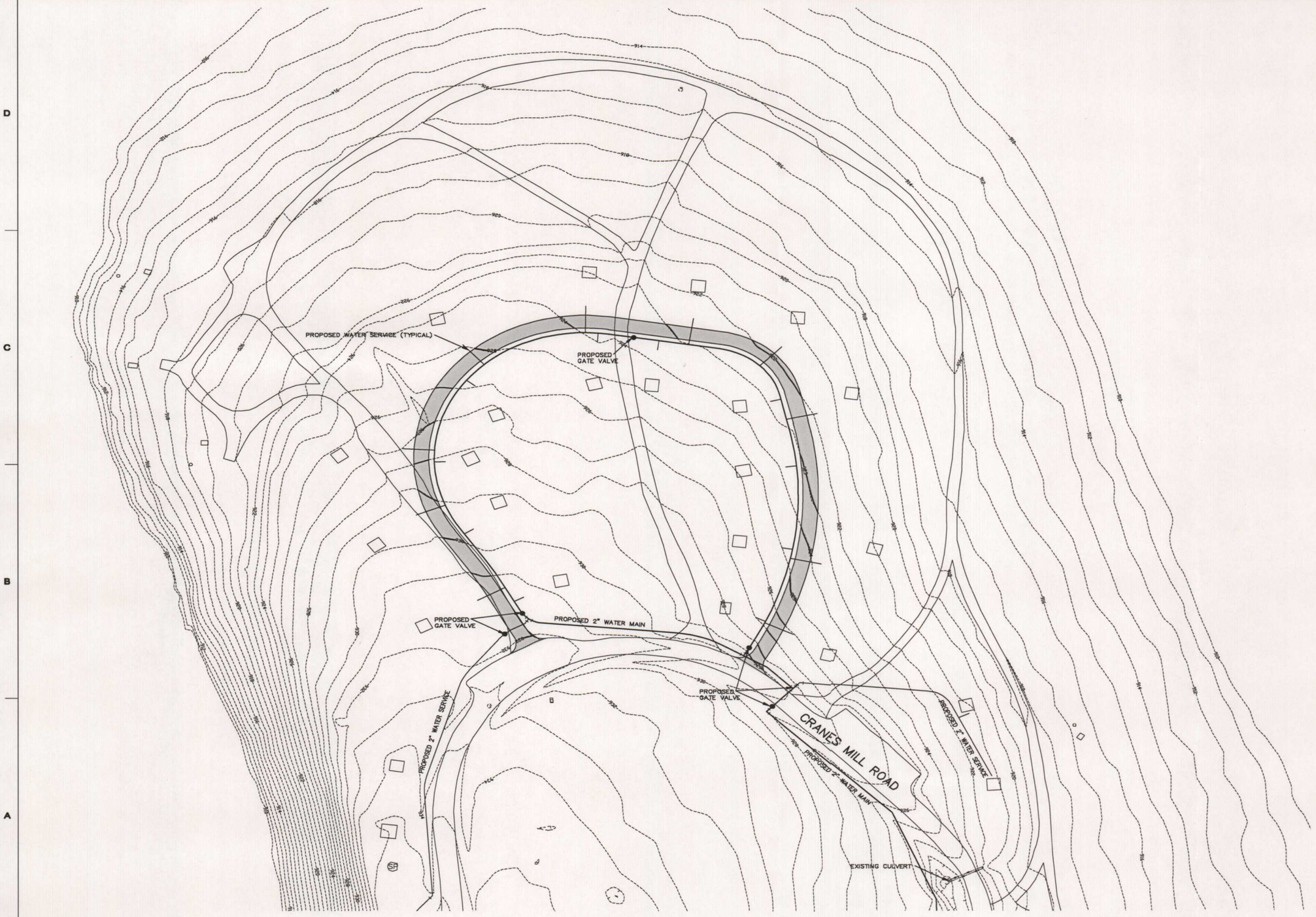
SCALE: 1" = 50'

0 25 50 100 200

GRAPHIC SCALE

LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	
PROPOSED FENCE	
DENSE VEGETATION	
EXISTING COVERED PICNIC AREA	
PROPOSED SEWER CLEANOUT	
EXISTING POWER POLE	
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	
EXISTING SEWER CLEANOUT/INLET	
BACKFLOW PREVENTER	



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SCALE: 1" = 50'

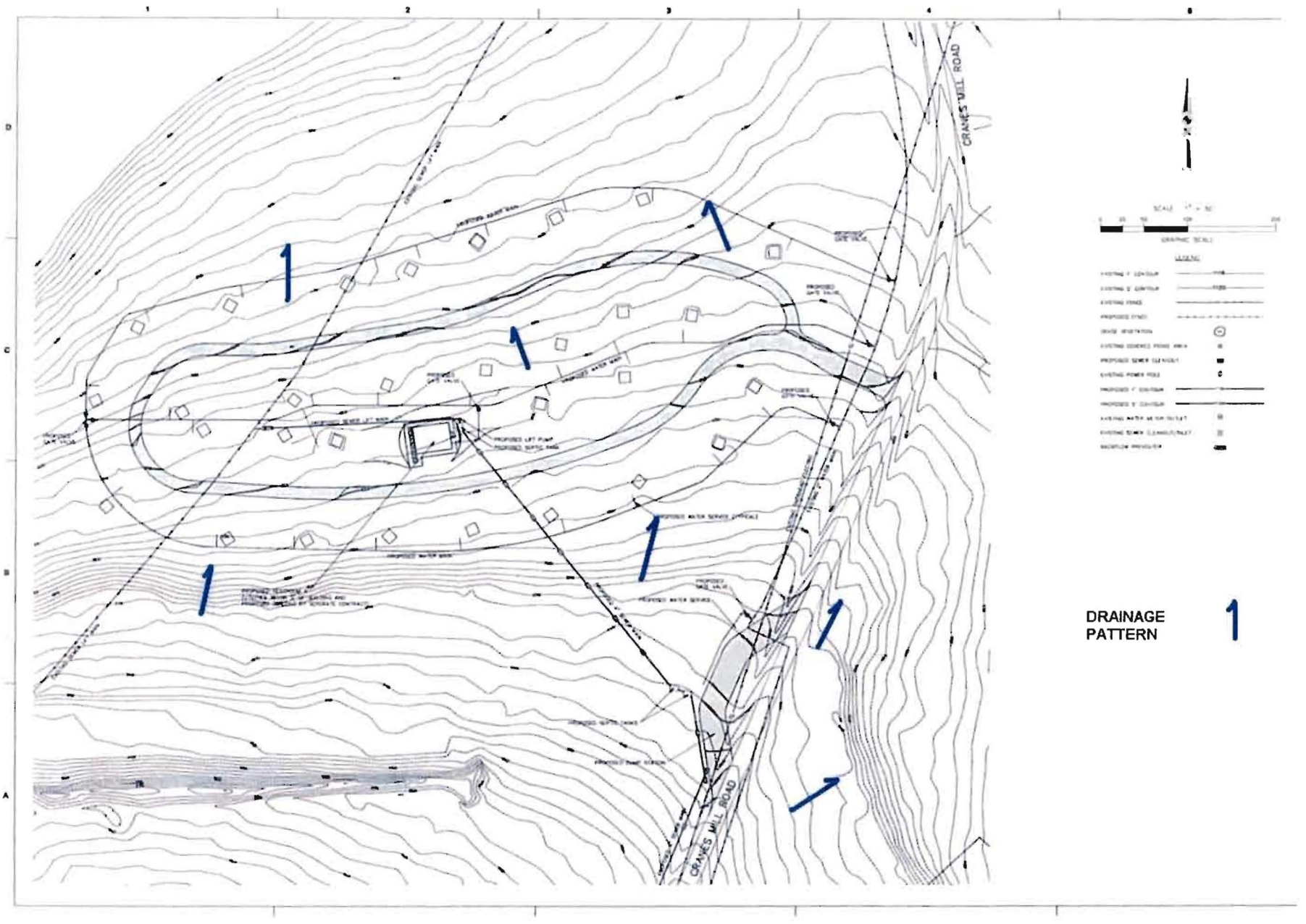
0 20 50 100 200

GRAPHIC SCALE

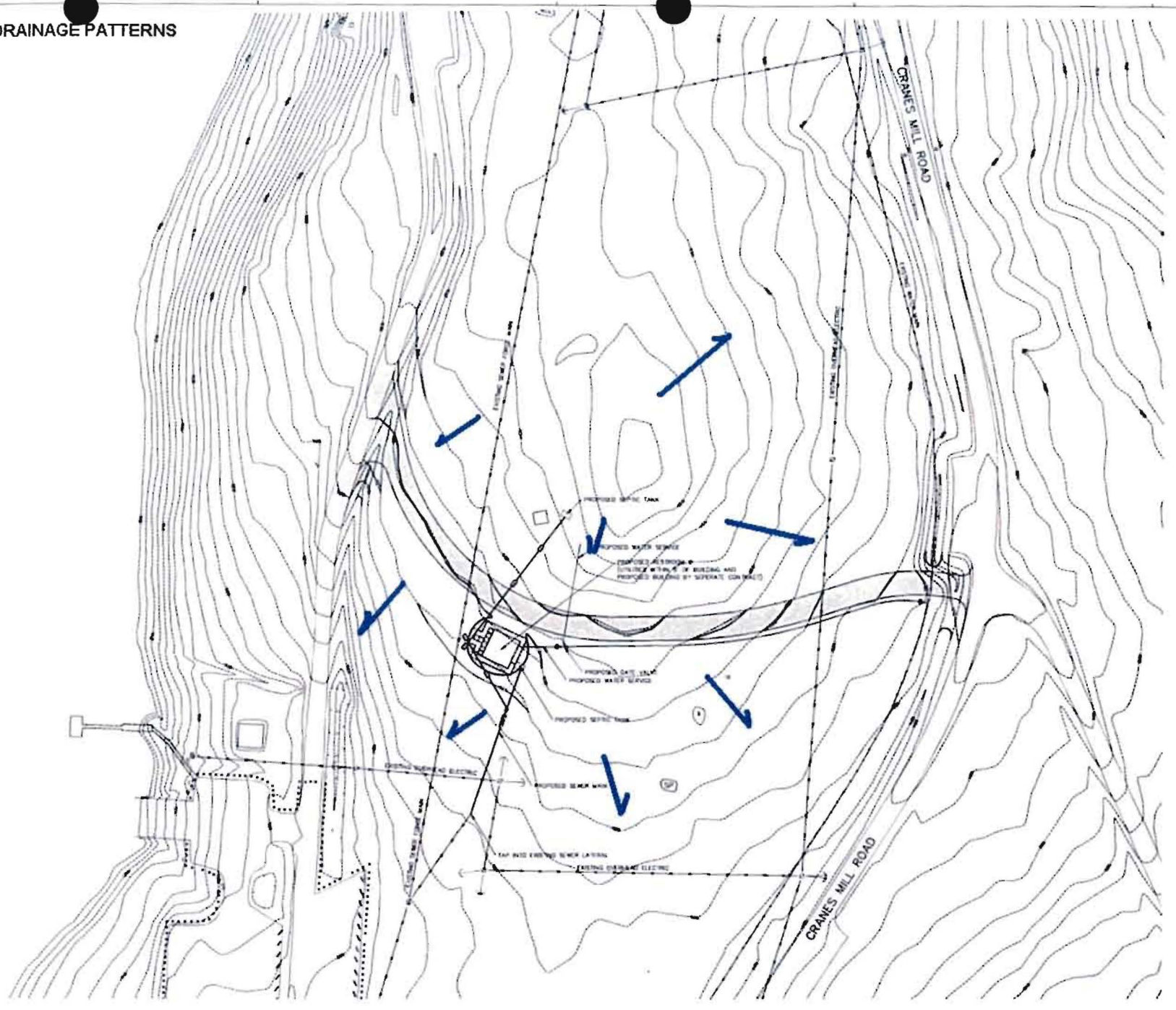
LEGEND

EXISTING 1' CONTOUR	1116
EXISTING 5' CONTOUR	1120
EXISTING FENCE	
PROPOSED FENCE	
DENSE VEGETATION	
EXISTING COVERED PICNIC AREA	
PROPOSED SEWER CLEANOUT	
EXISTING POWER POLE	
PROPOSED 1' CONTOUR	1119
PROPOSED 5' CONTOUR	1120
EXISTING WATER METER/OUTLET	
EXISTING SEWER CLEANOUT/INLET	

DRAINAGE PATTERNS



DRAINAGE PATTERNS



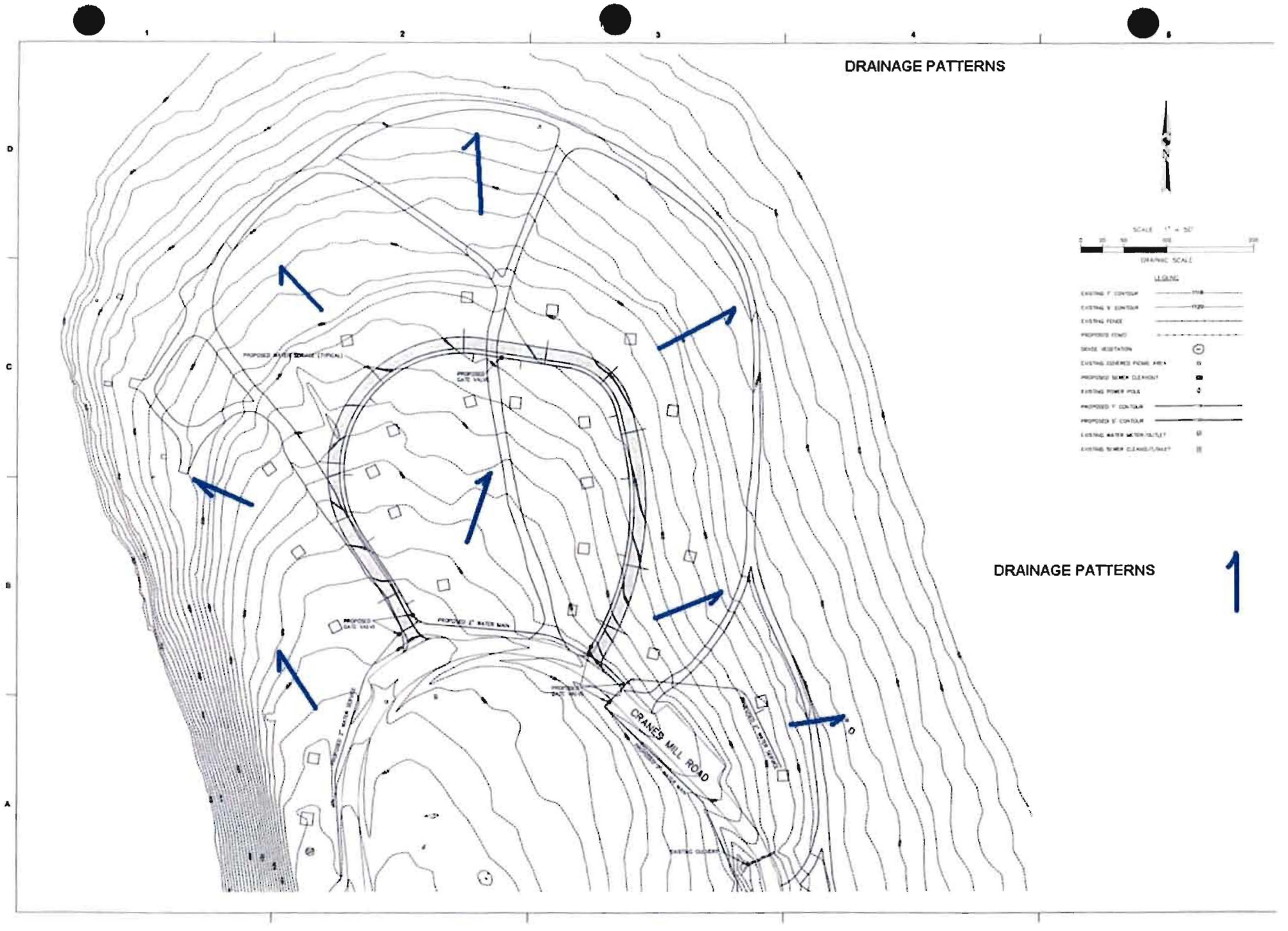
SCALE 1" = 50'

GRAPHIC SCALE

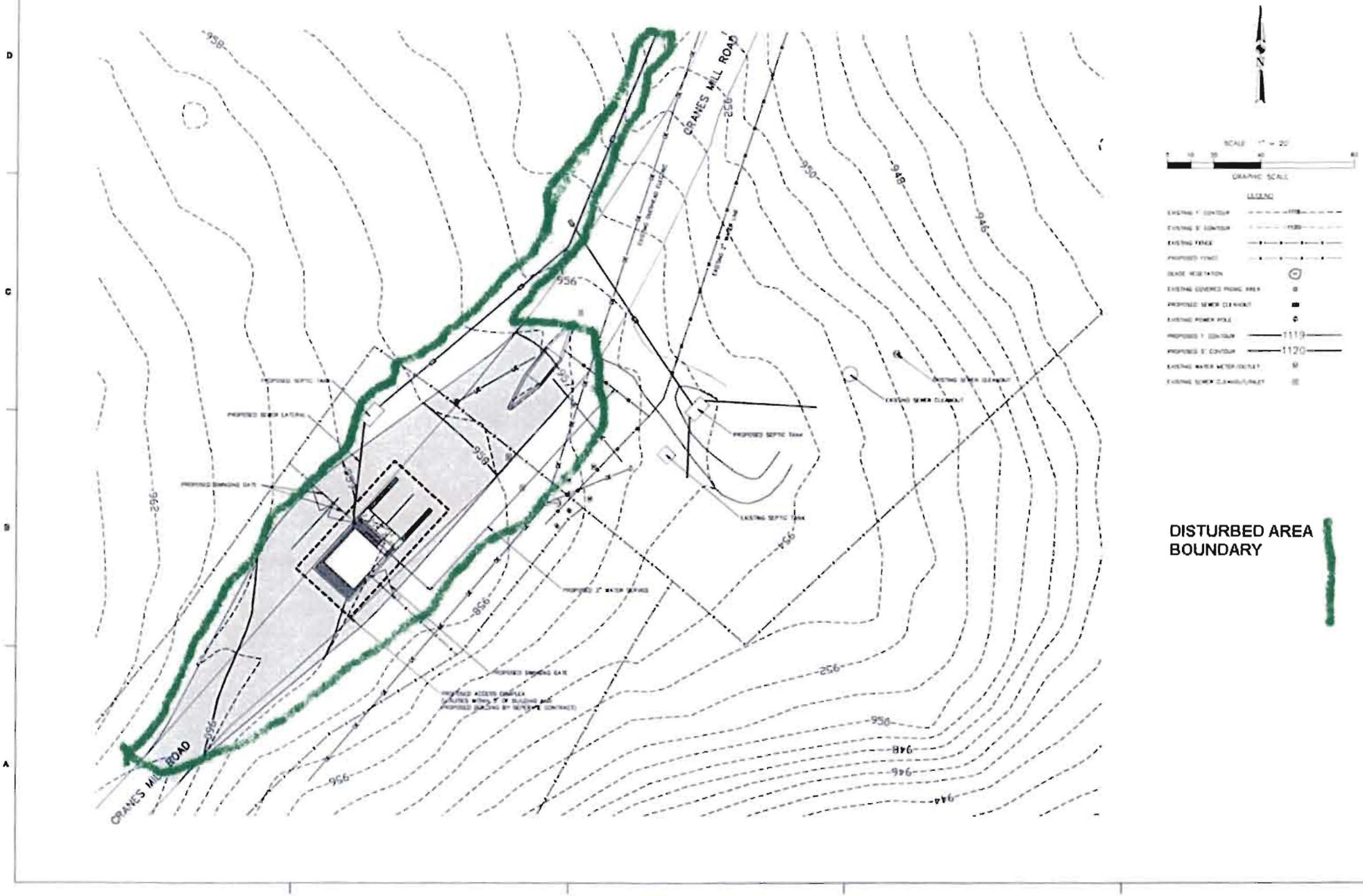
LEGEND

DRAINAGE PATTERNS

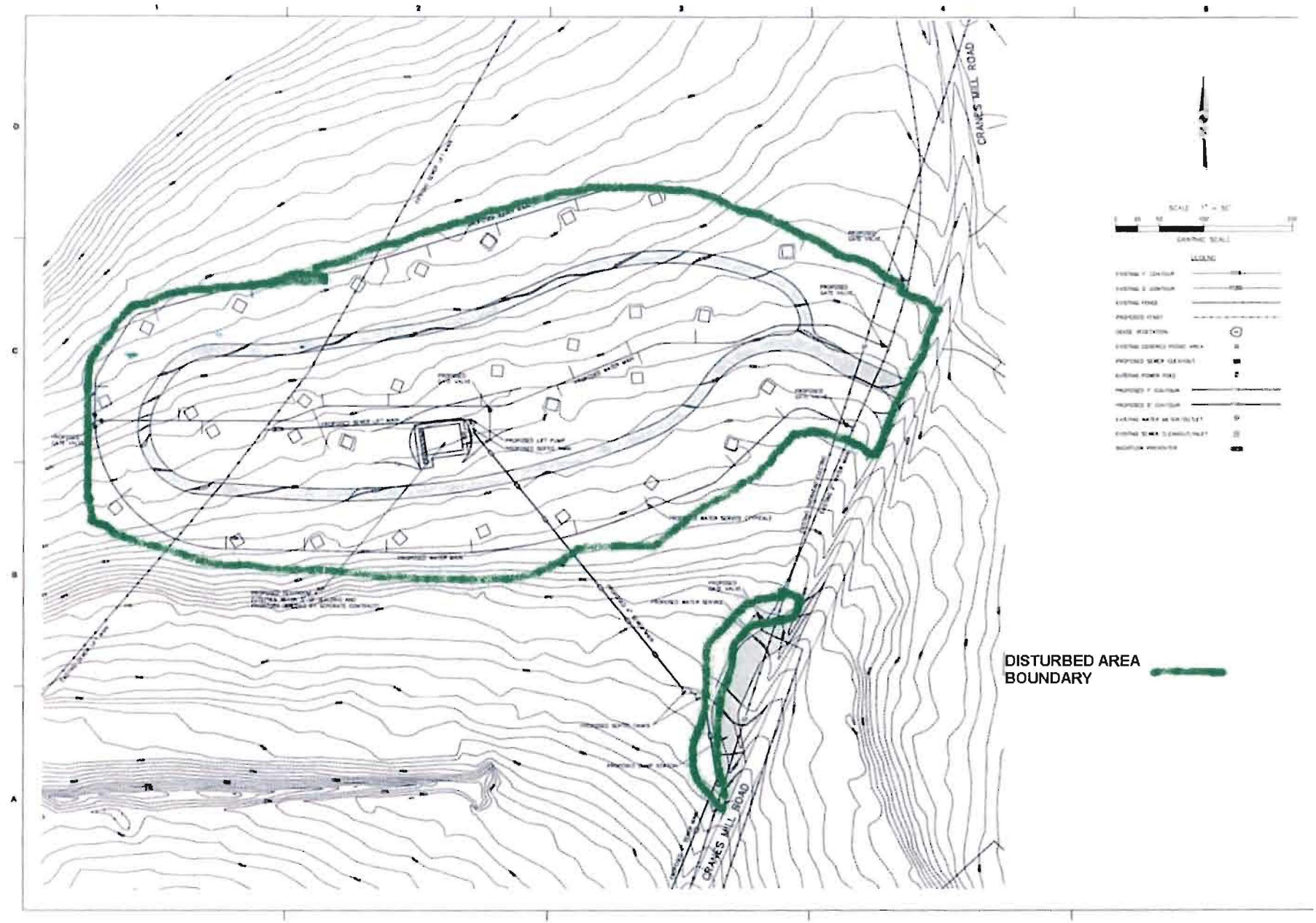
1

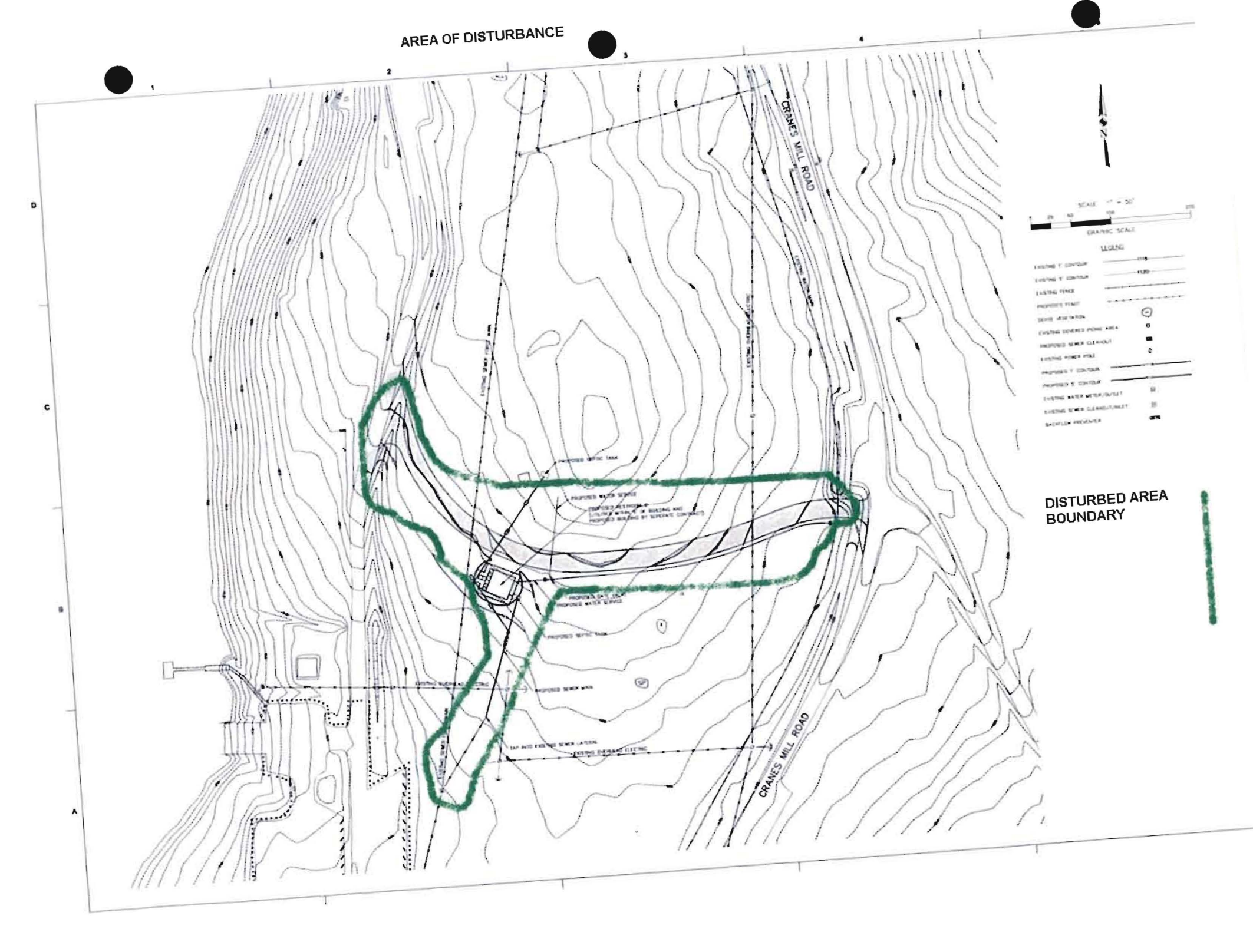

DRAINAGE PATTERNS
N
SCALE
GRAPHIC SCALE
LEGEND
CRANES MILL ROAD
DRAINAGE PATTERNS
1

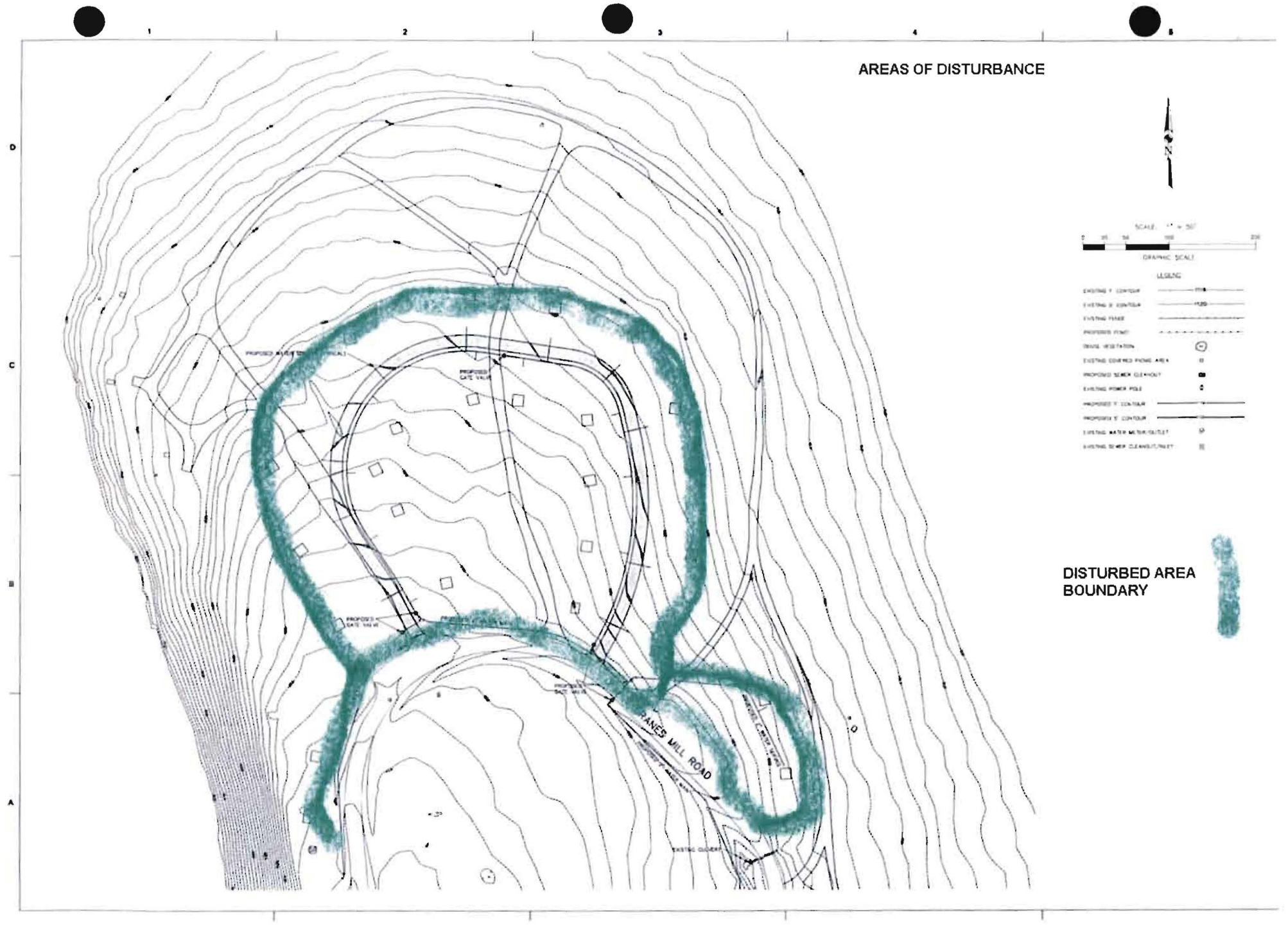
AREAS OF DISTURBANCE



AREAS OF DISTURBANCE




AREA OF DISTURBANCE
CRANES MILL ROAD
CRANES MILL ROAD
DISTURBED AREA BOUNDARY


AREAS OF DISTURBANCE
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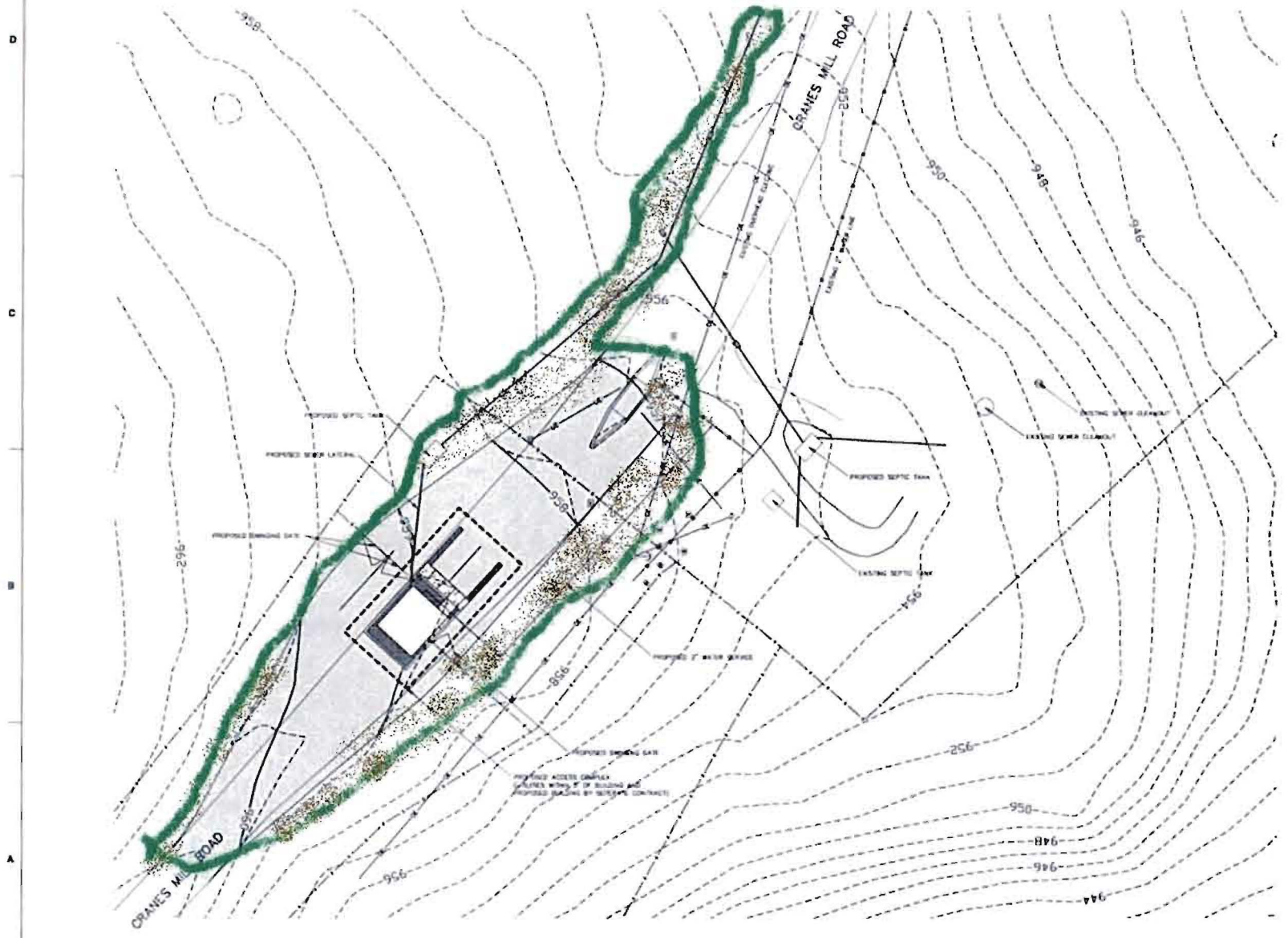
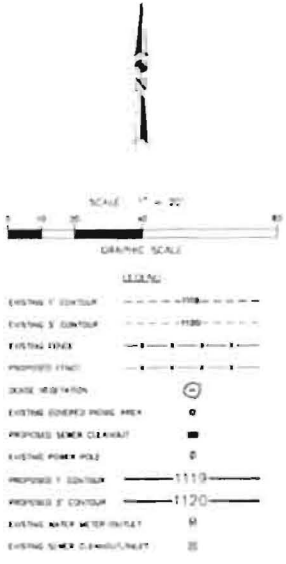
SCALE
GRAPHIC SCALE
LEGEND
DISTURBED AREA BOUNDARY
PROPOSED GATE VALVE
HANES MILL ROAD
EXISTING CULVERT

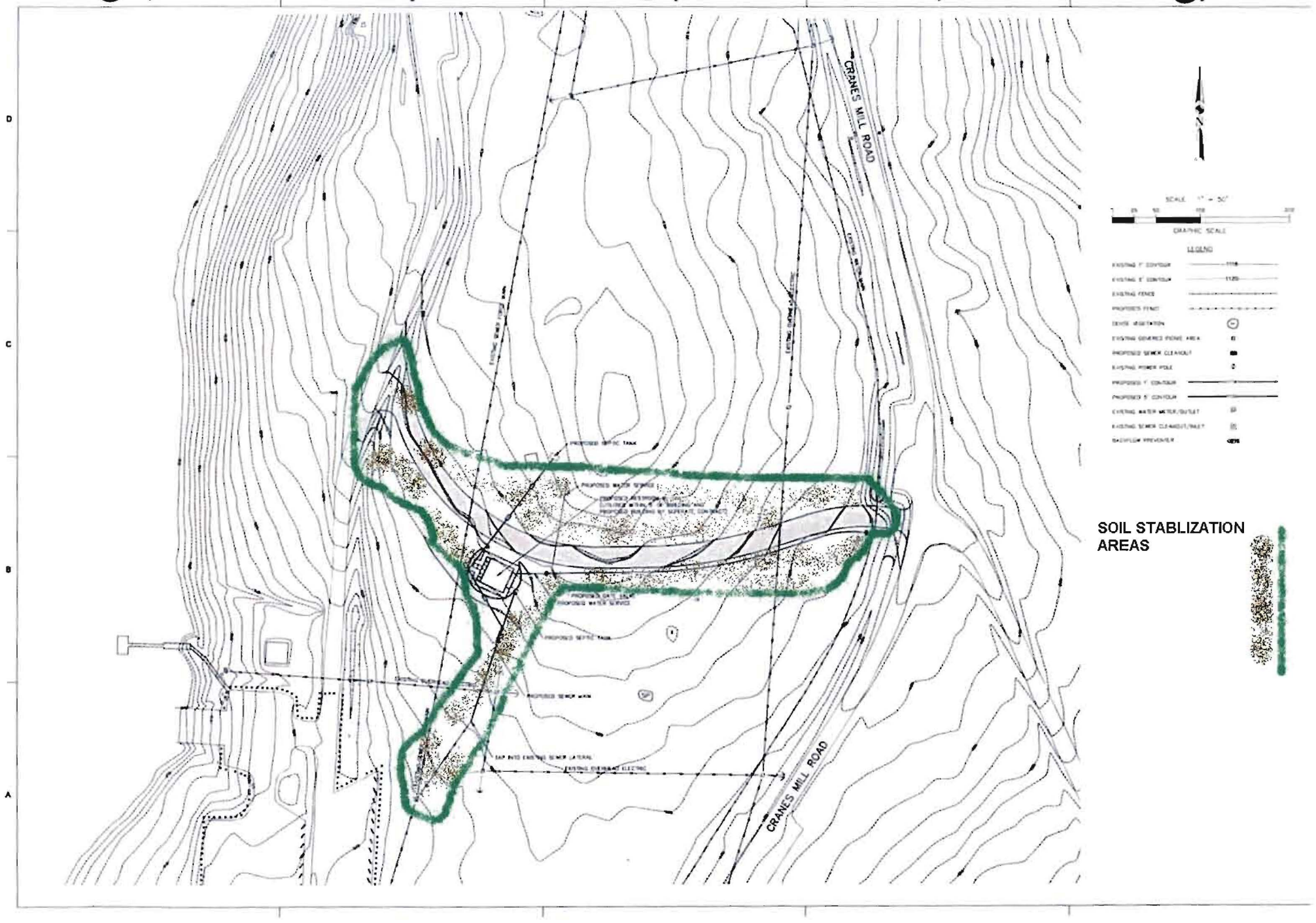
SOIL STABILIZATION AREAS





SOIL STABLIZATION AREAS

SOIL STABLIZATION AREAS



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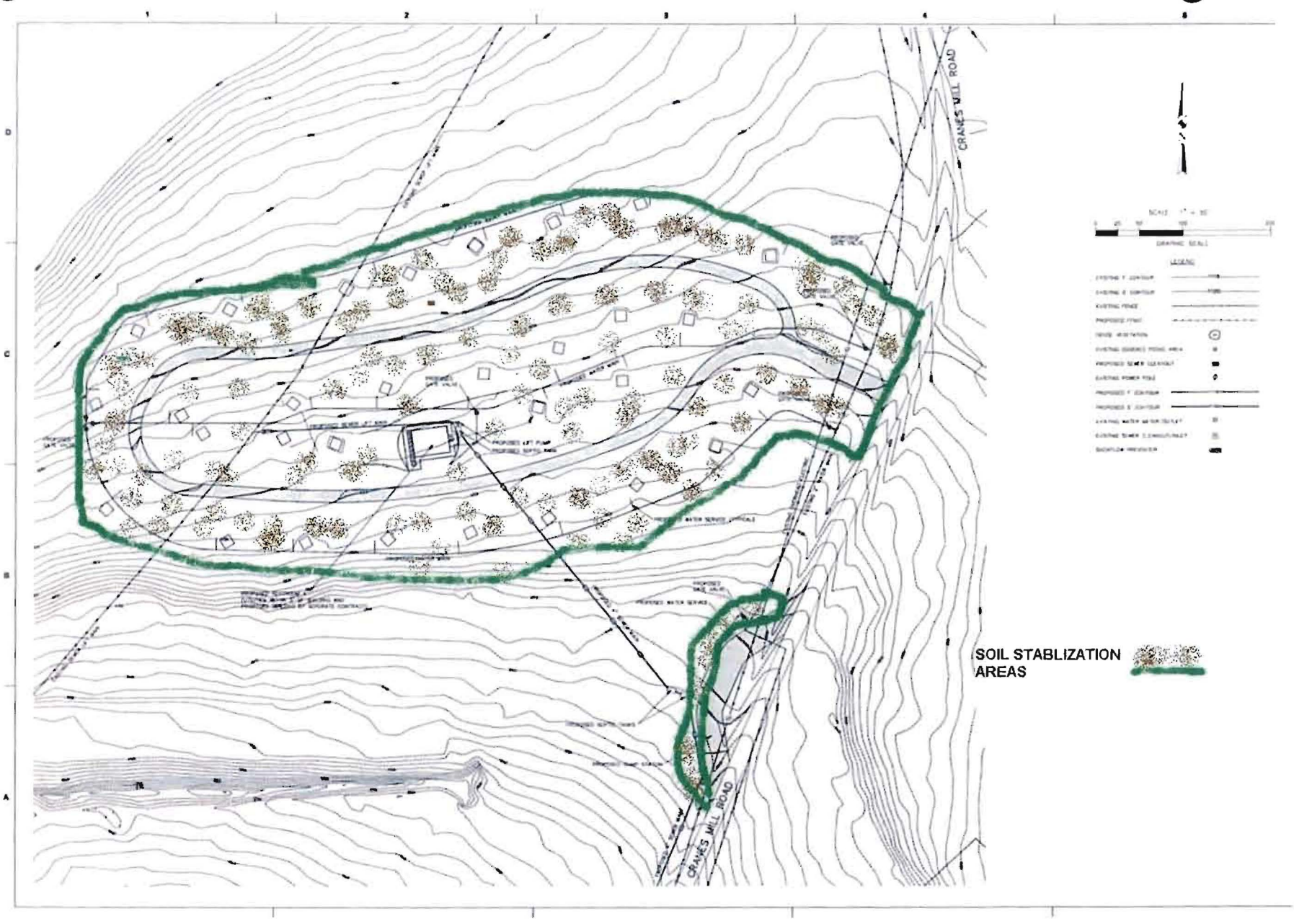

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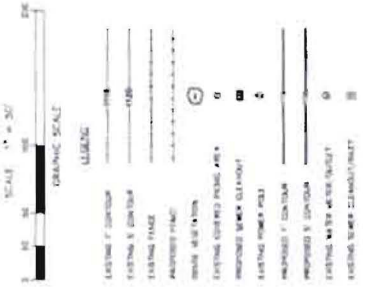
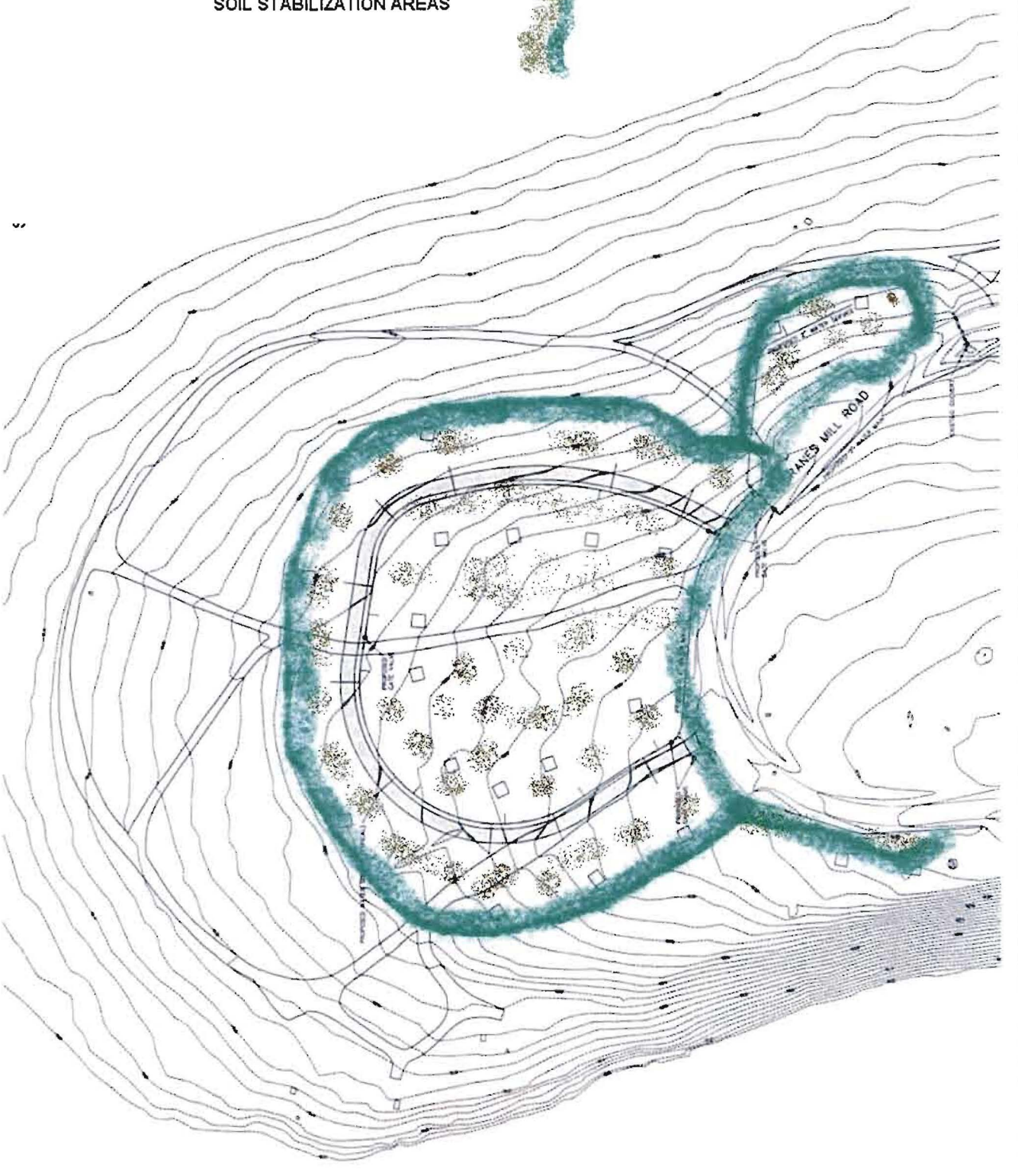
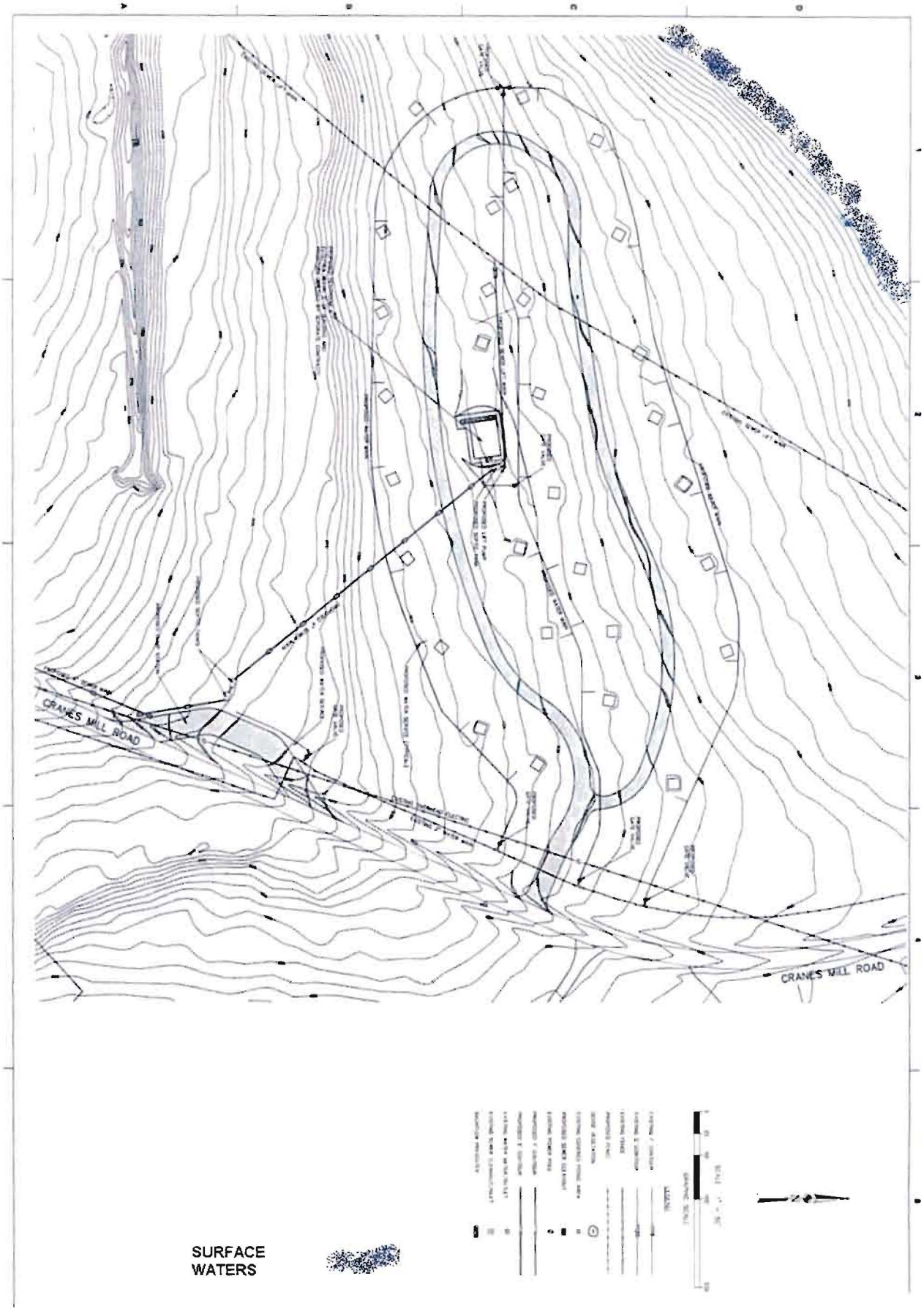
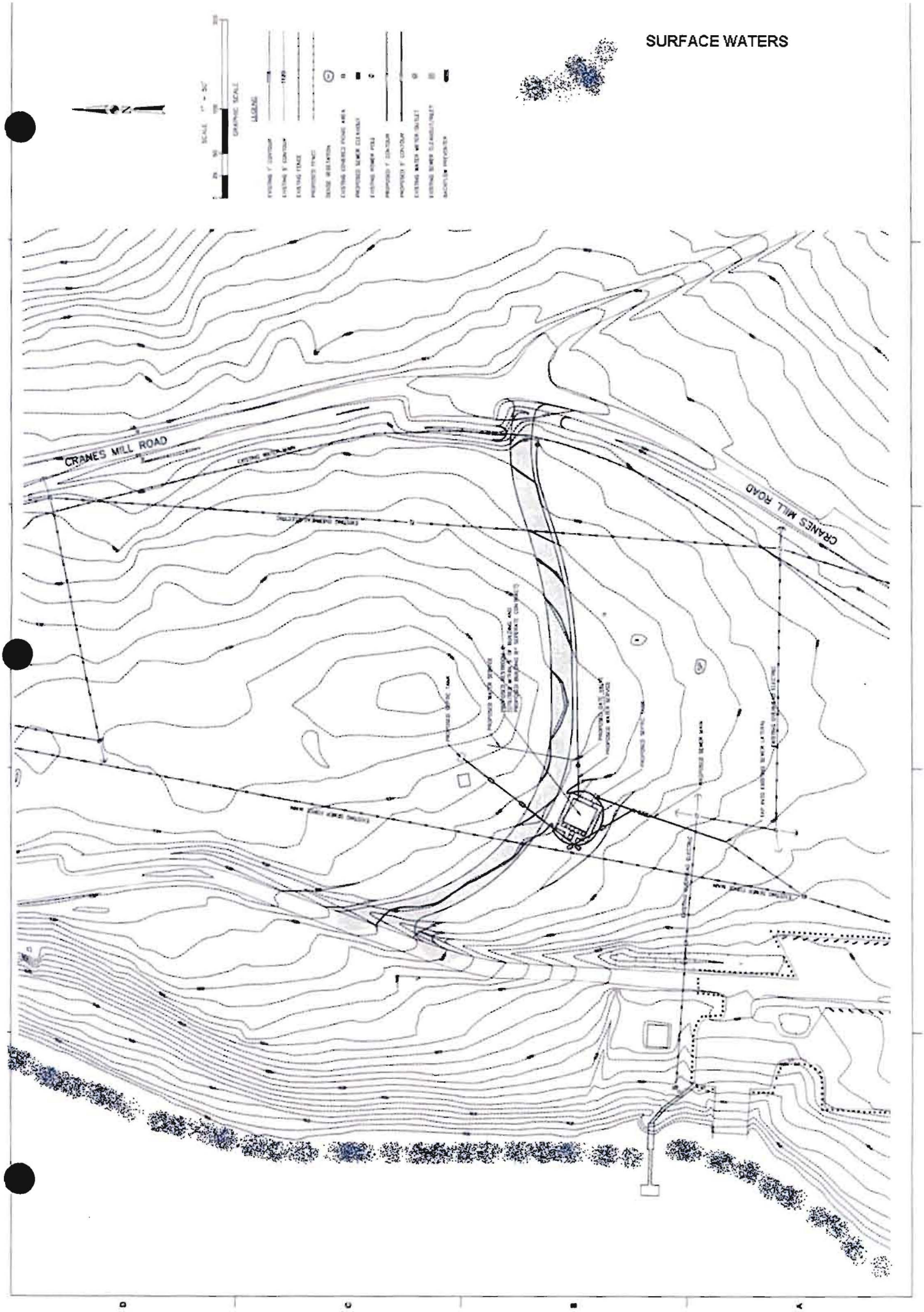


SOIL STABILIZATION AREAS

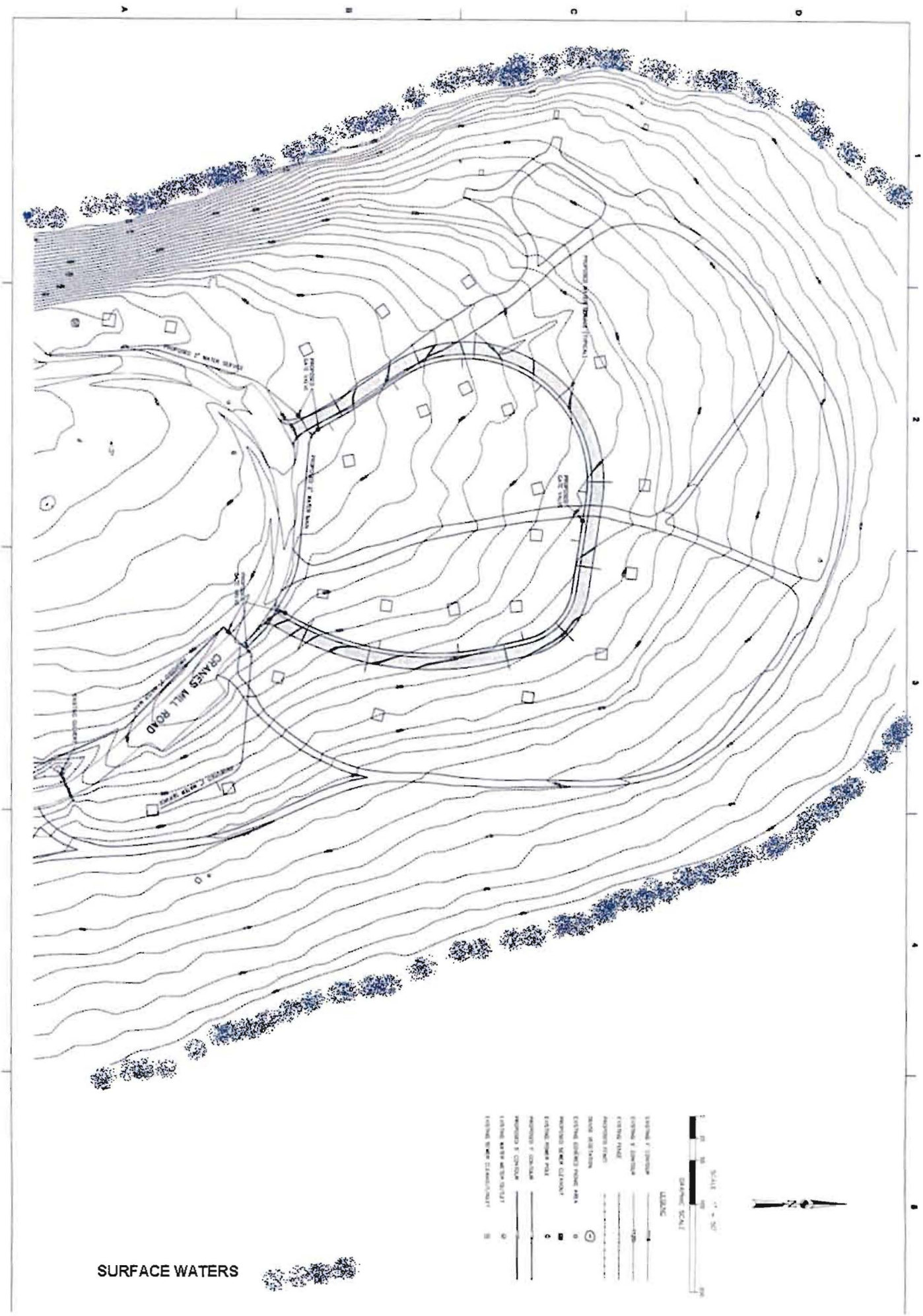


SURFACE WATERS




SURFACE WATERS
CRANES MILL ROAD
CRANES MILL ROAD

SURFACE WATERS



SURFACE WATERS

BEST MANAGMENT PRACTICES NOTES:

ALL TEMPORARY EROSION AND SEDIMENT CONTROLS SHOWN ON THIS MAP WILL BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITY AND WILL BE MAINTAINED THROUGHOUT THE PROJECT TO FINAL STABILIZATION.

NO CLEARING OR GRUBBING WILL BE PERFORMED AS PART OF THIS PROJECT.

DURING THE CONSTRUCTION PROCESS SOIL DISTURBING ACTIVITIES WILL BE MINIMIZED AND AS MUCH AS POSSIBLE THE EXISTING NATURAL VEGETATION WILL BE LEFT UNDISTURBED. ANY AREAS DISTURBED WILL BE TEMPORARILY STABILIZED USING MULCH, BROADCAST SEEDING, OR HYDROMULCH.

FINAL STABILIZATION OF UNSTABILIZED AREAS WILL BE ACCOMPLISHED THROUGH BROADCAST SEEDING, SODDING OR HYDROMULCH APPLICATION.

NO PERMANENT EROSION AND SEDIMENT CONTROLS WILL BE UTILIZED FOR THIS PROJECT.

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- R — ROLLOFF DUMPSTER
- T — TRASH RECEPTACLE
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- CW — CONCRETE WASHOUT AREA
- S — STORAGE TRAILER
- GRADED / POST DEV. FLOW
- NATURAL / EXISTING FLOW
- RECEIVING WATERS

ALL SLOPE EQUALS 1 - 3% UNLESS OTHERWISE INDICATED

- CANYON LAKE
- UTILITY LINE
- SILT FENCE

MAPSCO PAGE NUMBER: 354
MAPSCO GRID LETTER: F1
LOCATION: NORTH AND NORTHEAST OF THE INTERSECTION OF CRANES MILL ROAD AND CRANES MILL MARINA

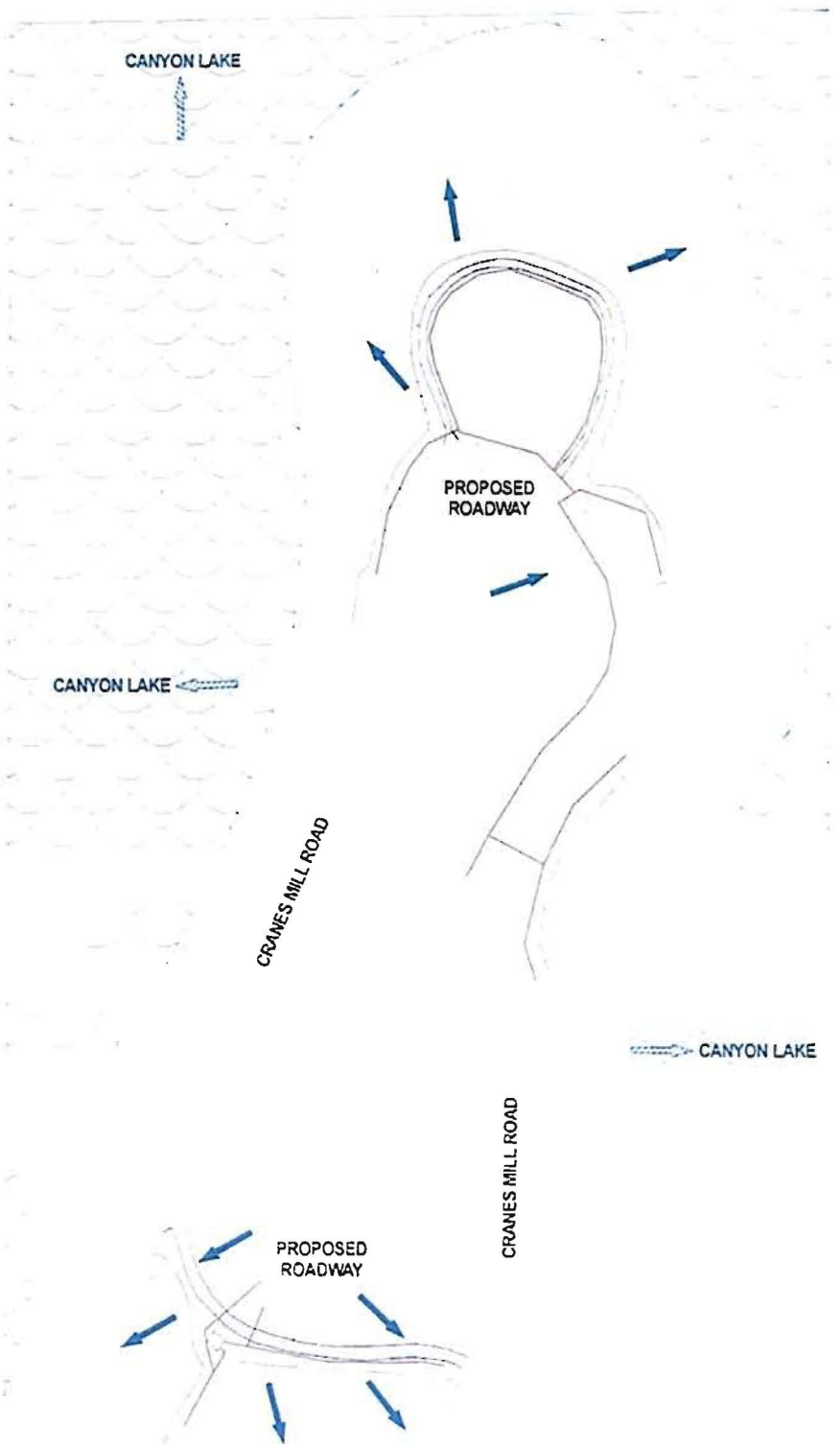

FIGURE 1

INITIAL BMP'S PRIOR TO CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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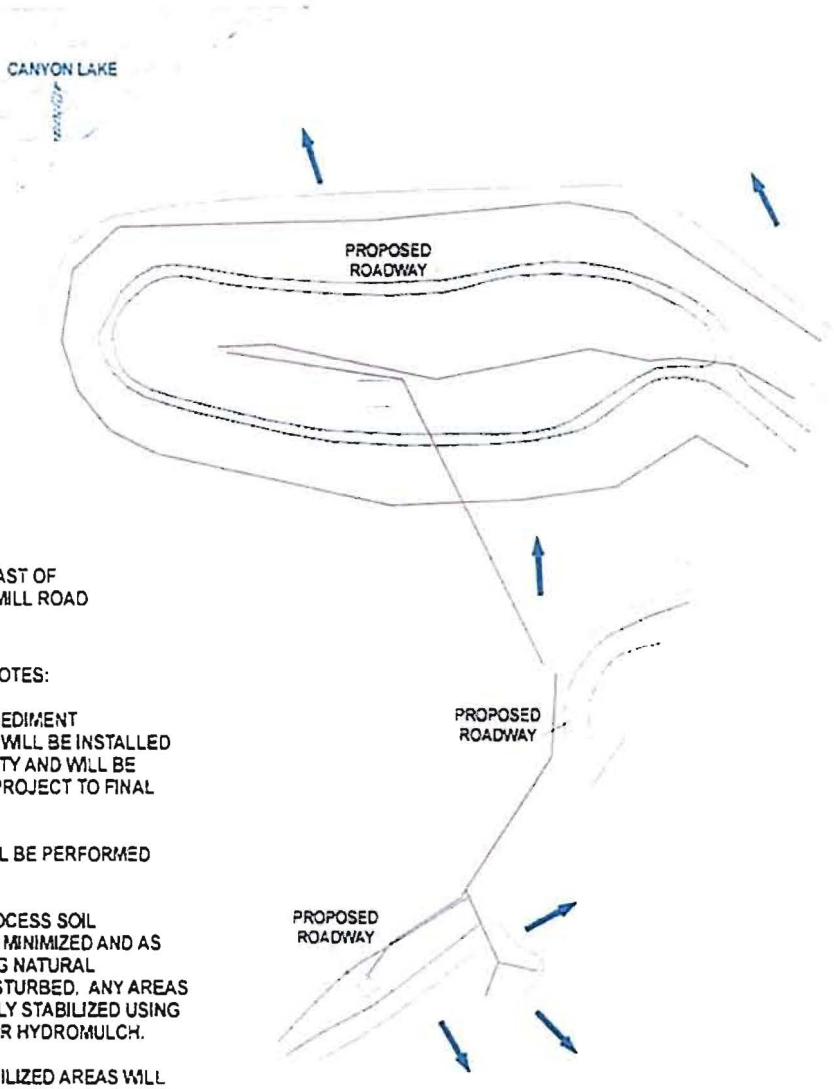

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PORTABLE TOILET
ROLLOFF DUMPSTER
TRASH RECEPTACLE
CONSTRUCTION TRAILER / MATERIAL STORAGE AREA
CW CONCRETE WASHOUT AREA
S STORAGE TRAILER
GRADED / POST DEV. FLOW
NATURAL / EXISTING FLOW
RECEIVING WATERS
ALL SLOPE EQUALS 1 - 3% UNLESS OTHERWISE INDICATED

CANYON LAKE
UTILITY LINE
SILT FENCE

CANYON LAKE

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N

FIGURE 2

INITIAL BMP'S PRIOR TO CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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CANYON LAKE

UTILITY LINE

SILT FENCE

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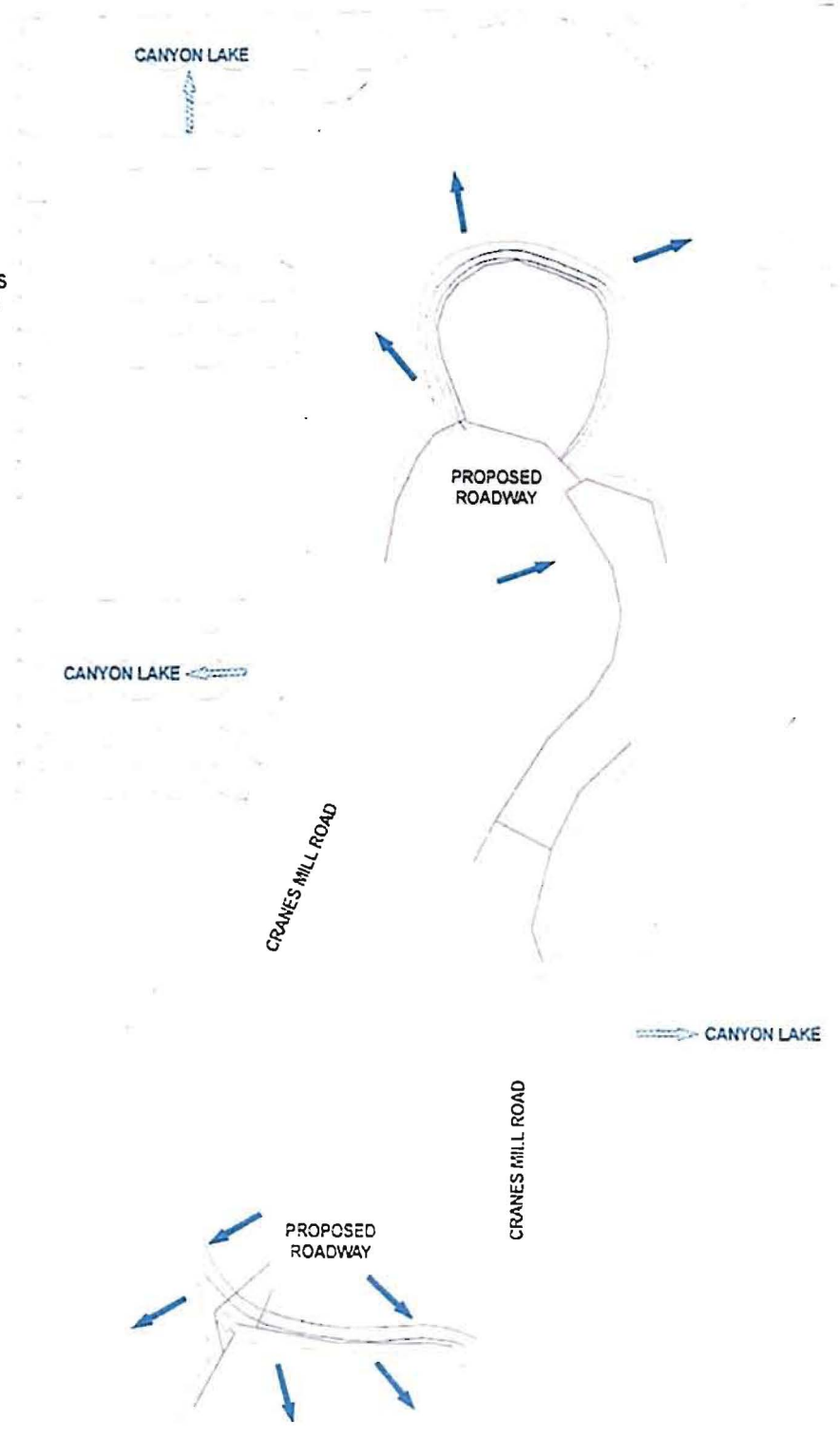

FIGURE 3

INTERIM BMP'S DURING CONSTRUCTION ACTIVITY JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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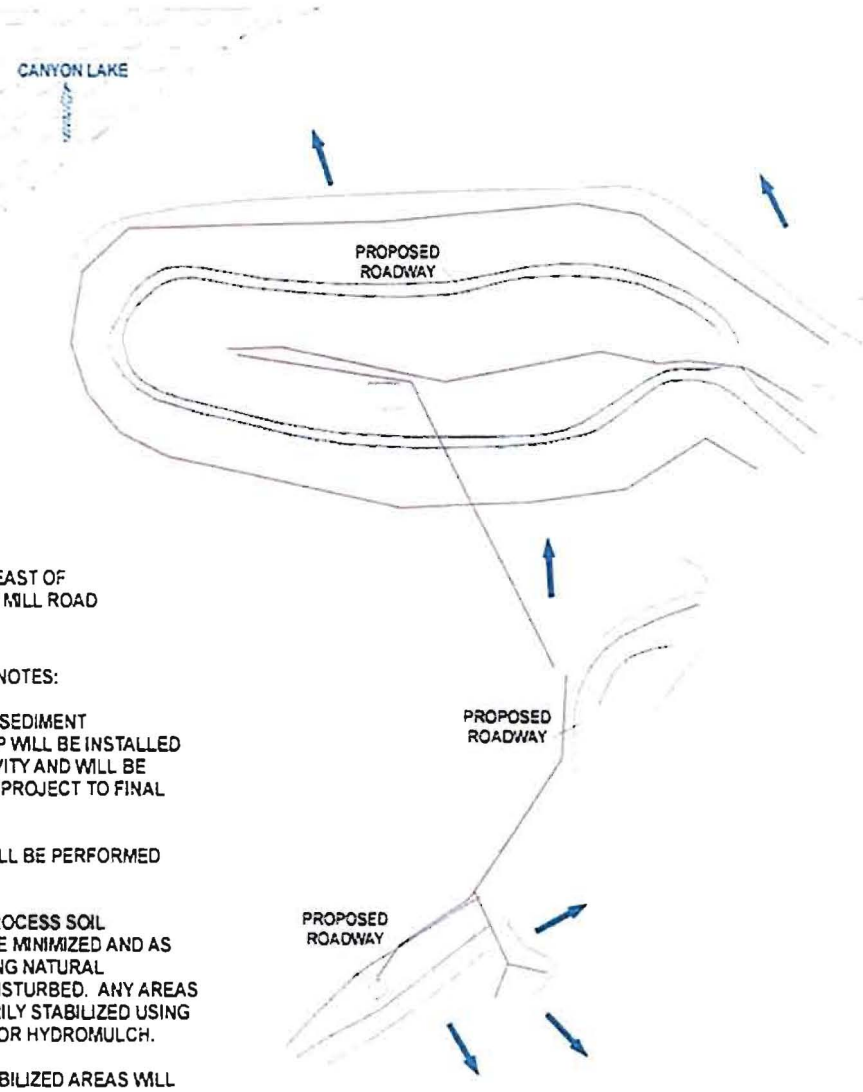
DCS



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CANYON LAKE

CANYON LAKE
UTILITY LINE
SILT FENCE

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N

FIGURE 4

INTERIM BMP'S DURING CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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UTILITY LINE

SILT FENCE

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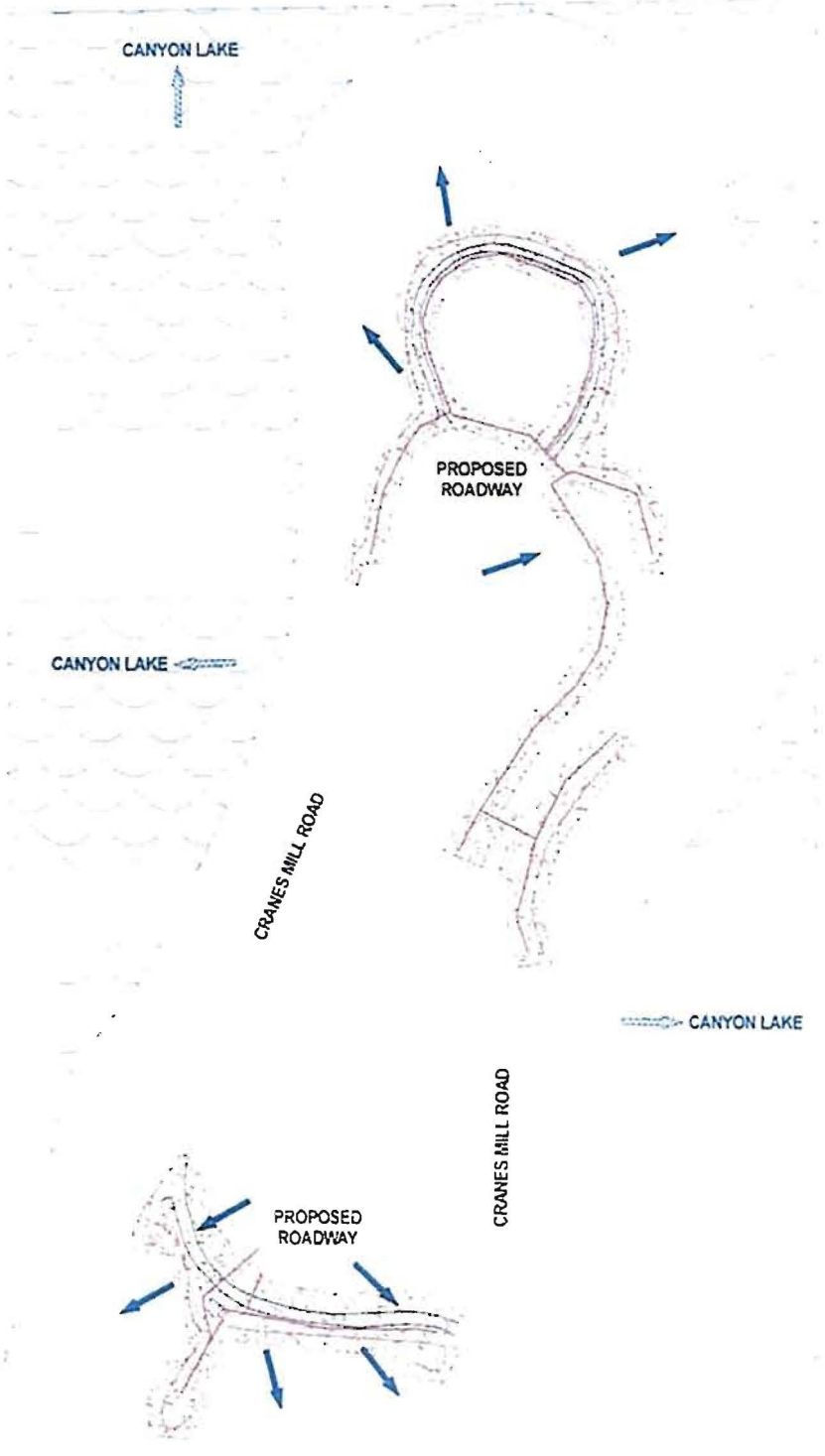

POTENTIAL AREAS OF DISTURBANCE AND TEMPORARY STABILIZATION

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FIGURE 5

TEMPORARY STABILIZATION MATERIALS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

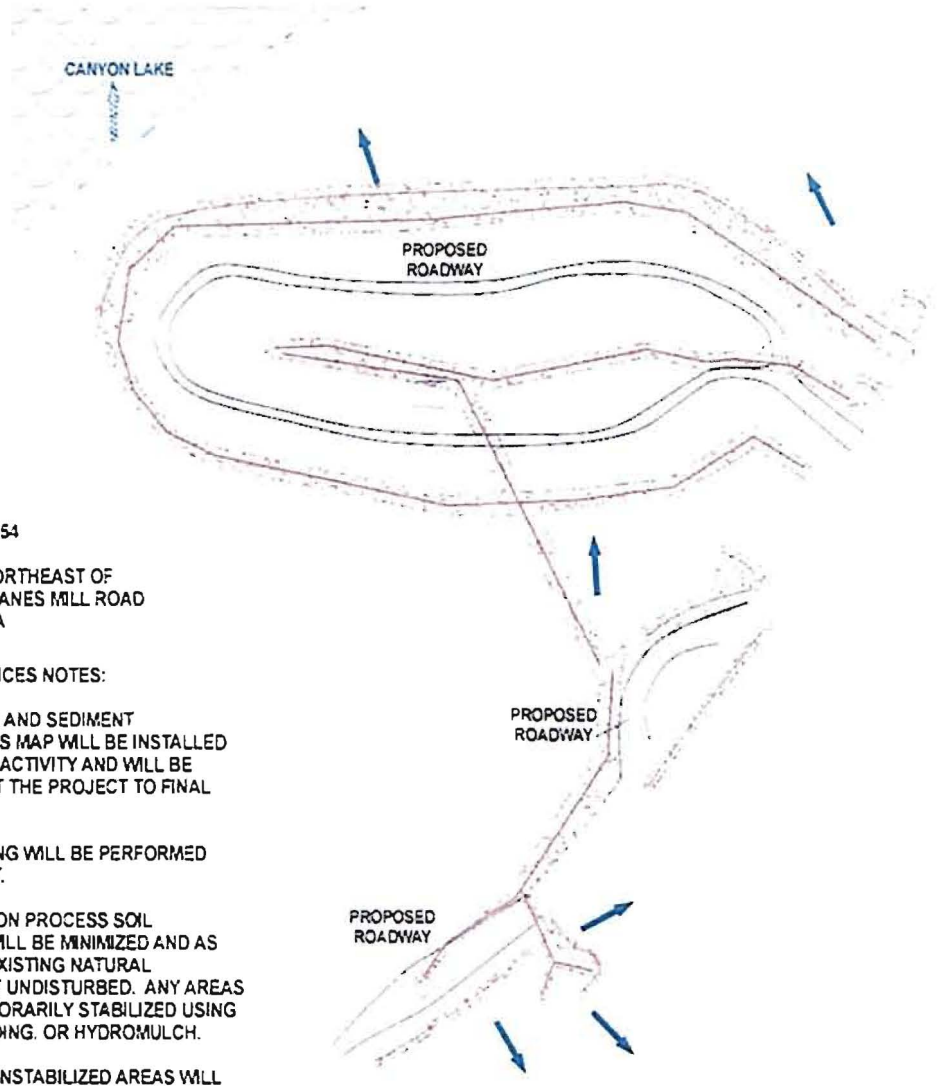

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FIGURE 6

TEMPORARY STABILIZATION METHODS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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CANYON LAKE

UTILITY LINE

SILT FENCE

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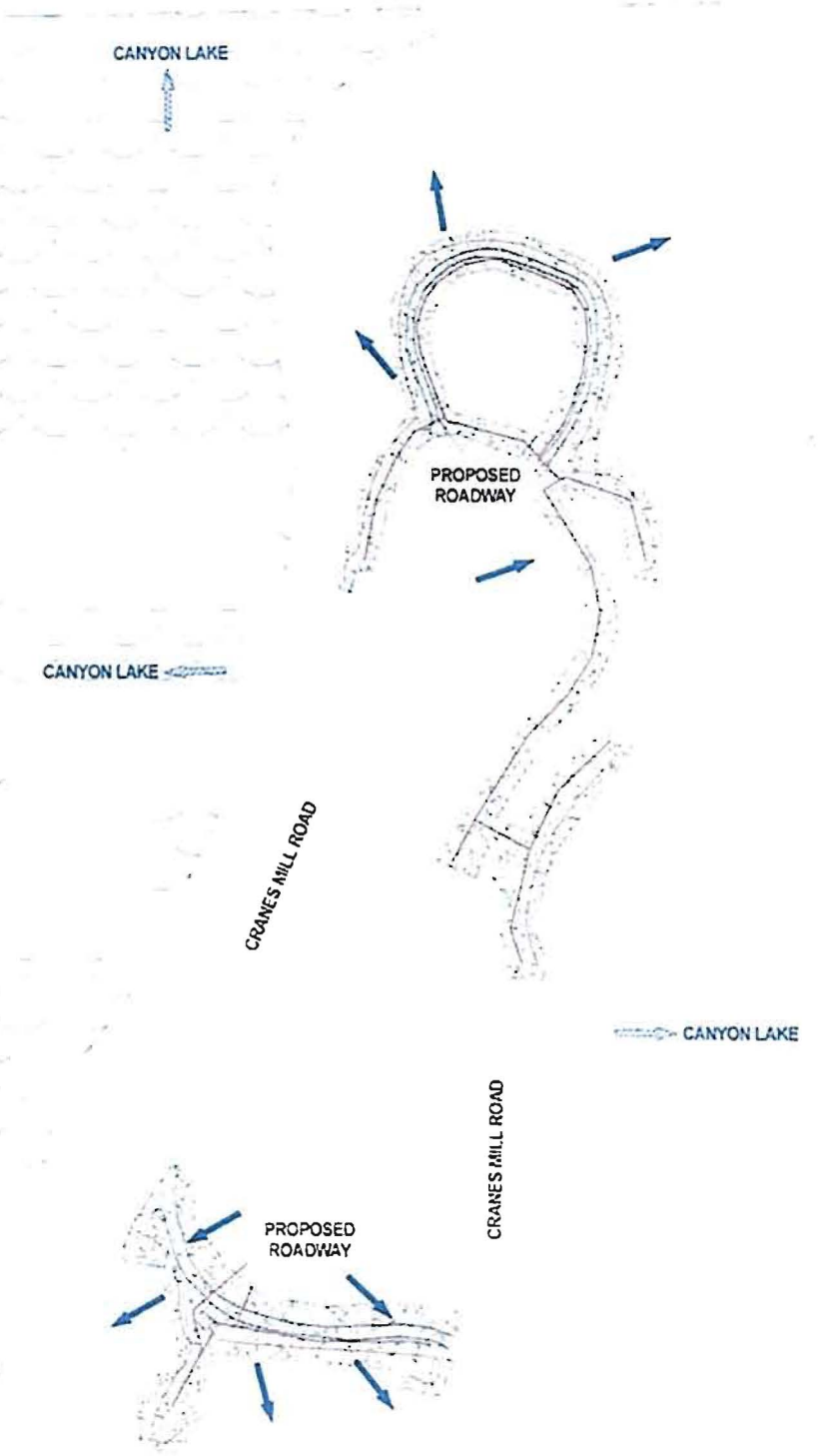

POTENTIAL AREAS OF DISTURBANCE AND PERMANENT STABILIZATION

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FIGURE 7

PERMANENT STABILIZATION MATERIALS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

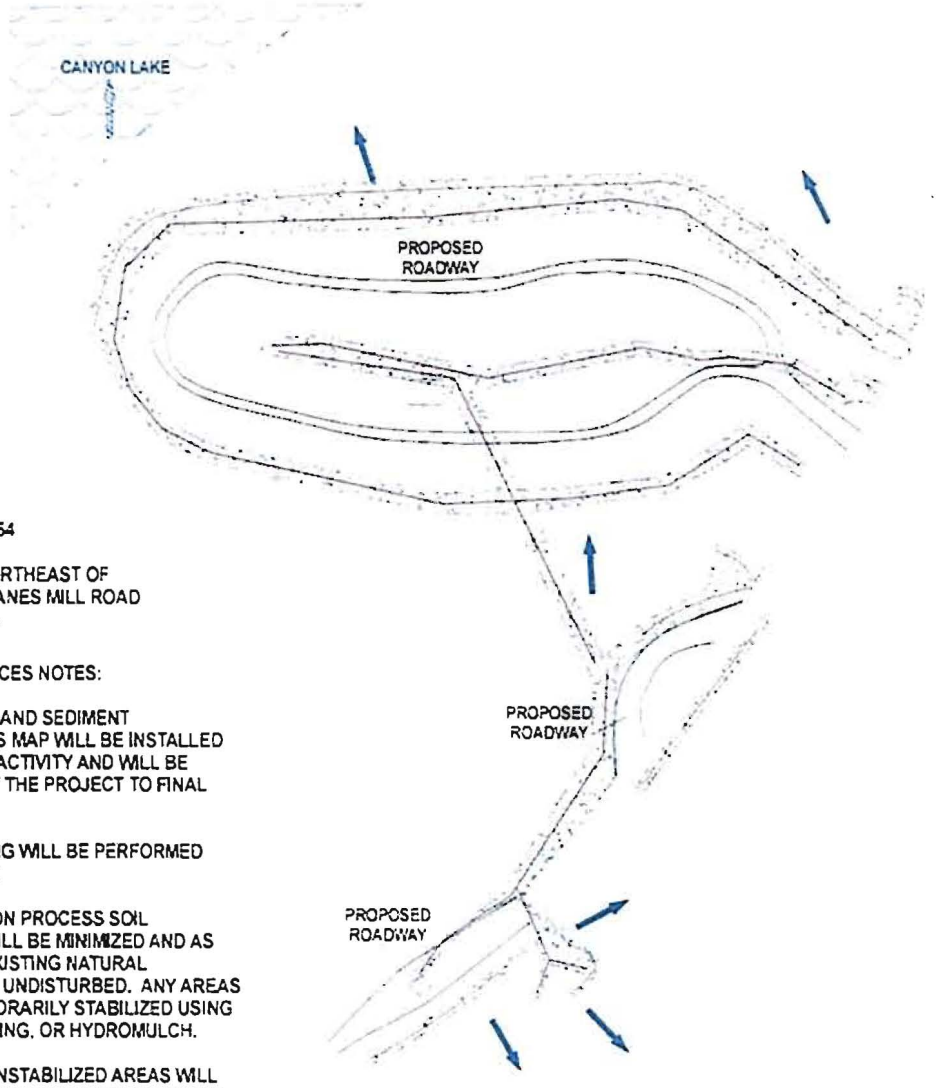

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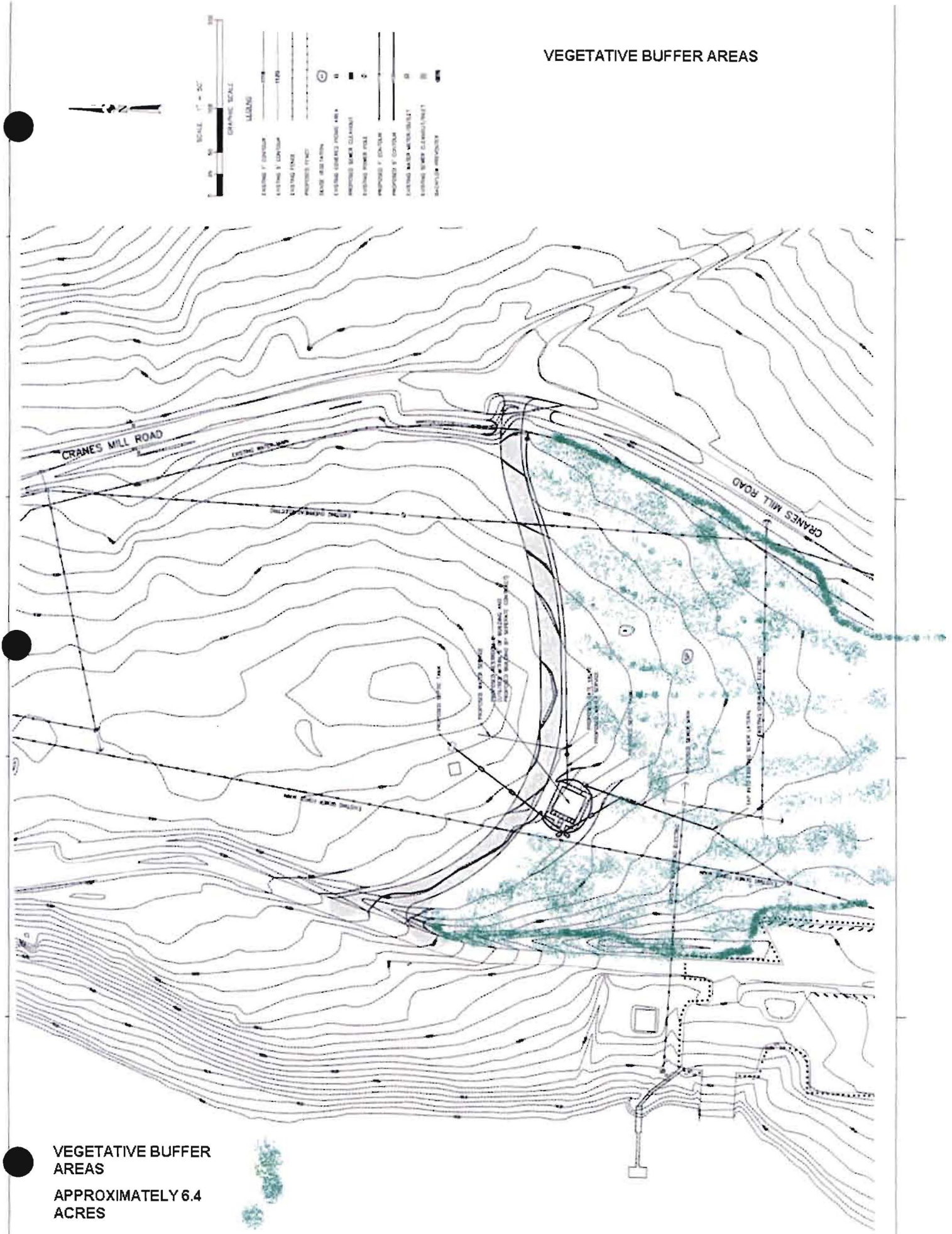
FIGURE 8

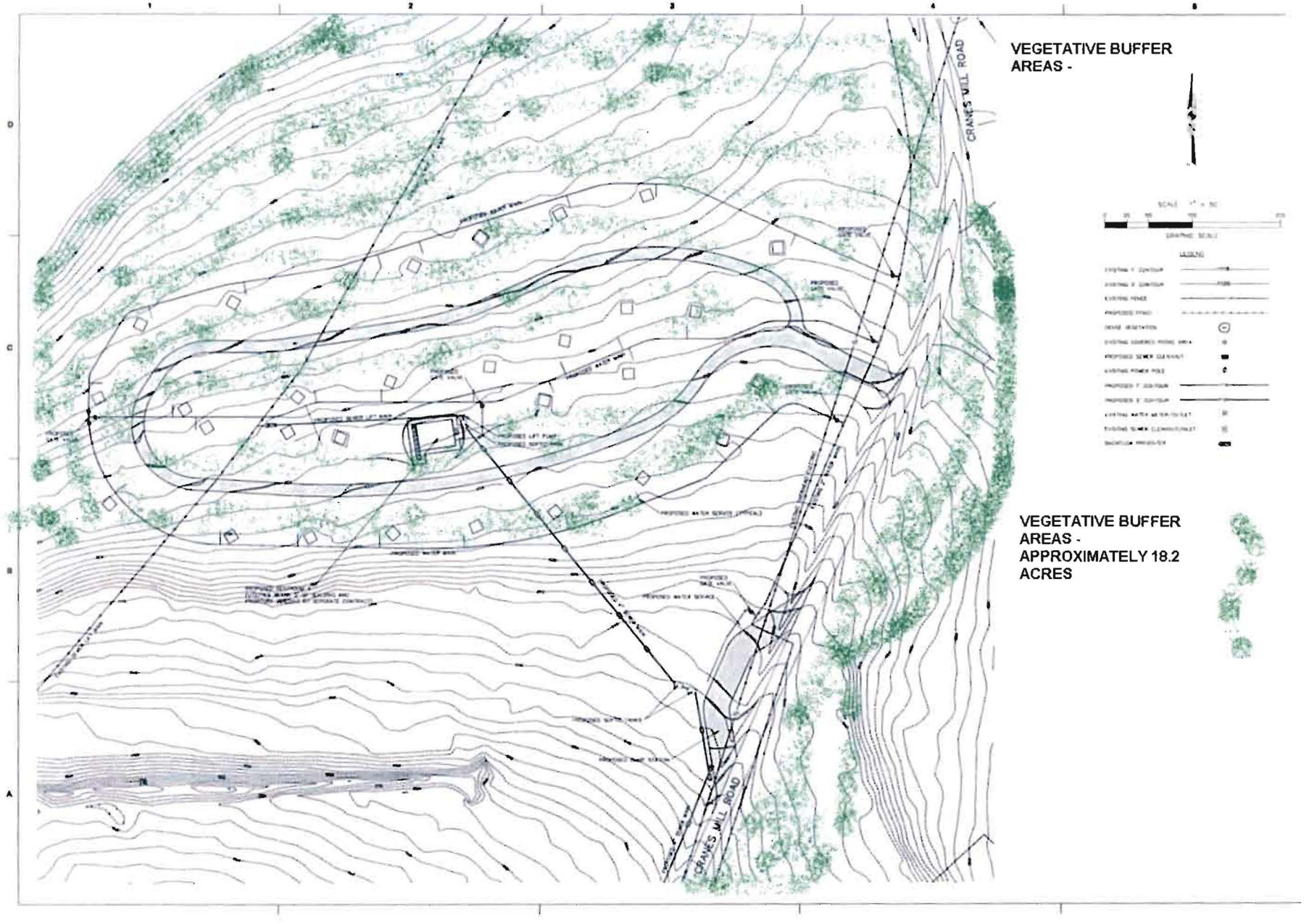
PERMANENT STABILIZATION METHODS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

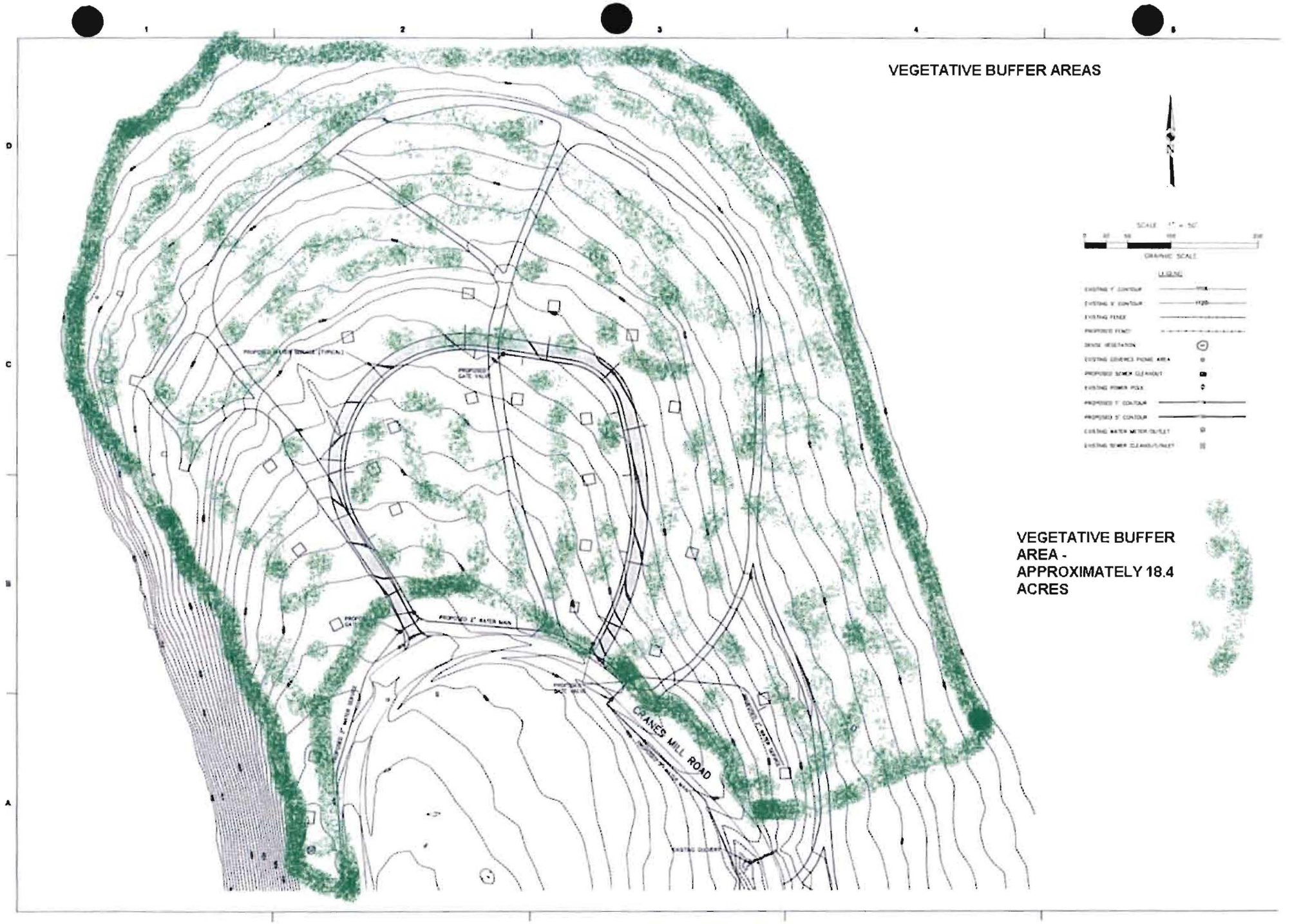
VEGETATIVE BUFFER AREAS



VEGETATIVE BUFFER AREAS

APPROXIMATELY 6.4 ACRES


VEGETATIVE BUFFER AREAS -
VEGETATIVE BUFFER AREAS - APPROXIMATELY 18.2 ACRES
CRANES MILL ROAD
CRANES MILL ROAD


VEGETATIVE BUFFER AREAS
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VEGETATIVE BUFFER AREA - APPROXIMATELY 18.4 ACRES
CRANES MILL ROAD

1.4.10 Vegetative Buffers

Buffer zones are undisturbed strips of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities. Natural buffer zones are used along streams and other bodies of water that need protection from erosion and sedimentation. Vegetative buffers can be used to protect natural swales and be incorporated into natural landscaping of an area. They can provide critical habitat adjacent to streams and wetlands, as well as assisting in controlling erosion, especially on unstable steep slopes.

The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted. If buffer zones are preserved, existing vegetation, good planning, and site management are needed to prevent disturbances such as grade changes, excavation, damage from equipment, and other activities. The creation of new buffer strips requires the establishment of a good dense turf (at least 80% coverage), trees, and shrubs.

Guidelines for installation:

(1) Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.

(2) All unstable steep slopes should be left in natural vegetation.

(3) Fence or flag clearing limits and keep all equipment and construction debris out of the natural areas.

(4) Keep all excavations outside the dripline of trees and shrubs.

(5) Debris or extra soil should not be pushed into the buffer zone area because it will cause damage from burying and smothering.

(6) The minimum width of a vegetative buffer used for sediment control should be 50 feet.

Inspection and Maintenance Guidelines:

Inspection and careful maintenance are important to ensure healthy vegetation. The need for routine maintenance such as mowing, fertilizing, irrigating, and weed and pest control will depend on the species of plants and trees, soil types, location and climatic conditions. County agricultural extension agencies are a good source of this type of information.

SILT FENCE

A silt fence is a barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. When properly used, silt fences can be highly effective at controlling sediment from disturbed areas. They cause runoff to pond, allowing heavier solids to settle out. If not properly installed, silt fences are not likely to be effective. A schematic illustration of a silt fence is shown in Figure 1.26.

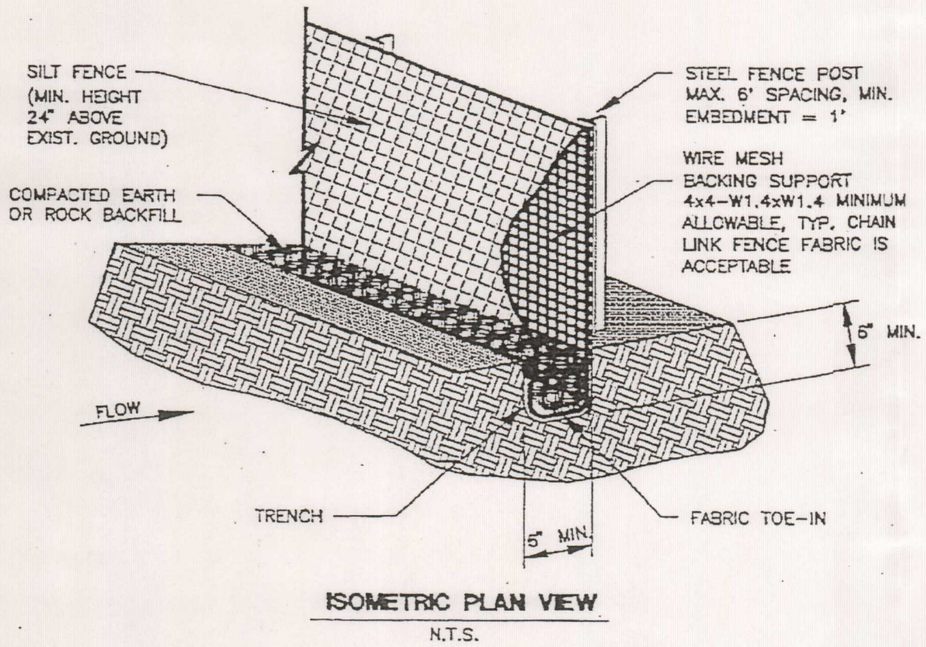

Figure 1.26 Schematic of a Silt Fence Installation (NCTCOG, 1993b)

The purpose of a silt fence is to intercept and detain water-borne sediment from unprotected areas of a limited extent. Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way. If concentrated flow occurs after installation, corrective action must be taken such as placing a rock berm in the areas of concentrated flow.

Materials:

Silt fence material should be polypropylene, polyethylene or polyamide woven or non-woven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No.30.
Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or y -bar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft2, and Brindell hardness exceeding 140. Rebar (either #5 or #6) may also be used to anchor the berm.
Woven wire backing to support the fabric should be galvanized 2" x 4" welded wire, 12-gauge minimum.
The berm structure should be secured with a woven wire sheathing having maximum opening of 1 inch and a minimum wire diameter of 20 gauge galvanized and should be secured with shoat rings.
Clean, open graded 3- to 5-inch diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rocks may be used.

Installation:

Layout the woven wire sheathing perpendicular to the flow line. The sheathing should be 20 gauge woven wire mesh with I-inch openings.
Install the silt fence along the center of the proposed berm placement, as with a normal silt fence described in Section 2.4.3.
Place the rock along the sheathing on both sides of the silt fence as shown in the diagram (Figure 1.30), to a height not less than 24 inches. Clean, open graded 3-5" diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rock may be used.
Wrap the wire sheathing around the rock and secure with tie wire so that the ends of the sheathing overlap at least 2 inches, and the berm retains its shape when walked upon.

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Form

NAME OF PROPOSED REGULATED ENTITY: Crane's Mill Park – Canyon Lake – Comal County
REGULATED ENTITY LOCATION: Crane's Mill Park – Canyon Lake – Comal county
NAME OF CUSTOMER: U.S. Army Corps of Engineers
CONTACT PERSON: Robert G. Adams PHONE: (254) 939-1829
(Please Print)

Customer Reference Number (if issued): CN 6009189 (nine digits)

Regulated Entity Reference Number (if issued): RN **1026773** (nine digits)

Austin Regional Office (3373) ☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362) ☐ Bexar ☒ Comal ☐ Medina ☐ Kinney ☐ Uvalde

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to (Check One):

☐ **Austin Regional Office**

☐ **Mailed to TCEQ**:
TCEQ – Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☐ **San Antonio Regional Office**

☐ **Overnight Delivery to TCEQ**:
TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Site Location (Check All That Apply): ☐ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	Size	Fee Due
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	142 Acres	$8000 GK 2-18-11
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	L.F.	$
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

ADAMS.ROBERT.G.1231001499
Digitally signed by ADAMS.ROBERT.G.1231001499
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499
Date: 2011.02.03 13:37:46 -06'00'
Signature

3 FEB 2011
Date

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Schedule
30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications
Contributing Zone Plans and Modifications

PROJECT	PROJECT AREA IN ACRES	FEE
One Single Family Residential Dwelling	< 5	$650
Multiple Single Family Residential and Parks	< 5 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $10,000

Organized Sewage Collection Systems and Modifications

PROJECT	COST PER LINEAR FOOT	MINIMUM FEE MAXIMUM FEE
Sewage Collection Systems	$0.50	$650 - $6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

PROJECT	COST PER TANK OR PIPING SYSTEM	MINIMUM FEE MAXIMUM FEE
Underground and Aboveground Storage Tank Facility	$650	$650 - $6,500

Exception Requests

PROJECT	FEE
Exception Request	$500

Extension of Time Requests

PROJECT	FEE
Extension of Time Request	$150

TCEQ

TCEQ Core Data Form

TCEQ Use Only

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

☒ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☐ Yes ☐ No NA

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 6009189		RN 1026773

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☐ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☒ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☒ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*

10. Mailing Address:

City		State		ZIP		ZIP + 4	

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
( ) -		( ) -

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
621642142			

20. Number of Employees

☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☐ Yes ☐ No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information ☒ No Change** *(See below)*

**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

23. Regulated Entity Name *(name of the site where the regulated action is taking place)*

Crane's Mill Park - Canyon Lake

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	16665 Crane's mill Rd.							
	City	Canyon Lake	State	TX	ZIP	78133	ZIP + 4	4129
25. Mailing Address:	U.S. Army Corps of Engineers							
	601 COE Rd.							
	City	Canyon Lake	State	TX	ZIP	78133	ZIP + 4	4129

26. E-Mail Address:	Robert.G.Adams@usace.army.mil

27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(254) 939-1829		(254) 939-8061

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
9512		92412	

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Flood Risk Management, Water Conservation/Supply, Recreation and Natural Resourcement Management.

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	Canyon Lake - Southwest quadrant - West end of FM2673.

36. Nearest City	County	State	Nearest ZIP Code
Startzville	Comal	TX	78133

37. Latitude (N) In Decimal:	29.53.48		38. Longitude (W) In Decimal:	98.17.27	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	53	48	98	17	27

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☐ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Robert G. Adams	41. Title:	Natural Resource Management BLM

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(254) 939-1829		(254) 939-8061	Robert.G.Adams@usace.army.mil

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	U.S. Army Corps of Engineers	Job Title:	Natural Resource Management BLM
Name *(In Print)*:	Robert G. Adams	Phone:	(254) 939-1829
Signature:	ADAMS.ROBERT.G.1231001499 Digitally signed by ADAMS.ROBERT.G.1231001499 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499 Date: 2011.03.03 11:18:05 -06'00'	Date:	

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	16665 Crane's mill Rd.							
	City	Canyon Lake	State	TX	ZIP	78133	ZIP + 4	4129
25. Mailing Address:	U.S. Army Corps of Engineers							
	601 COE Rd.							
	City	Canyon Lake	State	TX	ZIP	78133	ZIP + 4	4129
26. E-Mail Address:	Robert.G.Adams@usace.army.mil							
27. Telephone Number		28. Extension or Code		29. Fax Number *(if applicable)*				
(254) 939-1829				(254) 939-8061				
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9512			92412					
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Flood Risk Management, Water Conservation/Supply, Recreation and Natural Resourcement Management.								

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35. Description to Physical Location:	Canyon Lake - Southwest quadrant - West end of FM2673.				
36. Nearest City		County		State	Nearest ZIP Code
Startzville		Comal		TX	78133
37. Latitude (N) In Decimal:	29.53.48		38. Longitude (W) In Decimal:	98.17.27	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
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☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

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(254) 939-1829		(254) 939-8061	Robert.G.Adams@usace.army.mil

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(See the Core Data Form instructions for more information on who should sign this form.)

Company:	U.S. Army Corps of Engineers	Job Title:	Chief of Operations - Ft. Worth District
Name *(In Print)*:	Charles L. Burger	Phone:	(817) 886-~~1829~~ 1567
Signature:	Charles L. Burger	Date:	3 Feb 11

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I ROBERT G. ADAMS,
Print Name

OTHER,
Title - Owner/President/Other

of U.S. ARMY CORPS OF ENGINEERS,
Corporation/Partnership/Entity Name

have authorized GARRETT KELLER
Print Name of Agent/Engineer

of MATKIN HOOVER ENGINEERING + SURVEYING
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Robert Glenn Adams
Applicant's Signature

15 Feb 2011
Date

THE STATE OF Texas §

County of Bell §

BEFORE ME, the undersigned authority, on this day personally appeared Robert Glenn Adams known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 15th day of February 2011.

CRYSTAL A WALKER
Notary Public, State of Texas
My Commission Expires
5-10-2011

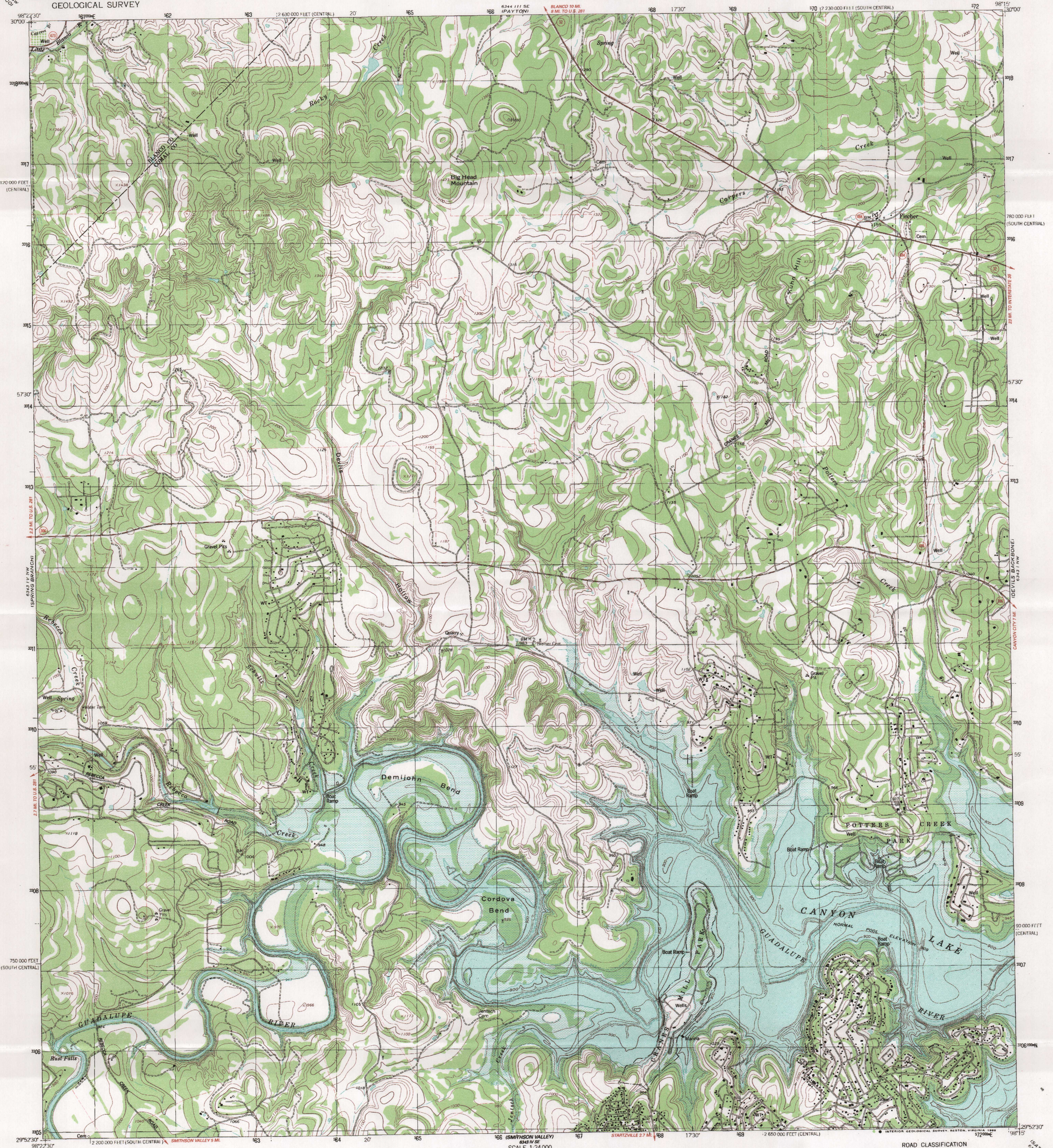
NOTARY PUBLIC

Crystal A Walker
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 5/10/2011

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FISCHER QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



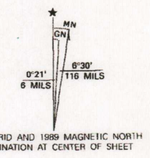
Mapped, edited, and published by the Geological Survey
Revised in cooperation with the Texas Water Development Board

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1963. Revised from aerial photographs taken 1986. Field checked 1988. Map edited 1989

Projection and 10,000-foot grid ticks: Texas coordinate system, south central and central zones (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 14
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 19 meters south and 29 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence lines



UTM GRID AND 1989 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

2998–434

ROAD CLASSIFICATION

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route
U. S. Route
State Route

FISCHER, TEX.
29098-H3-TF-024

1989

DMA 6343 IV NE-SERIES V882

CONTRIBUTING ZONE PLAN

CRANE'S MILL PARK

CANYON LAKE

COMAL COUNTY

U.S. ARMY CORPS OF ENGINEERS

STORM WATER POLLUTION PREVENTION PLAN

CRANES MILL PARK

INSTALLATION OF UTILITIES AND ACCESS ROADWAYS

JSR, INC.

Table of Contents

I. Introduction

Regulatory Requirements for Construction Storm Water

Section 26.040 of the Texas Water Code and Section 402 of the Clean Water Act require that at least one storm water pollution prevention plan (SW3P) shall be developed for each construction project or site covered by the permit.

The SW3P shall be completed prior to a submittal of the Notice of Intent (NOI) and shall provide for compliance with the terms and schedule of the SW3P beginning with the initiation of construction activities.

The SW3P shall be available, upon request, to the Director, a State, Tribal or local agency approving sediment and erosion control plans, grading plans, or storm water management plans; local government officials; or the operator of a municipal storm water sewer receiving discharges from the site.

The SW3P is available at the office of JSR, Inc. (8534 Greaves Lane, Schertz, Texas 78154).

Notice of Intent

The NOI must be submitted: ***1)*** at least 7 days prior to the start of work for a paper NOI or ***2)*** prior to the start of work for an electronic NOI submitted to the TCEQ STEERS program (must receive email confirmation receipt from TCEQ before starting construction). The NOI must be signed by a duly authorized representative and retained on site where the storm water discharge is generated.

GENERAL CONTRACTOR - A copy of the Cranes Mill Park – Installation of Utilities and Access Roadways, JSR, Inc., Texas Pollutant Discharge Elimination System (TPDES) Notice of Intent for a General Permit for Discharges associated with Construction Activity is available behind the NOI tab at the back of the SW3P.

The NOI submittal date to TCEQ is _____.
The NOI submittal date to the MS4 is _____.

Signed Notices of Intent will be posted until the permits are granted. All authorization numbers will be posted when received from the Texas Commission on Environmental Quality (TCEQ).

A copy of the signed Notice(s) of Intent will be supplied to the operator of the Municipal Separate Storm Sewer System (MS4) if discharges enter an MS4. Cranes Mill Park – Installation of Utilities and Access Roadways is located in the Comal County MS4 system.

Permit Amendment

Permittees must submit a Notice of Change (NOC) letter within 14 days to the executive director upon the discovery of an omission, inaccuracies or submittal of incorrect information on the Notice of Intent. A copy of the Notice of Change must also be submitted to the operator of the MS4 receiving the discharge from the site. If necessary, changes that stem from the submittal of the Notice of Change need to be revised in the SW3P and those revisions shall be completed within 7 calendar days following the discovery of the error.

Notice of Termination

Permittees must submit a completed Notice of Termination (NOT) that is signed by a duly authorized representative upon completion of the project, which consists of final stabilization of all disturbed areas, including a uniform perennial vegetative cover with a density of 70% of the native background vegetative cover for the area on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures have been employed – (TPDES *General Permit No. TXR150000*, Part II Section E). A copy of the NOT for JSR, Inc. TPDES General Permits for Discharges Associated with Construction Activity will be placed in Section VII for review by interested parties.

Signage

Notices required to be posted near the entrance of the site include:

- TXR150000 Large Construction Site Notice(s) *(for Primary and Secondary Operators)*
- Signed copy of the TCEQ TXR150000 Notice(s) of Intent *(Primary Operators only)*

In areas where safety is a concern, the NOI/permit number must be posted in a local public building or publicly accessible location near the construction site.

Appropriate signage will be posted near the construction site entrance.

Other Federal, State, Local or Tribal Requirements

This SW3P is designed to comply with other state and local requirements as follows.

The **Comal County** Standard Building Regulations.

As this site is not located in an area where separate Tribal Requirements may apply, no additional storm water management controls are required to minimize the effects of storm water runoff to affected areas.

The Texas Commission on Environmental Quality (TCEQ) TPDES General Permit TXR150000 regulations pursuant to Section 26.040 of the Texas Water Code and Section

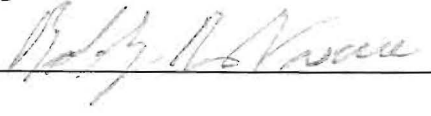
402 of the Clean Water Act. Also, **30 Texas Administrative Code (TAC) Chapter 213** is known as the Edwards Aquifer Rules and requires a Water Pollution Abatement Plan (WPAP) to be developed for construction activities over the Edwards Aquifer Recharge Zone. A Contributing Zone Plan (CZP) is required for construction activities over the Edwards Aquifer Contributing Zone. **As this site is located inside the Edwards Aquifer Contributing Zone, a CZP is required. The CZP is required to be on site at all times.**

SWPPP CERTIFICATION

II. SW3P Certification

Authority Signature

"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 gathered and evaluated 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."

Authority Representative Name and Title	Phone Number
Bobby R. Greaves, Vice President JSR, Inc.	210-653-7772
Signature 	Date 10-21-10

SITE & CONSTRUCTION DESCRIPTION

III. Site and Construction Activity Description

Endangered or Threatened Species Information

Endangered and Threatened Species listed for Comal County by the Texas Parks and Wildlife:

Amphibians:	
Cascade Caverns salamander	Threatened
Comal blind salamander	Threatened
Birds:	
Zone-tailed Hawk	Threatened
Golden-cheeked Warbler	Endangered
Peregrine Falcon	Threatened
American Peregrine Falcon	Threatened
Whooping Crane	Endangered
Bald Eagle	Threatened
Black-capped Vireo	Endangered
Crustaceans:	
Peck's cave amphipod	Endangered
Fishes:	
Fountain darter	Endangered
Mammals:	
Red wolf	Endangered
Jaguarundi	Endangered
Black bear	Threatened
Mollusks:	
Texas fatmucket	Threatened
Golden orb	Threatened
False spike mussel	Threatened
Reptiltes:	
Cagle's map turtle	Threatened
Texas horned lizard	Threatened

Historical Places Information

According to the National Register of Historical Places, there are no historical places on or near the subject property.

Location Maps and Site Map

The topographic map is located on page 15. The local map is located on page 16. The site map is located on page 17.

Receiving Waters

The receiving waters for this project will be Canyon Lake. No other wetlands or aquatic vegetation occur either within or in close proximity to the limits of construction.

Impaired Water Body

As required under Sections 303(d) and 304(a) of the federal Clean Water Act, this list identifies the water bodies in or bordering Texas for which effluent limitations are not stringent enough to implement water quality standards, and for which the associated pollutants are suitable for measurement by maximum daily load.

In addition, the TCEQ also develops a schedule identifying Total Maximum Daily Loads (TMDLs) that will be initiated in the next two years for priority impaired waters. Issuance of permits to discharge into 303(d)-listed water bodies is described in the TCEQ regulatory guidance document *Procedures to Implement the Texas Surface Water Quality Standards* (August 2002, RG-194).

Impairments are limited to the geographic area described by the Assessment Unit and identified with a six or seven-digit AU_ID. A TMDL for each impaired parameter will be developed to allocate pollutant loads from contributing sources that affect the parameter of concern in each Assessment Unit. The TMDL will be identified and counted using a four or five-digit SegID. Water Quality permits that are issued before a TMDL is approved will not increase pollutant loading that would contribute to the impairment identified for the Assessment Unit.

Receiving water body: Canyon Lake
Is the receiving water body a 303(d) listed water body?

☐ **NO**
☒ **YES**

SegID: 1805

Water Body Location: From Canyon Dam in Comal County to a point 2.7 km (1.7 miles) downstream of Rebecca Creek Road in Comal County, up to normal pool elevation of 909 feet (impounds Guadalupe River)

Area	Parameter	Category	Year First Listed
1805_01 Cove around Jacob's Creek Park	Mercury in edible tissue	5c	2006
1805_02 North end of Crane's Mill Park peninsula to south end of Canyon Park	Mercury in edible tissue	5c	2006
1805_03 Upper end of segment	Mercury in edible tissue	5c	2006
1805_04 Lower end of reservoir from dam upstream to Canyon Park	Mercury in edible tissue	5c	2006

Information Provided:

SegID and Name
The unique identifier (SegID), segment name, and location of the water body. The SegID may be one of two types of numbers. The first type is a classified segment number (4 digits, e.g., 0218), as defined in Appendix A of the Texas Surface Water Quality Standards (TSWQS). The second type (five digits, e.g., 0218A) is a partially classified water body described in Appendix D of the TSWQs, or an unclassified water body, not defined in the TSWQs, though associated with a classified water body because it is in the same watershed. The segment name and description immediately follow SegID.

Area
Identifies the assessment unit (AU_ID), six or seven digits, *e.g.*, 0101A-01) and describes the location of the specific area in which one or more water quality standards are not met.

Parameter(s)
Pollutants or water quality conditions that assessment procedures indicate do not meet assigned water quality standards.

Category
In the 2008 Assessment, one of three subcategories was assigned to each impaired parameter to provide information about water quality status and management activities on that water body.
The categories are defined below:

Category 5: The water does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
Category 5a – A TMDL is underway, scheduled, or will be scheduled.
Category 5b – A review of the water quality standards for this water body will be conducted before a TMDL is scheduled.
Category 5c – Additional data and information will be collected before a TMDL is scheduled.

Year First Listed
The assessment year the pollutant or water quality condition in this water body initially did not meet water quality standards as indicated in any of these assessed (AU_IDs).

Site Description

The site is located north and northeast of the intersection of Cranes Mill Park Road and Cranes Mill Marina in the City of Canyon Lake, Comal County, Texas 78133. The property is located inside the Edwards Aquifer Contributing Zone as defined by the Texas Commission on Environmental Quality. The site is bordered on the west, north and east by Canyon Lake and south by existing subdivisions and Cranes Mill Park. The latitude is 29°53'21"N and the longitude is 098°17'34"W. JSR, Inc. (8534 Greaves Lane, Schertz, Texas 78154) will be constructing the utilities and access roadways.

The scope of the project includes:

> The construction of utilities and access roadways including erosion and sedimentation controls.

The major soil disturbing events are clearing and grubbing, rough cut grading, excavation, regrading, and final grading of the site.

GENERAL SEQUENCE FOR CONSTRUCTION ACTIVITIES	
CONSTRUCTION ACTIVITY	**DATE ACTIVITY BEGAN**
CONSTRUCTION START DATE:	
Install temporary erosion controls.	
Remove existing roadways.	
Construct new roadways and utilities.	
Complete permanent erosion controls and restoration of site vegetation (i.e. landscaping where applicable).	
Remove/dispose of temporary erosion controls.	
Complete final site clean up.	

STABILIZATION ACTIVITIES	DATE ACTIVITY BEGAN

CONSTRUCTION ACTIVITIES CEASE ON PORTION/ALL OF SITE	DATE ACTIVITY CEASED

The site area is approximately 10 acres with a disturbed area of approximately 10 acres.

The site geology is composed of:

Comfort-Rock outcrop complex, undulating soils are found on side slopes, hilltops and upland ridgetops within the Edwards Plateau Land Resource Area and occurs in mapped areas ranging in size from 25 to 1000 acres in size. This complex is comprised of 70% Comfort soils and 15% Rock outcrop. Surface Comfort soils are dark brown extremely stony clay to 6" deep that is covered with stones and cobbles as large as 4 ft. over 45 % of the surface with sub-soils that are dark reddish brown extremely stony clay to 13" deep all underlain by indurated, fractured limestone. This soil is well drained and surface run off is medium, resulting in a slight water erosion hazard.

Existing vegetation on the site is comprised of native grasses and trees.

Storm water runoff flows north, east and west. Storm water runoff will flow over land before discharging into Canyon Lake. The runoff discharges into Canyon Lake. Some runon is received from adjacent properties during typical storm events. As indicated by the map, the site is located in the Comal County MS4, Canyon Lake, Texas. No portions of the site are within the 100-year floodplain.

The pre-construction runoff coefficient calculated for the 100-year storm event is approximately 0.30 while the post-construction runoff coefficient is expected to be about

0.70 due to the use of Best Management Practices. Post-construction slopes will approximate those of pre-construction.

Paved areas of the site include roadways and concrete pads for the utilities. Disturbed pervious areas will be seeded and/or landscaped once construction is complete to facilitate infiltration and reduce erosion due to exposed soils.

Wastewater from the site will be disposed of via the Comal County Wastewater Treatment Facility.

No discharge other than that associated with typical construction activities is expected.

Potential Pollutant Sources

Potential pollution sources associated with the site include the following:

- **Soil disturbing activities** – such as clearing of vegetation, grading/excavation of the lot in preparation for construction, and landscaping. These activities typically expose soil and sediment particles to precipitation which can then move (erode) the pollutants downhill, potentially into storm water conveyances and receiving waters.
- **Equipment storage** – such as earth-moving equipment, delivery vehicles, power tools, etc. Much of this equipment contains petroleum-based fuels or lubricants, which when exposed to precipitation can discharge with the storm water runoff.
- **Paving** – asphalt paving activities during road construction can result in the discharge of hydrocarbons with storm water runoff.
- **Concrete truck washout** – runoff from the cleanouts of concrete trucks can result in sediment, debris, and excessively high pH discharge with storm water runoff.
- **Vehicle and equipment maintenance** – such as fueling, lubrication, and repair. If conducted on site, accidental spills or improper disposal of automotive fluids or petroleum products can significantly impact storm water runoff and receiving waters.
- **Material storage** – such as storage of concrete and concrete products, metal reinforcing materials such as rebar and welded wire fabric, lumber, plastic (PVC), metal pipe and fittings, rock, gravel, sand, soil, petroleum products like lubricants, fuel, oil-based paints and paint thinners, miscellaneous chemicals or products including latex paint, joint compound, adhesives, fertilizers, etc. Some materials may contain hazardous or toxic ingredients which can pollute surface waters or make source water unsafe for consumption. Other materials may contain ingredients which are non-toxic, but can still impact storm water conveyances by silting or clogging them, causing flooding, or using up needed oxygen for aquatic life to survive in the receiving waters.
- **Waste generation, storage and disposal** – such as excess fill material, soil contaminated by spilled petroleum, leftover chemicals, cement, miscellaneous trash and debris, and human wastes. All these materials can negatively impact the runoff leaving the construction site as described above.

Control of these potential pollution sources, thereby preventing contamination of storm water runoff is the goal of this plan and will be described in detail in the "Best Management Practices" section.

There are no off-site material, waste, borrow, fill, or equipment storage areas planned for this site. There are no on-site support facilities such as asphalt or concrete plants planned for this site.

Potential Pollutant Sources Onsite:

Hi Solids Polyester
- Methyl Amyl Ketone
- 2-Butoxy-Ethyl Acetate
- Normal Butyl Alcohol
- Aromatic Hydrocarbon 150
- 1-Methoxy-2-Propanol Acetate
- Xylol
- Aromatic 100 Solvent
- Diethylene Glycol N-Butyl Ether
- Toluol
- Oxo-Hexyl Acetate

Aluminum Alloys
- See attachment

Quick Dry Floor Sweep
- Hydrotreated Petroleum Distillates

Acetone

Silicone Sealant
- Silicone Polymer
- Polydimethylsiloxane
- Silica
- Ethyltriciacetoxsilane
- Acetoxysilanse with oligomers
- Titanium Dioxide
- Carbon

Adhesive-Sealant
- Dimethyl Siloxane OH Terminated
- Methyltriacetoxy Silane
- Titanium Dioxide
- Ethyltriciacetoxsilane
- Polydimethylsiloxane

Acrylic Seam Sealer
- Acrylic Resin/Toluene Solution
- Toluene
- Silicon Dioxide
- Isopropyl Alcohol

Acrylic Bedding Sealant
- Acrylic Resin/Toluene Solution
- Toluene
- Silicon Dioxide

Blue X Institutional Strength Cleaner
- 2-Butoxyethanol
- Ammonium Hydroxide

Sweep Ez
- Dupont Oil Red B Liquid

Aromatic Hydrocarbon
- Toluene

Acrylic Sealant
- Toluene

High Performance Glazing Tape Sealant
- Carbon

General Purpose Glazing Sealant
- Silicone Polymer
- Polydimethylsiloxane
- Silica
- Silane
- Oximino Silane

Transmission Fluid
- Light Paraffinic Petroleum
- Heavy Paraffinic Petroleum
- Light Napthenic Petroleum
- Metacrylic Acid

Motor Oil
- Alkenysuccinimide Dispersant
- Heavy Paraffinic Petroleum

Soluble Oil D
- Sodium Petroleum Sulfonate
- Heavy Paraffinic Petroleum

Lumber

Glass

Fiberglass Insulation

Dry-wall material

Oil and Water Based Paint

Concrete

Steel (Steel rebar)

Petroleum Based Automotive Fuel

Diesel Fuel

Formaldehyde (used in Portable Toilet facilities)

Sand

Note: also refer to on-site copies of any MSDS information.

ONSITE CONSTRUCTION MATERIALS *(please add any additional potential pollutant sources not listed on previous page)*

ONSITE WASTE MATERIALS *(please add any additional potential pollutant sources not listed on previous page)*

Non-Storm Water Discharges

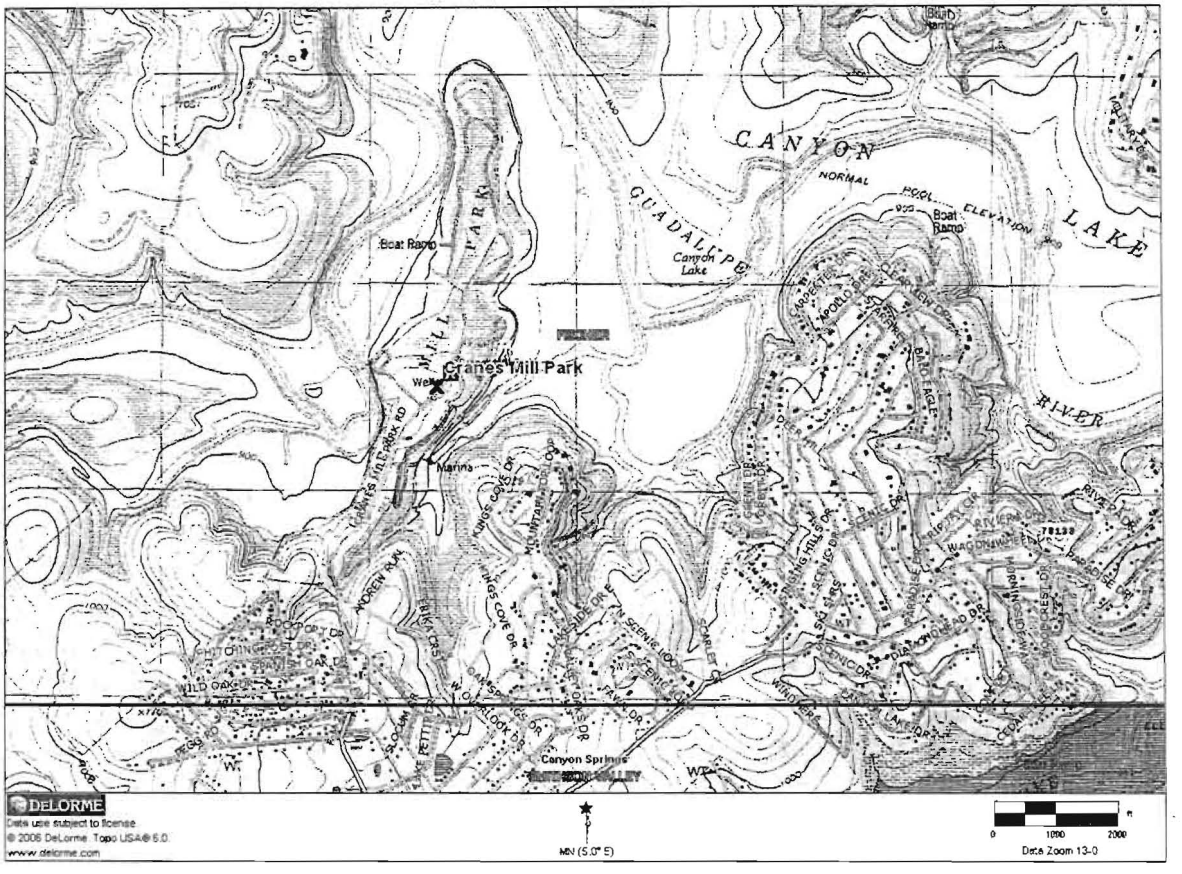
Storm water falling on the site may co-mingle with non-storm water discharges such as:

- Discharges from fire fighting activities (fire fighting activities do not include washing of trucks, run-off water from training activities, test water from fire suppression systems, and similar activities);
- Uncontaminated fire hydrant flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life), which include flushings from systems that utilize potable water, surface water, or groundwater that does not contain additional pollutants (uncontaminated fire hydrant flushings do not include systems utilizing reclaimed wastewater as a source water);
- Water from the routine external washing of vehicles, the external portion of buildings or structures, and pavement, where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials have been removed; and if local state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, or dust;
- Uncontaminated water used to control dust (watering of disturbed areas, particularly roadways);
- Potable water sources including waterline flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life);
- Uncontaminated air conditioning condensate (from air conditioned vehicles and construction trailer, if present);
- Uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents; and
- Lawn watering and similar irrigation drainage.

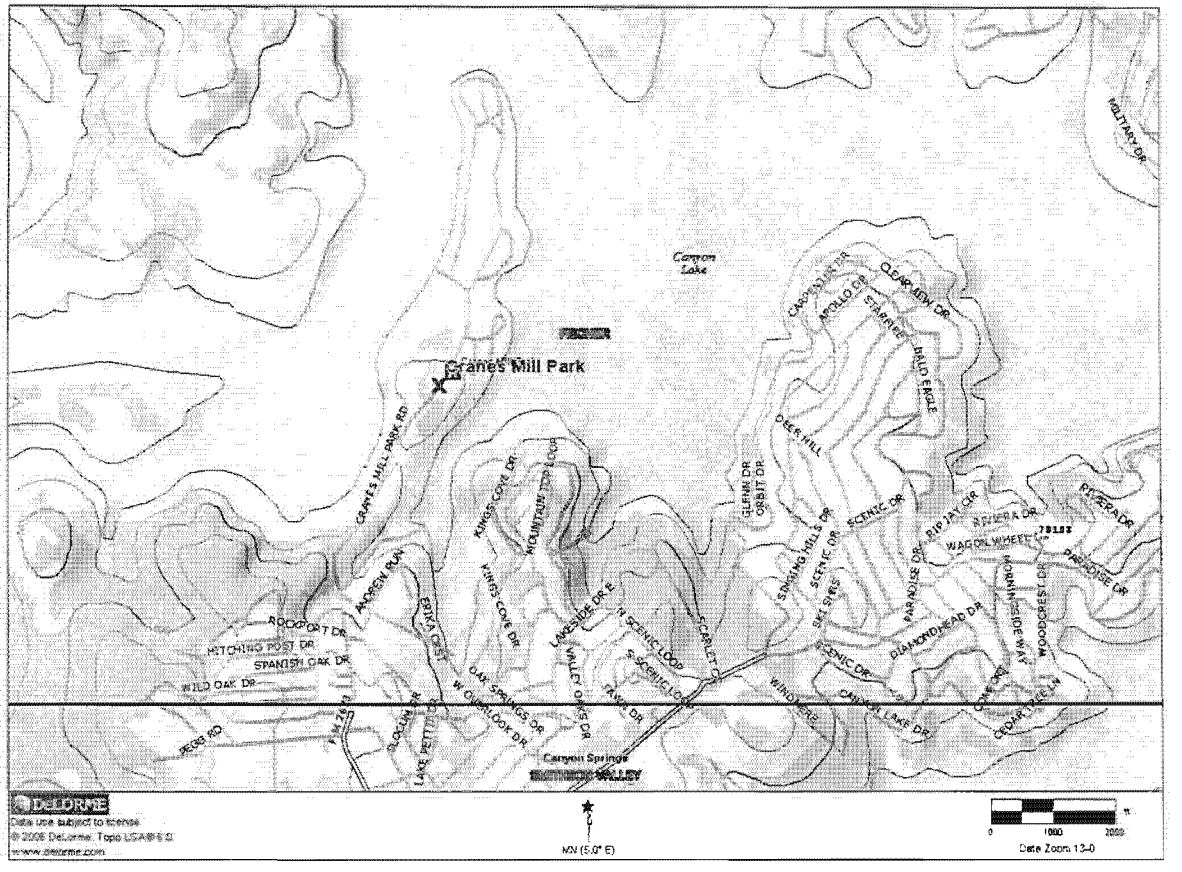
To prevent unauthorized non-storm water discharges, all such discharges will be directed to sedimentation and erosion control structures prior to discharge. Attempts will be made to minimize such discharges to prevent contact with storm water runoff.

Dewatering Details

If dewatering of site excavations or ponds becomes necessary, the following procedure will be followed. A temporary dewatering system will be constructed adjacent to the excavation, but preferably as far away from a creek/drainage way as possible to allow for storm water infiltration. These activities may include the use of pumps and/or other filtration media, such as a silt fence, "dirt bags," or other controls as necessary to help remove sediment from the discharge. The discharge will be visually checked to ensure it is clear prior to entering a creek/drainage way or storm drainage structure. If sediment is detected exiting the dewatering system, additional controls will be used in a sequence to promote additional sedimentation prior to offsite discharge.



Cranes Mill Park - Installation of Utilities and Access Roadways
Canyon Lake, Texas 78133
Fischer Quadrangle
7.5 Minute Series (Topographic Map)



Cranes Mill Park - Installation of Utilities and Access Roadways
North and northeast of the intersection of Cranes Mill Park Road and Cranes Mill Marina
Canyon Lake, Texas 78133
Local Map

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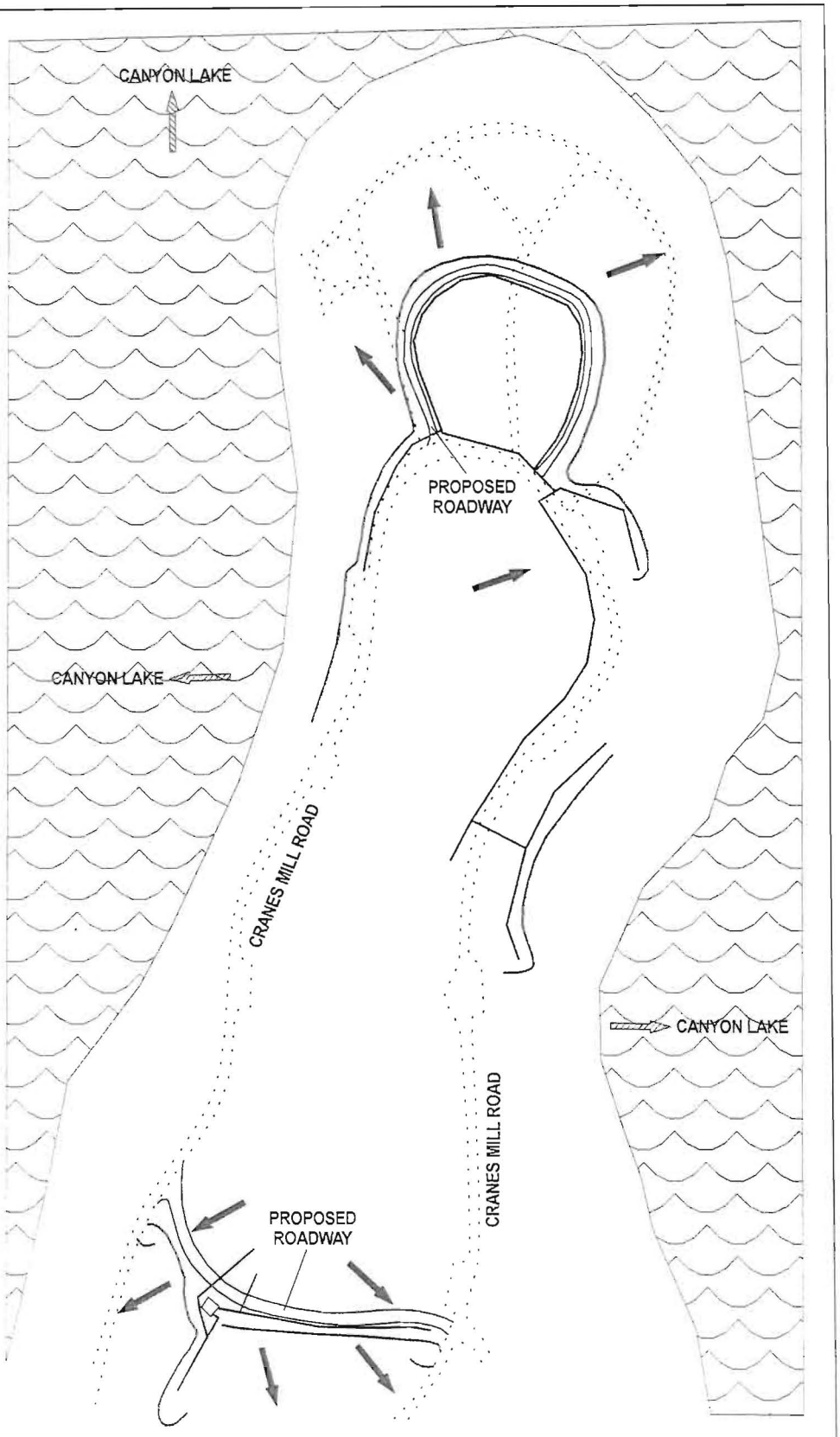
- SILT FENCE



MAPSCO PAGE NUMBER: 354
MAPSCO GRID LETTER: F1
LOCATION: NORTH AND NORTHEAST OF THE INTERSECTION OF CRANES MILL ROAD AND CRANES MILL MARINA

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ONCE CONSTRUCTION HAS BEEN COMPLETED, DISTURBED AREAS OF SOIL WILL BE STABILIZED WITH HYDROMULCH, SOD AND/OR LANDSCAPING.

FIGURE 1

SITE MAP - JSR & USACE
CRANES MILL PARK
INSTALLATION OF UTILITIES AND ACCESS ROADWAYS
CANYON LAKE, TEXAS 78133

DATE: 10/15/2010
AJS
N

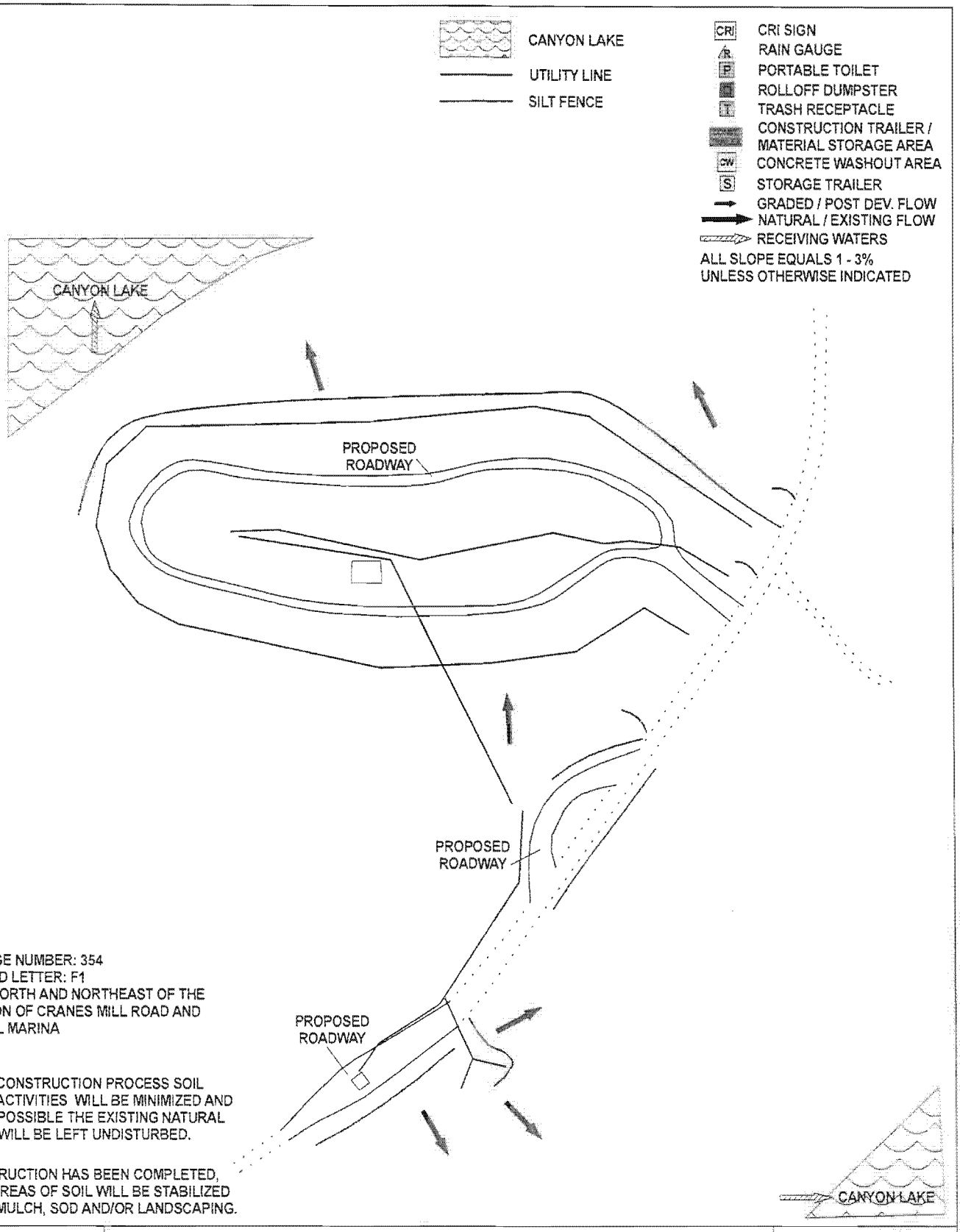

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FIGURE 2

SITE MAP - JSR & USACE
CRANES MILL PARK
INSTALLATION OF UTILITIES AND ACCESS ROADWAYS
CANYON LAKE, TEXAS 78133

DATE: 10/15/2010
AJS

N

BEST MANAGMENT PRACTICES NOTES:

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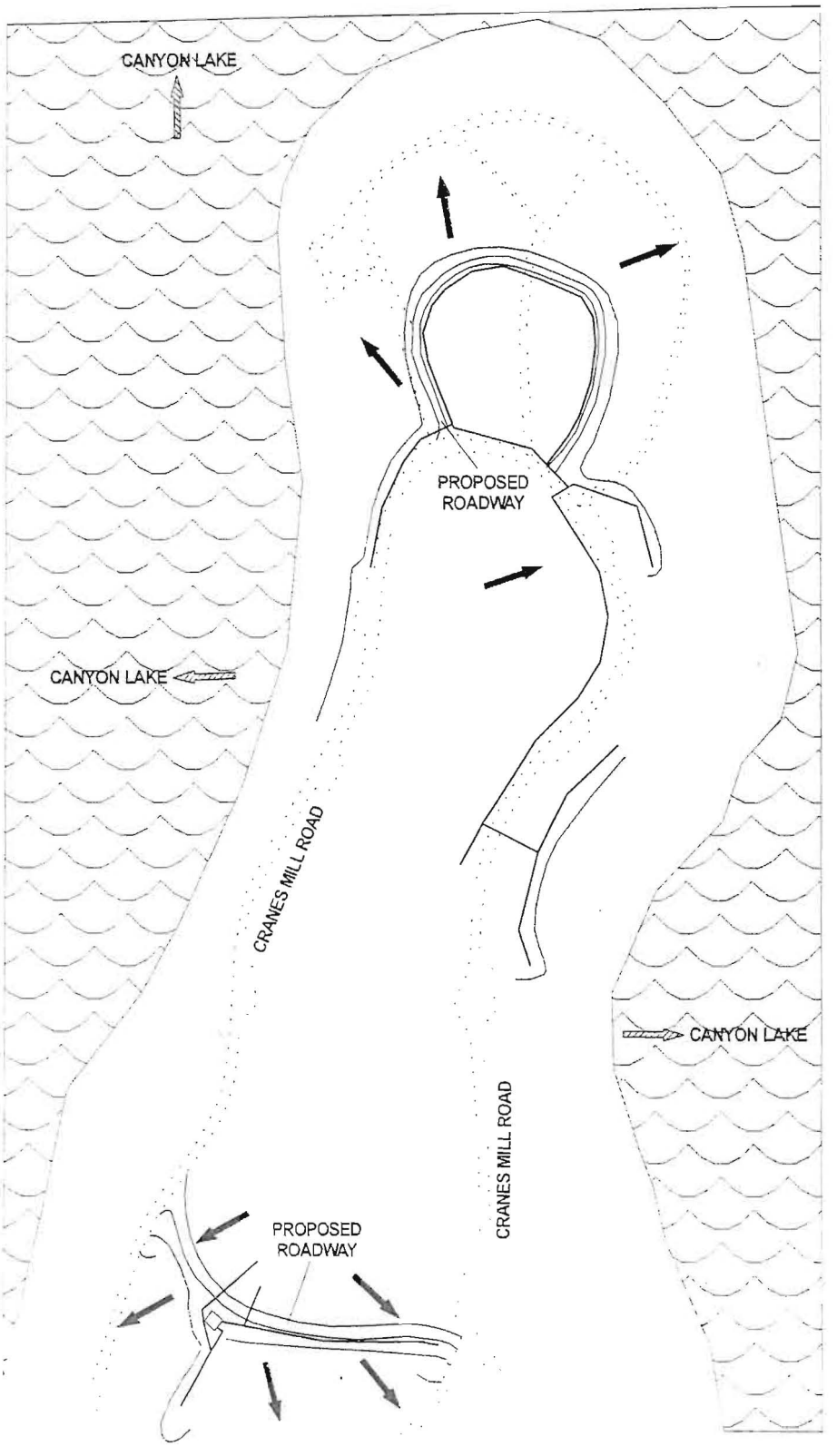

FIGURE 1

INITIAL BMP'S PRIOR TO CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
DCS
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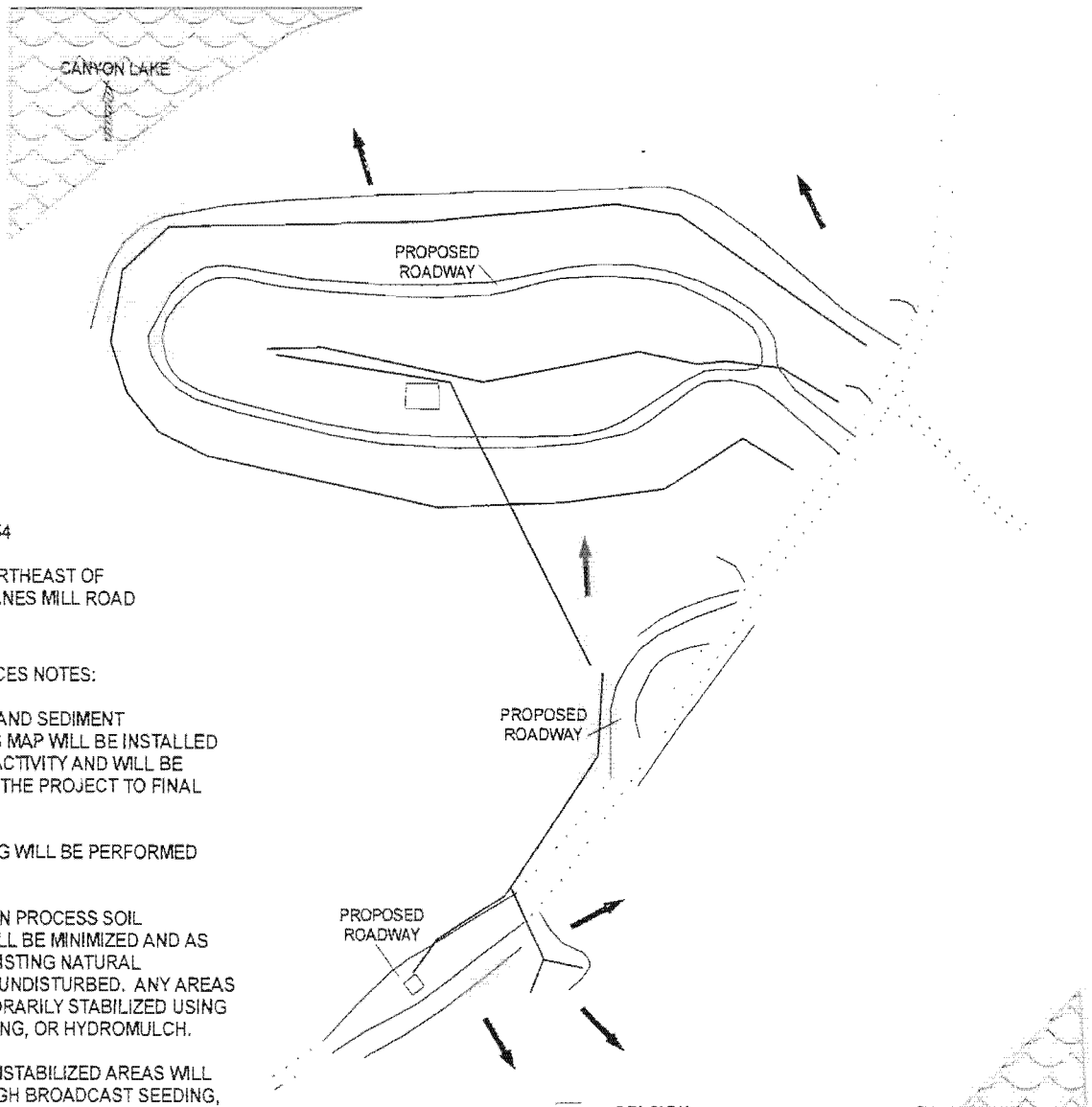

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FIGURE 2

INITIAL BMP'S PRIOR TO CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
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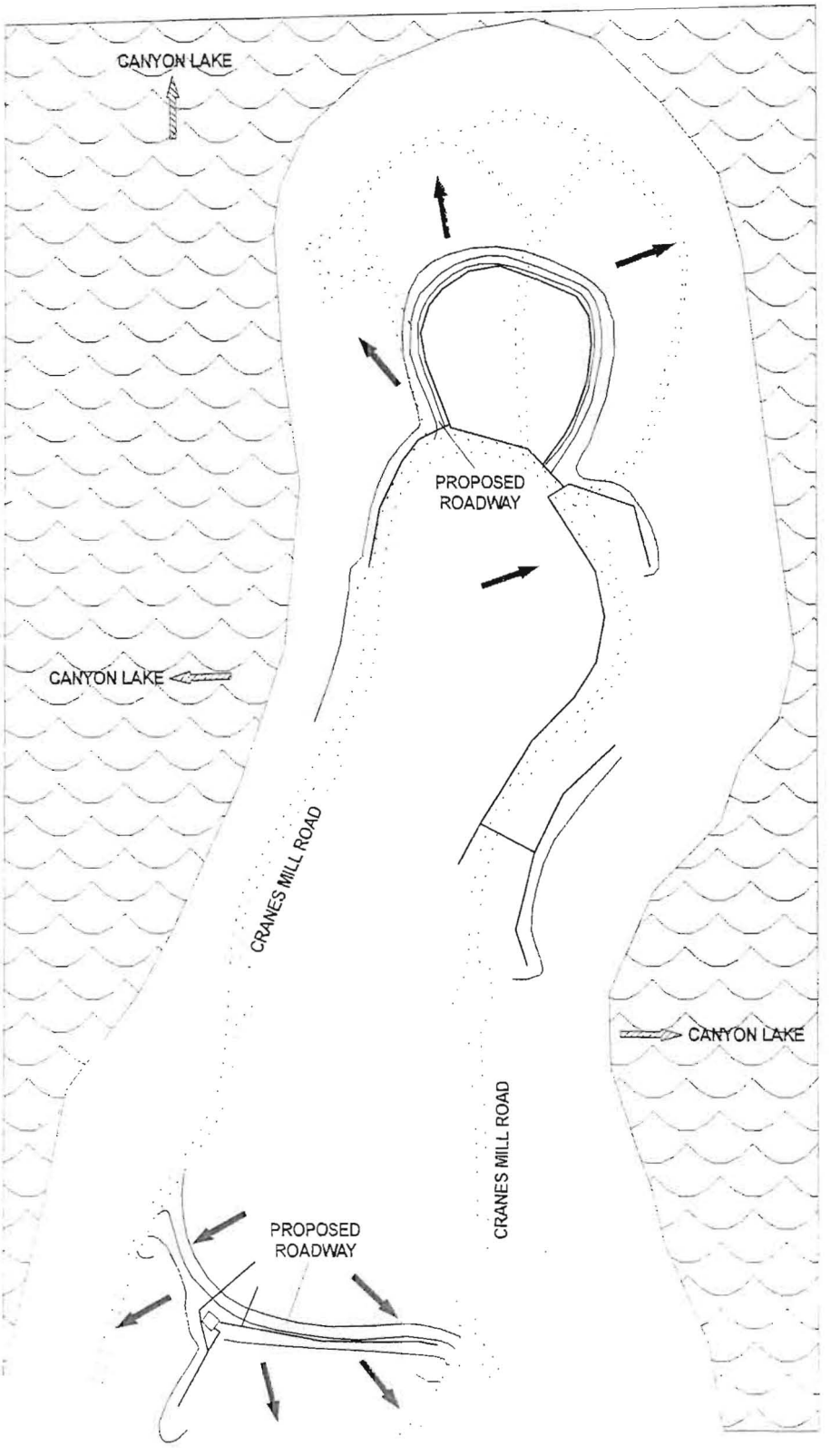

FIGURE 3

INTERIM BMP'S DURING CONSTRUCTION ACTIVITY JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
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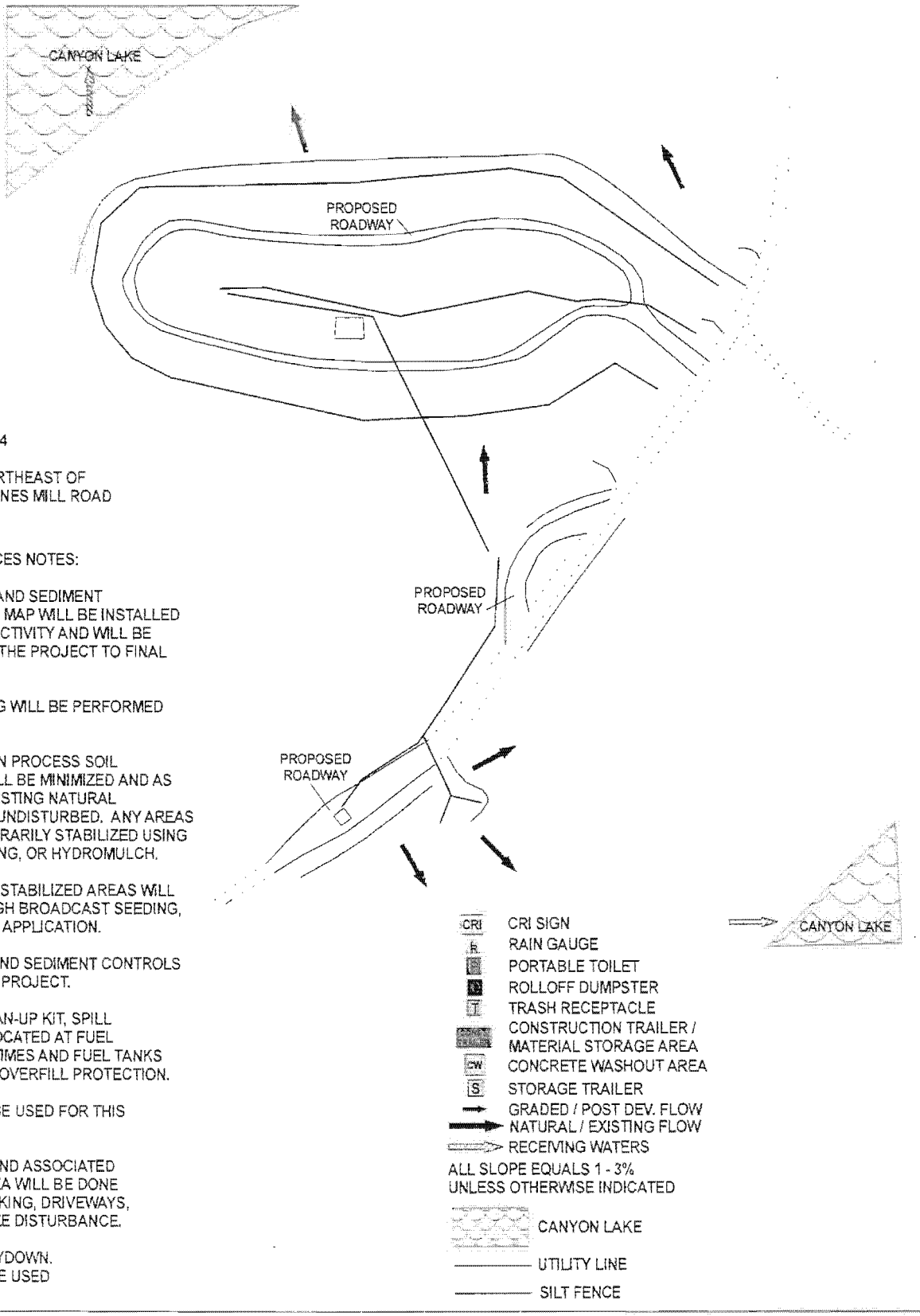

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FIGURE 4

INTERIM BMP'S DURING CONSTRUCTION ACTIVITIES JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
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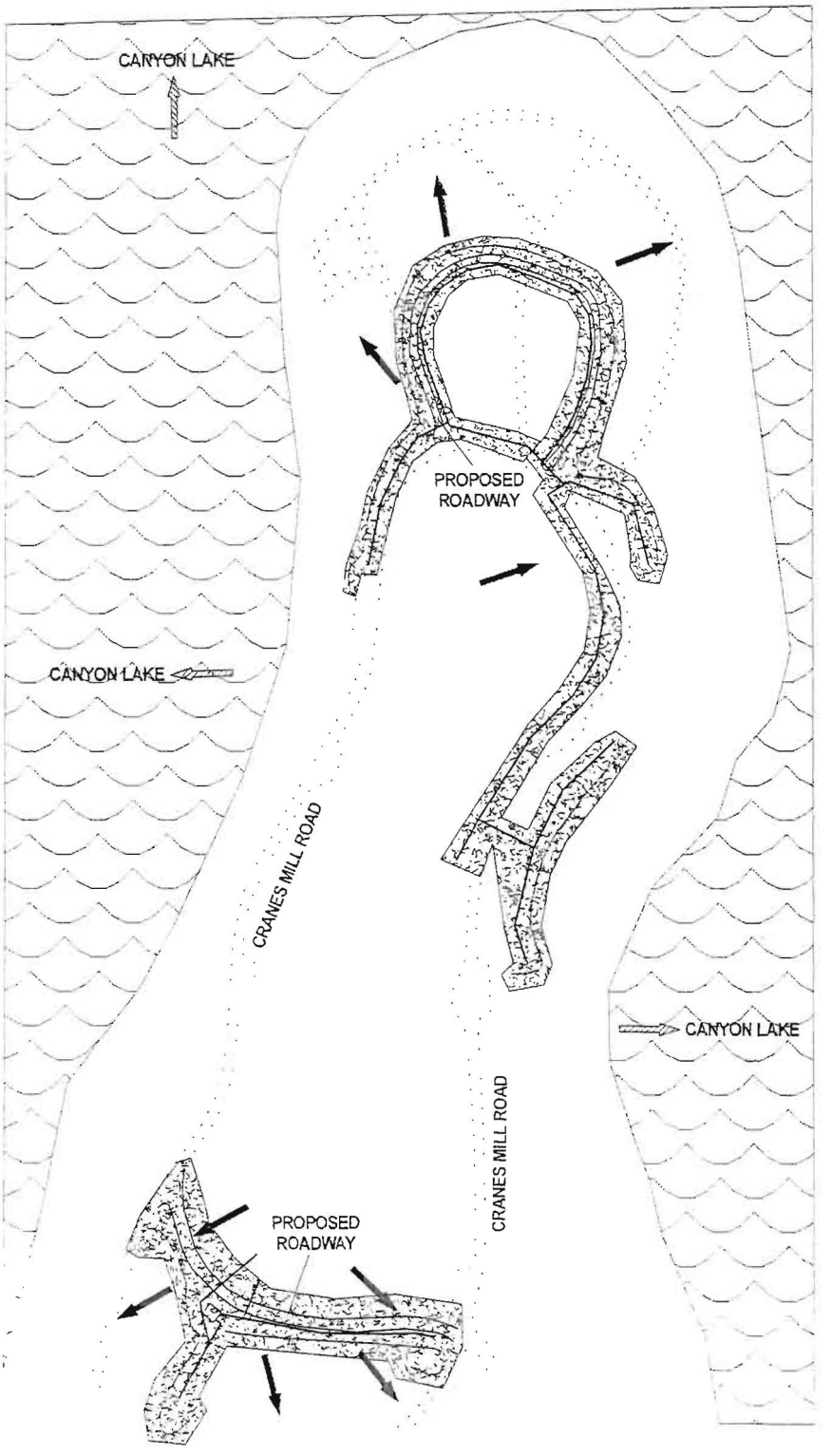

POTENTIAL AREAS OF DISTURBANCE AND TEMPORARY STABILIZATION

FIGURE 5

TEMPORARY STABILIZATION MATERIALS / LOCATIONS
JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS
CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
DCS
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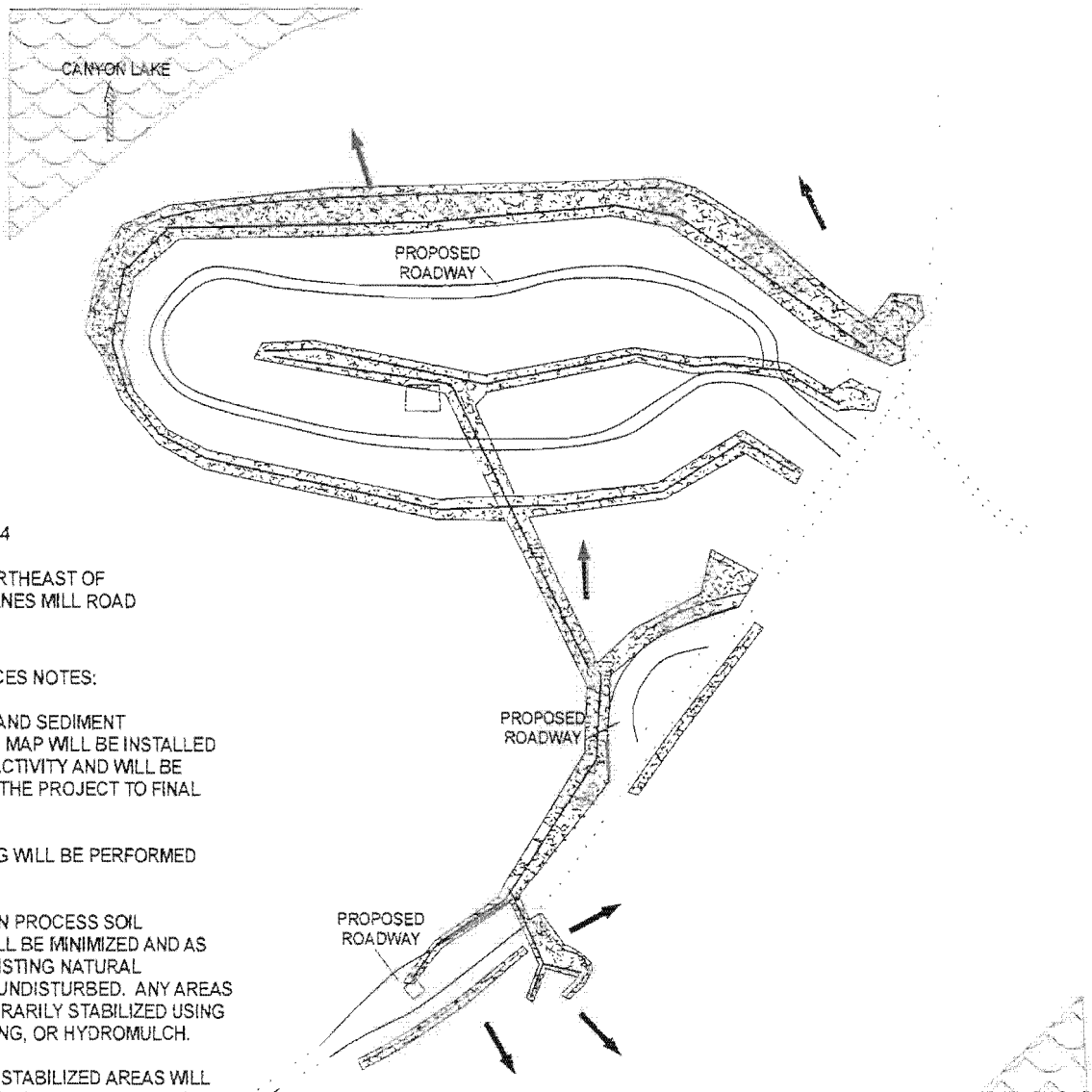

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NO OFFSITE MATERIALS LAYDOWN, STORAGE, PARKING WILL BE USED FOR THIS PROJECT.

FIGURE 6

TEMPORARY STABILIZATION METHODS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
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BEST MANAGMENT PRACTICES NOTES:

ALL TEMPORARY EROSION AND SEDIMENT CONTROLS SHOWN ON THIS MAP WILL BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITY AND WILL BE MAINTAINED THROUGHOUT THE PROJECT TO FINAL STABILIZATION.

NO CLEARING OR GRUBBING WILL BE PERFORMED AS PART OF THIS PROJECT.

DURING THE CONSTRUCTION PROCESS SOIL DISTURBING ACTIVITIES WILL BE MINIMIZED AND AS MUCH AS POSSIBLE THE EXISTING NATURAL VEGETATION WILL BE LEFT UNDISTURBED. ANY AREAS DISTURBED WILL BE TEMPORARILY STABILIZED USING MULCH, BROADCAST SEEDING, OR HYDROMULCH.

FINAL STABILIZATION OF UNSTABILIZED AREAS WILL BE ACCOMPLISHED THROUGH BROADCAST SEEDING, SODDING OR HYDROMULCH APPLICATION.

NO PERMANENT EROSION AND SEDIMENT CONTROLS WILL BE UTILIZED FOR THIS PROJECT.

AN EMERGENCY SPILL CLEAN-UP KIT, SPILL CONTAINMENT DEVICE IS LOCATED AT FUEL TRANSFER POINTS AT ALL TIMES AND FUEL TANKS OR FUELING TRUCKS HAVE OVERFILL PROTECTION.

A BATCH PLANT WILL NOT BE USED FOR THIS PROJECT.

ACCESS TO EACH TOWER AND ASSOCIATED TEMPORARY LAYDOWN AREA WILL BE DONE FROM EXISTING PAVED PARKING, DRIVEWAYS, AND WALKWAYS TO MINIMIZE DISTURBANCE.

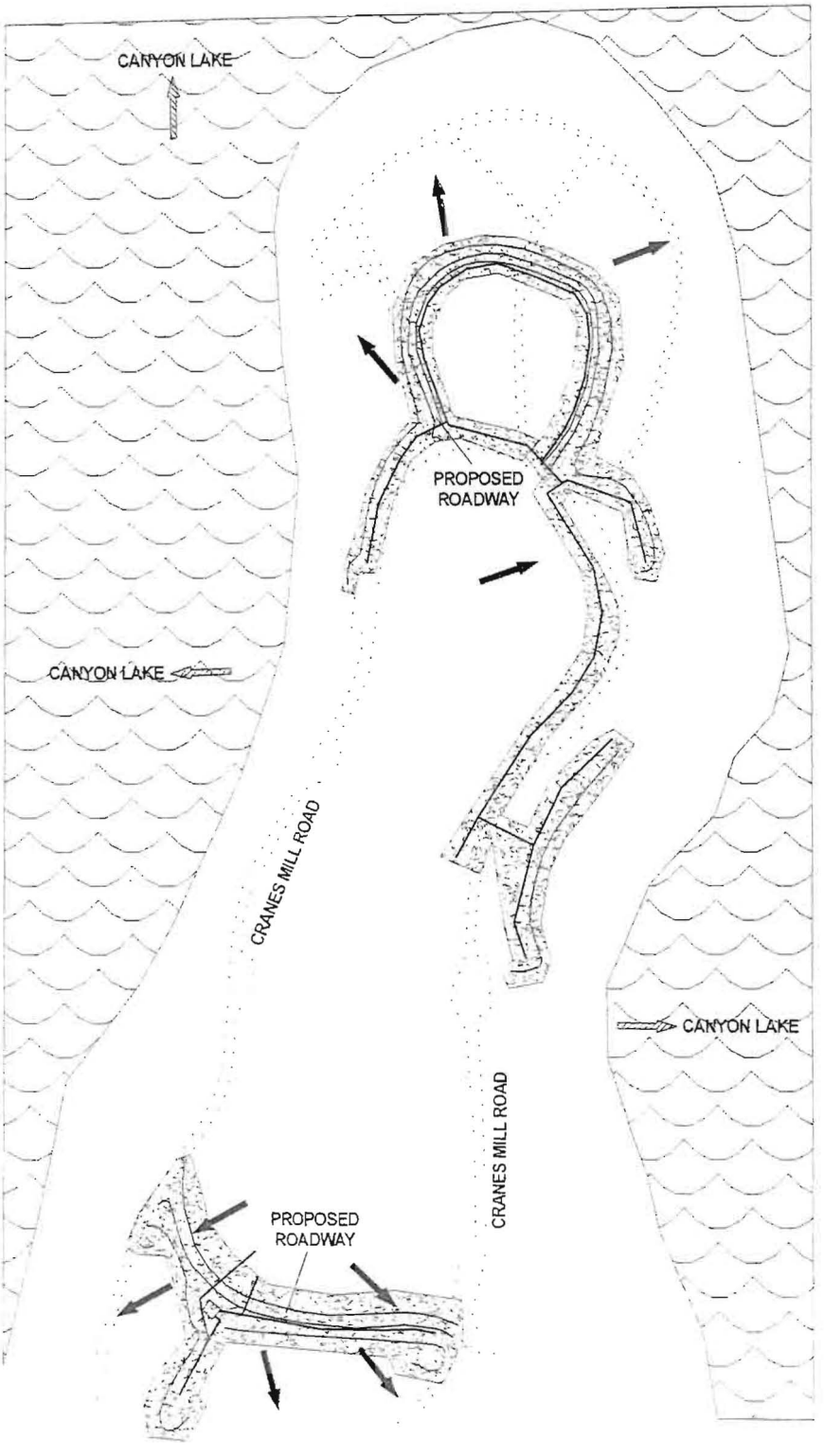
NO OFFSITE MATERIALS LAYDOWN, STORAGE, PARKING WILL BE USED FOR THIS PROJECT.

- CRI — CRI SIGN
- R — RAIN GAUGE
- P — PORTABLE TOILET
- D — ROLLOFF DUMPSTER
- T — TRASH RECEPTACLE
- CONSTR. TRAILER — CONSTRUCTION TRAILER / MATERIAL STORAGE AREA
- CW — CONCRETE WASHOUT AREA
- S — STORAGE TRAILER
- GRADED / POST DEV. FLOW
- NATURAL / EXISTING FLOW
- RECEIVING WATERS

ALL SLOPE EQUALS 1 - 3% UNLESS OTHERWISE INDICATED

- CANYON LAKE
- UTILITY LINE
- SILT FENCE

MAPSCO PAGE NUMBER: 354
MAPSCO GRID LETTER: F1
LOCATION: NORTH AND NORTHEAST OF THE INTERSECTION OF CRANES MILL ROAD AND CRANES MILL MARINA



POTENTIAL AREAS OF DISTURBANCE AND PERMANENT STABILIZATION

FIGURE 7

PERMANENT STABILIZATION MATERIALS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

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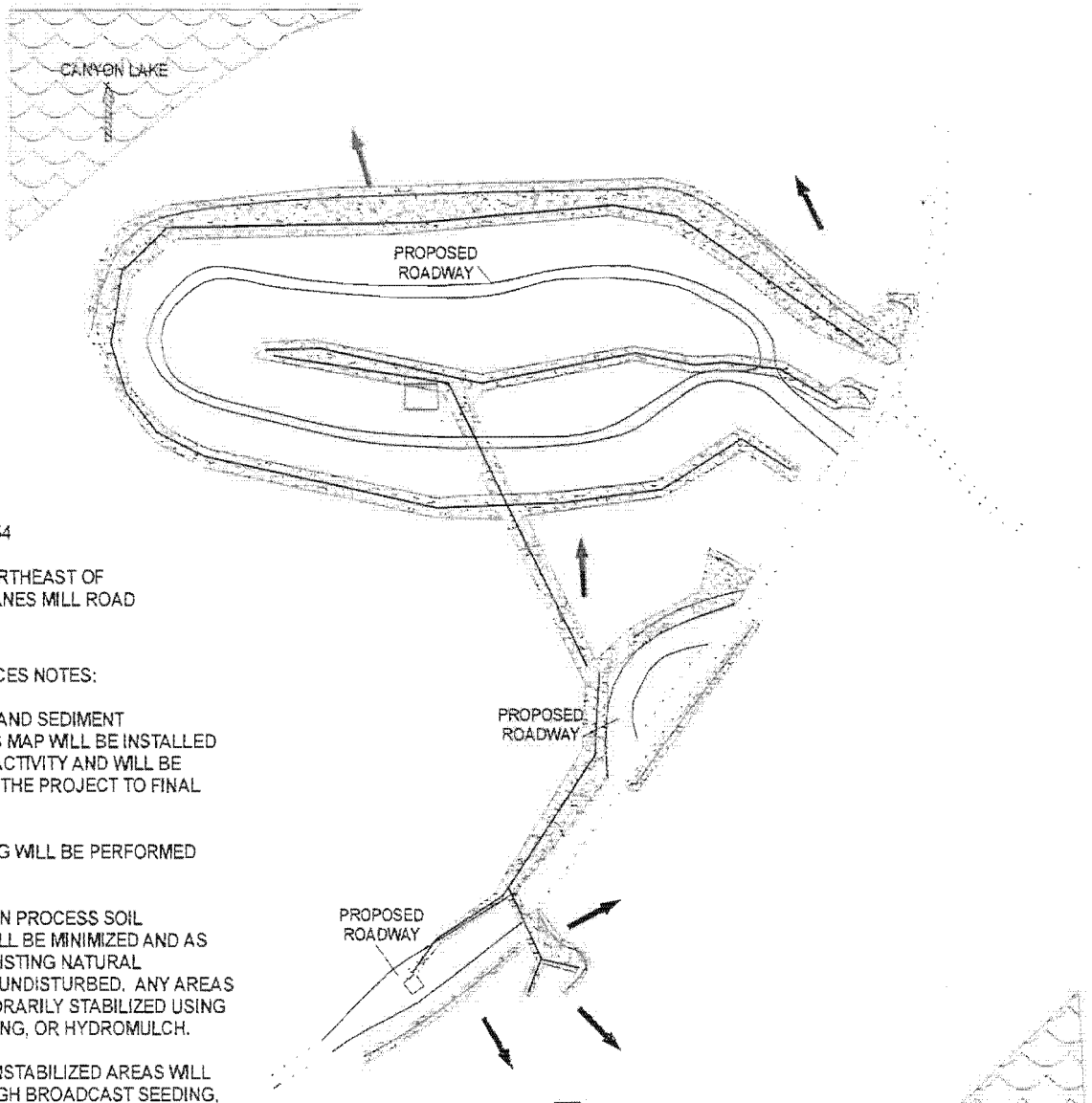

MAPSCO PAGE NUMBER: 354
MAPSCO GRID LETTER: F1
LOCATION: NORTH AND NORTHEAST OF THE INTERSECTION OF CRANES MILL ROAD AND CRANES MILL MARINA

BEST MANAGMENT PRACTICES NOTES:

ALL TEMPORARY EROSION AND SEDIMENT CONTROLS SHOWN ON THIS MAP WILL BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITY AND WILL BE MAINTAINED THROUGHOUT THE PROJECT TO FINAL STABILIZATION.

NO CLEARING OR GRUBBING WILL BE PERFORMED AS PART OF THIS PROJECT.

DURING THE CONSTRUCTION PROCESS SOIL DISTURBING ACTIVITIES WILL BE MINIMIZED AND AS MUCH AS POSSIBLE THE EXISTING NATURAL VEGETATION WILL BE LEFT UNDISTURBED. ANY AREAS DISTURBED WILL BE TEMPORARILY STABILIZED USING MULCH, BROADCAST SEEDING, OR HYDROMULCH.

FINAL STABILIZATION OF UNSTABILIZED AREAS WILL BE ACCOMPLISHED THROUGH BROADCAST SEEDING, SODDING OR HYDROMULCH APPLICATION.

NO PERMANENT EROSION AND SEDIMENT CONTROLS WILL BE UTILIZED FOR THIS PROJECT.

AN EMERGENCY SPILL CLEAN-UP KIT, SPILL CONTAINMENT DEVICE IS LOCATED AT FUEL TRANSFER POINTS AT ALL TIMES AND FUEL TANKS OR FUELING TRUCKS HAVE OVERFILL PROTECTION.

A BATCH PLANT WILL NOT BE USED FOR THIS PROJECT.

ACCESS TO EACH TOWER AND ASSOCIATED TEMPORARY LAYDOWN AREA WILL BE DONE FROM EXISTING PAVED PARKING, DRIVEWAYS, AND WALKWAYS TO MINIMIZE DISTURBANCE.

NO OFFSITE MATERIALS LAYDOWN, STORAGE, PARKING WILL BE USED FOR THIS PROJECT.

CRI CRI SIGN
R RAIN GAUGE
P PORTABLE TOILET
ROLLOFF DUMPSTER
T TRASH RECEPTACLE
CONSTRUCTION TRAILER / MATERIAL STORAGE AREA
CW CONCRETE WASHOUT AREA
S STORAGE TRAILER
GRADED / POST DEV. FLOW
NATURAL / EXISTING FLOW
RECEIVING WATERS
ALL SLOPE EQUALS 1 - 3% UNLESS OTHERWISE INDICATED
UTILITY LINE
SILT FENCE

CANYON LAKE

CANYON LAKE

POTENTIAL AREAS OF DISTURBANCE AND PERMANENT STABILIZATION

FIGURE 8

PERMANENT STABILIZATION METHODS / LOCATIONS JSR, INC. - CRANES MILL PARK INSTALLATION OF UTILITIES AND ACCESS ROADWAYS CANYON LAKE, TEXAS 78133

UPDATE: 10/18/2010
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BEST MANAGEMENT PRACTICIES

IV. Best Management Practices

Non-structural and structural control measures and stabilization practices that will be implemented to prevent or control potential pollutants in storm water discharges are summarized in the tables below. Each major activity will identify the appropriate control measure, general timing, (specific timing will be addressed in an attached construction schedule) and the responsible permittee for controlling the discharge.

The Contractor (JSR, Inc.) shall be responsible for, and retain controls over any changes to site plans, the design of erosion and sedimentation controls, and the development of a Storm Water Pollution Prevention Plan. The Contractor or its designee shall perform any additions, deletions, or changes in design of control measures. The Contractor (JSR, Inc.) shall be fully responsible for daily implementation, inspection, and maintenance of the erosion and sedimentation measures or controls. Through the identified inspection report process, the contractor shall notify the appropriate JSR, Inc. representative of any amendments to the SW3P and/or control measures.

Contact information: JSR, Inc., Jim Behl, Project Manager, office phone 210-653-7772

The Contractor shall be fully responsible for actions of Subcontractors for which they direct on site activities.

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Soil Disturbing Activities		
Areas are not to be disturbed until it is necessary for construction to proceed. Disturbed areas are to be covered and stabilized as soon as possible.	JSR, Inc.	October 2010 - October 2012
Erosion and Sediment Controls		
Erosion/sediment controls will be designed to retain sediment on site to the extent practicable with consideration for site topography, soil type, and rainfall.	JSR, Inc.	October 2010 - October 2012
Erosion/sediment controls will be designed and used to reduce the offsite transport of suspended sediments and other pollutants if dewatering activities are necessary.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Erosion and Sediment Controls (continued)		
Erosion/sediment control measures will be in place prior to commencement of construction activities including clearing and grading. Disturbed areas will be restored as soon as practicable during construction. Temporary erosion and sedimentation controls will be removed only after all disturbed areas have been restored.	JSR, Inc.	October 2010 - October 2012
Erosion/sediment controls such as silt fences, rock berms, outlet protection, and drainage channels are inspected weekly to ensure their effectiveness. Erosion control inspections are documented every 7 days (weekly) and after rainfall events in excess of 0.5" to ensure site compliance.	JSR, Inc.	October 2010 - October 2012
Erosion/sediment controls are promptly maintained (as soon as practicable after damage is discovered, and prior to the next rain event, but no later than seven days after the inspections) to ensure maximum sediment removal from storm water runoff.	JSR, Inc.	October 2010 - October 2012
If sediment escapes the site, accumulations will be removed at a frequency to minimize negative effects and prior to the next rain event, if feasible.	JSR, Inc.	October 2010 - October 2012
Sediment removed from erosion controls will be reused on site to minimize waste generation.	JSR, Inc.	October 2010 - October 2012
Sediment deposited onto public right-of-way will be regularly removed to prevent sediment discharge from off site tracking during storm events, and reused on site whenever possible to prevent excess waste generation.	JSR, Inc.	October 2010 - October 2012
Accumulated sediment will be removed when the depth reaches six inches (or 50% of the design capacity of site controls).	JSR, Inc.	October 2010 - October 2012
Dust control will be provided by water trucks in such a manner that runoff does not occur.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Erosion and Sediment Controls (continued)		
Disturbed areas including the construction storage and staging area and spoils disposal site where construction activity ceases for at least 21 days will be stabilized with seeding and mulching by the 14th day after the last disturbance.	JSR, Inc.	No temporary cessation of site construction is anticipated, but if so, October 2010 - October 2012
Mulching for temporary or final stabilization shall be accomplished by using shredded wood mulch. To avoid waste generation, trees cut down on site will be recycled into mulch for stabilization.	JSR, Inc.	October 2010 - October 2012
Seeding for temporary stabilization shall be accomplished by broadcast seeding or hydromulch application. Seeding for permanent stabilization shall be accomplished by broadcast seeding, sodding, or hydromulch application.	JSR, Inc.	October 2010 - October 2012
Irrigation for temporary or final stabilization will be achieved by sprinkling in a manner that will not erode the topsoil, but will sufficiently soak the soil to a depth of six inches. The irrigation may occur at 10-day intervals during the first two months. Rainfall occurrences of 0.5 inch or more should postpone the watering schedule for one week.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Material Storage, Handling, and Disposal		
Construction materials will be stored in the construction staging and materials storage area. An attempt will be made to store materials inside or under cover as practicable to minimize contact of storm water with potential pollutants and prevent water damage to materials.	JSR, Inc.	October 2010 - October 2012
Excess spoils will be temporarily stored away from drainage channels/creeks and ponds, preferably out of floodplains to prevent offsite discharge.	JSR, Inc.	October 2010 - October 2012
An effort will be made to store only enough products required to do the job to minimize waste generation and potential contact with storm water.	JSR, Inc.	October 2010 - October 2012
Lubricants will not routinely be stored on site, except the small amount needed for a specific process or piece of equipment.	JSR, Inc.	October 2010 - October 2012
Materials will be used according to the manufacturer's recommendation for proper use and disposal.	JSR, Inc.	October 2010 - October 2012
Chemicals will be stored in their original containers (unless they are not resealable), with the labels intact for proper identification.	JSR, Inc.	October 2010 - October 2012
Material Safety Data Sheets and original labels for products used or stored at the site will be retained as they contain important storage, handling, and disposal information.	JSR, Inc.	October 2010 - October 2012
During landscaping, fertilizers and pesticides will not be applied just before or during a storm event. Such landscape chemicals will be applied in the minimum amount recommended by the manufacturer. Fertilizers will be worked into the soil to minimize contact with storm water.	JSR, Inc.	October 2010 - October 2012
If disposal is necessary for excess product, the manufacturer's recommendations or local or state regulations for proper disposal will be followed.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Material Storage, Handling, and Disposal (continued)		
Regulated materials containment shall have containment for 110% storage capacity.	JSR, Inc.	October 2010 - October 2012
Storage of petroleum fuel or regulated materials on site requires impervious secondary containment equal to 110% of stored capacity.	JSR, Inc.	October 2010 - October 2012
Provide spill kits, secondary containment pallets, containers (open/closed drums), no smoking signs (English/Spanish), and in-use material signs.	JSR, Inc.	October 2010 - October 2012
Waste Storage, Handling, and Disposal		
Portable toilet facilities serviced by a licensed disposal company are available on the site to ensure proper disposal of wastes.	JSR, Inc.	Weekly
Non-storm water discharges such as from concrete truck wash outs, surplus concrete or drum water will be limited to the spoils area or on disturbed soils around the structures, to prevent potential discharge in storm water runoff. Upon construction completion, the spoils area and disturbed soils used for temporary waste storage will be cleaned up in accordance with applicable regulations.	JSR, Inc.	October 2010 - October 2012
Waste generation will be minimized by purchasing only the amount of material estimated as necessary for the application, and where practicable, using all of a product prior to disposal of the container.	JSR, Inc.	October 2010 - October 2012
The site will be routinely patrolled for regular trash and debris collection. Once collected, the waste will be stored as described above.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Waste Storage, Handling, and Disposal (continued)		
Waste materials will be collected and stored in metal dumpsters meeting state and local waste management requirements. When full, the dumpsters will be emptied and the trash hauled to an approved off site dump. No construction waste materials will be buried on site.	JSR, Inc.	October 2010 - October 2012
Non-hazardous, latex paint wastes (i.e. wash water) will be disposed of in accordance with applicable regulations.	JSR, Inc.	October 2010 - October 2012
Potentially hazardous and/or liquid wastes generated on site will be stored under cover, in leak proof containers to await proper disposal by licensed disposal companies.	JSR, Inc.	October 2010 - October 2012
Non-hazardous waste management minimization by recycling or ruses to maximum extent and disposal (spec 01355 paragraph 1.7.2). Items for recycling include concrete wastes, plastic, light metal, and steel.	JSR, Inc.	October 2010 - October 2012
Hyper-chlorination of new water systems per AWWA C651 generates high levels of chlorine residuals in waste water. If released to the environment without neutralization, it will have significant impact to vegetation and wild life. During disinfection of newly installed waterlines, chlorinated water to be discharged to the environment (or storm water conveyance) shall be neutralized to achieve a maximum residual chlorine concentration of 4 parts per million, in accordance with AWWA standard C651.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Spill Prevention and Response		
Spill cleanup materials will be stored on site in the material storage area, and may include: brooms, dustpans, mops, rags, gloves, goggles, sawdust or other absorbent material, plastic/metal trash containers specifically for this purpose.	JSR, Inc.	October 2010 - October 2012
Site personnel will be made aware of spill clean up procedures and location of spill cleanup materials.	JSR, Inc.	October 2010 - October 2012
Spills will be cleaned up upon discovery following the procedure outlined on Page 36.	JSR, Inc.	October 2010 - October 2012
Storage of vehicles and equipment on site will be limited to minimize potential for leaks or spills to contaminated storm water runoff.	JSR, Inc.	October 2010 - October 2012
Where possible, vehicles and equipment will be stored over an impervious surface, away from storm water conveyances, to facilitate clean up of potential leaks or spills and prevent contact with storm water.	JSR, Inc.	October 2010 - October 2012
Vehicles and equipment used on site will be monitored and maintained to prevent leaks from occurring.	JSR, Inc.	October 2010 - October 2012
Regulated materials containment shall have containment for 110% storage capacity.	JSR, Inc.	October 2010 - October 2012
Provide spill kits, secondary containment pallets, containers (open/closed drums), no smoking signs (English/Spanish), and in-use material signs.	JSR, Inc.	October 2010 - October 2012
All vehicles and construction equipment shall have routine O&M maintenance before brought on site.	JSR, Inc.	October 2010 - October 2012

Non-Structural Controls and Maintenance	Permittee Responsible	Schedule
Spill Prevention and Response (continued)		
A spill response kit shall be maintained at each fuel storage and dispensing location. Drip pans or other temporary containments shall be used during fuel transfers to prevent leaks at the most vulnerable locations.	JSR, Inc.	October 2010 - October 2012
Place drip pans under all vehicles to contain minor spills.	JSR, Inc.	October 2010 - October 2012

BMP Maintenance Log for Sediment Removal

Date Maintained	BMP Maintained (example - silt fence, rock berm, creek, etc)	Location of BMP (example - at the south end of the pond, etc)	Approximate amount of sediment removed (example - ~3 yds)	Location of removed sediment (example – spoils area)

Structural Controls

Structural controls are used to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. The following is a list of possible structural control tools available for preventing or minimizing erosion and sedimentation.

Silt fences – are made of filter fabric supported by metal or wood posts (steel T-posts and wire backing are required in certain jurisdictions) for temporary erosion control. The bottom edge of the silt fence is anchored by "sewing in" the filter fabric. "Sewing in" is accomplished by trenching, placing the bottom 6" to 12" of filter fabric in the trench and backfilling. Used to prevent silt from entering drainage ways and receiving waters, silt fences are recommended for use only in low volume storm water flow applications. Silt fences must be frequently inspected and maintained to operate efficiently.

Stabilized construction entrance – is typically composed of large dump rock placed on the disturbed soil at the entrance/exit of the construction site. A 50 linear foot rock entrance is standard at most sites. The purpose of the entrance is to trap sediment usually attached to the wheels of the vehicle, and prevent it from being tracked off site onto paved surfaces. Depending on the amount of use, additional dump rock may need to be added to the stabilized construction entrance if it becomes full of sediment.

Earth dikes – are ridges constructed from compacted soil and stone and vegetation. Dikes are used for storm water diversion, typically around disturbed areas to sedimentation basins or stabilized areas to reduce erosion.

Drainage swales (drainage channels) – are channels lined with vegetation, riprap, concrete, etc. Drainage swales are used to channel usually a large volume of runoff without causing erosion. The use of drainage swales is typically restricted to relatively flat slopes.

Sediment traps – are essentially basins or low areas to collect and hold storm water. Most sediment traps have an outlet or spillway designed to slow the flow of runoff out of the basin. Sediment traps hold storm water long enough to allow most of the sediment to settle out. Such traps are effective only if they are frequently inspected and maintained to remove the accumulated sediment.

Check dams (rock berms) – are small dams placed across a drainage ditch or storm water conveyance to slow the flow of the storm water. This results in reduced erosion in the conveyance and allows sediments to settle out. Check dams may cause turbulence, which can erode the banks of the stream or ditch and can reduce the capacity of the drainage channel.

Subsurface drains – are made of perforated pipe placed below the ground surface to drain saturated soils. As saturated soils can erode by sliding down a slope; subsurface drainage can prevent erosion. Subsurface drains cannot be installed in areas where heavy vehicles may cross and crush them, and may be damaged by the growth of tree roots.

Pipe slope drains – carry runoff from the top to the bottom of a slope which is disturbed and at significant risk for erosion. Pipe slope drains usually discharge into stabilized areas or a sediment trap. These drains require maintenance to ensure they do not clog and cause flooding.

Storm drain inlet protection – is a sediment-trapping filter placed around the inlet or drain. This control not only prevents sediment from entering the storm drainage structure, but also keeps it and the downstream conveyances from silting-in. Inlet protection can be composed of filter fabric, sod, or similar filtering media. Inlet protection is recommended only for small drainage areas (less than one acre) with low storm water flows with small velocities. As with other filtering media, inlet protection must be frequently inspected and maintained to operate efficiently.

Outlet protection – is the use of rock, concrete, riprap, or similar structures at storm water outlets for sediment basins or ponds. Outlet protection slows the velocity of storm water flow and reduces erosion at the outlet and potentially reduces downstream erosion. Some outlet protection requires frequent maintenance and may be difficult to maintain without removing/replacing the rock or similar protective structure.

Level spreader – is a device which spreads storm water runoff out uniformly over the ground surface as sheet flow. Level spreaders are used to prevent concentrated, channelized storm water flows, which in turn prevents erosion and facilitates infiltration of the storm water into the ground.

Reinforced soil retaining system – uses structures such as a retaining wall to hold soil in place. Such retaining systems can be used both for safety and water quality benefits. Soil retaining systems are used where vegetative stabilization is not practical due to steep slope. Reinforced soil retaining systems usually require design by a professional engineer.

Gabions – are wire cages filled with rock and are typically used for stream bank stabilization. Gabions are used where vegetative stabilization is not effective and the potential for heavy erosion exists. Gabions can be expensive to install due to the design and cost of materials.

Temporary basins – are settling ponds with a dewatering outlet to capture and store sediment removed from storm water runoff from construction sites. The dewatering outlet is usually composed of a riser and a pipe with a spillway or gravel outlet. The outlet is designed to slow the flow of runoff and provides for some filtration to remove sediment. These basins are typically required for areas greater than 10 acres, and should be designed to store the volume of storm water runoff estimated from a 2-year, 24-hour storm event. Consequently basins require larger land area than other controls. Temporary basins are effective only if they are frequently inspected and maintained to remove the accumulated sediment.

For sites that have 10 or more acres disturbed at one time, if a sedimentation basin is not feasible, then the permittee shall provide equivalent control measures until final stabilization of the site. In determining whether installing a sediment basin is feasible, the permittee may consider factors such as site soils, slope, available area, public safety, precipitation patterns, site geometry, site vegetation, infiltration capacity, geotechnical factors, depth to groundwater, and other similar considerations. The permittee shall document the reason that the sediment basin(s) are not feasible, and shall utilize equivalent control measures, which may include a series of smaller sediment basins.

Permanent basins – are a permanent version of the temporary basins above, and are typically constructed with long-term maintenance considerations such as ease of entry into the pond to remove accumulated sediment.

Structural Practices	Schedule of Implementation	Location	Reason
Silt fences	Prior to and throughout site development process	At various locations throughout the site	Silt fence will be constructed at the downstream edge of disturbed areas where there will be shallow sheet flow to slow the flow of storm water runoff and promote sediment deposition.
Stabilized construction entrance	N/A	N/A	A stabilized construction entrance will not be used as streets are paved.
Earth dikes	N/A	N/A	Earthen dikes (diversion berms) will not be used on site due to the relatively large site size making diversion of storm water impractical.
Drainage swales (Drainage channels)	Prior to and throughout site development process	At various naturally vegetated areas throughout the site	Existing grassy drainage easements/channels will be used to convey storm water runoff into the storm sewer system or offsite thereby slowing the flow of storm water runoff and promoting sediment deposition.
Sediment traps	N/A	N/A	Sediment traps will not be used due to the considerable maintenance necessary to remove accumulated sediment and prevent street flooding both during and after construction.

Structural Practices	Schedule of Implementation	Location	Reason
Check dams (Rock berms)	N/A	N/A	Rock berms will not be used due to the use of alternative storm water treatment devices.
Subsurface drains	N/A	N/A	Subsurface drains will not be used as saturated soils do not exist on the site.
Pipe slope drains	N/A	N/A	Pipe slope drains will not be used due to the use of alternative controls and lack of significant slope within the limits of construction.
Storm drain inlet protection	N/A	N/A	Inlet protection will not be used due to the use of alternative storm water treatment devices.
Outlet protection	Prior to and throughout site development	At the storm sewer discharge locations from the site	Outlet protection consisting of concrete headwalls and pads will be used to prevent erosion around the storm water outfalls.
Level spreaders	N/A	N/A	Level spreaders will not be used due to the use of alternative storm water treatment devices.

Structural Practices	**Schedule of Implementation**	**Location**	**Reason**
Reinforced soil retaining system	N/A	N/A	Reinforced soil retaining walls will not be used due to the lack of significant slope within the limits of construction.
Gabions	N/A	N/A	Gabions will not be used as alternative controls will be used instead.
Temporary basins	N/A	N/A	No temporary basins were required for the site due to the proposed site conditions and controls.
Permanent basins	N/A	N/A	No permanent basins were required for the site due to the proposed site conditions and controls.

Post Construction Structural Controls

Measures that will be installed during construction process to control pollutants in storm water discharges that will occur after construction operations have been completed.

Storm Water Management Measures	Schedule of Implementation	Location	Reason
Storm water detention structures	N/A	N/A	No permanent basins were required for the site due to the proposed site conditions and controls.
Storm water retention structures	N/A	N/A	A retention pond will not be used on site due to the large amount of land area necessary to retain runoff from the site.
Flow attenuation (by use of vegetated swales and natural depressions)	Prior to and throughout site development process	At various naturally vegetated areas throughout the site	Existing grassy drainage easements/channels will be used to convey storm water runoff into the storm sewer system or offsite thereby slowing the flow of storm water runoff and promoting sediment deposition.
Infiltration of runoff on site	During site development	Various vegetated areas throughout the site	Existing grassy drainage easements and proposed grassy channels will be used to facilitate storm water infiltration and minimize runoff.
Velocity dissipation devices	N/A	N/A	No specific velocity dissipating devices will be used on site after construction is complete due to the use of alternative storm water treatment.
Sequential systems	During site development	Various locations throughout the site	Storm sewers are followed by grassy drainage channels and outlet protection to facilitate storm water treatment prior to offsite discharge.

Stabilization Practices

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

Permanent vegetation – reduces erosion by holding soil particles in place, slowing the velocity of storm water runoff, promoting infiltration, filtering sediment out of storm water runoff, and provides aesthetic benefits. Planting or seeding is particularly effective in areas where the soil requires stabilization due to its structure, texture, or steep slope. Permanent vegetation types include trees, shrubs, and grasses.

Temporary vegetation – produces similar effects as permanent vegetation, but will be re-disturbed before construction is complete. Temporary vegetation is typically accomplished using rapidly growing grasses.

Mulching – is the installation of a substance such as chipped wood to protect the unstable soil particles from the erosive force of storm water runoff by slowing the velocity, filtering sediment, and promoting infiltration. Mulch also has the added benefit of reducing soil water loss, which is especially valuable during the hot, dry, Texas summers. Depending on the thickness of the application, and size of the mulch pieces, mulching can be used even on steep slopes to prevent erosion.

Geotextiles – are also known as filter fabrics or matting. Geotextiles are porous fabrics which allow storm water to pass through, but block the passage of most soil particles. Geotextiles such as matting can be used alone on newly seeded slopes to prevent seed and topsoil loss, or next to riprap to prevent soil from washing out underneath.

Sod stabilization – is the use of grass sod strips or squares placed on a disturbed surface to provide immediate protection of soil from the force of storm water runoff. Sodding is most effective in areas where construction is complete for the grass cover to become established. Sod requires maintenance such as watering or the application of topsoil where the soil is inadequate.

Vegetative buffer strips – are strips of land where vegetation is typically left undisturbed, but it can also be newly planted. Buffer strips or zones slow the velocity of storm water runoff, filter sediment out of the runoff, promote infiltration, and provide aesthetic benefits. Buffer zones are most effective on steep, unstable slopes, or in floodplains, and along waterways.

Protection of trees – is required by many regulatory agencies. Only certain sizes of trees are required to be protected in certain jurisdictions. However, even if not mandated by a regulation, tree protection is an important and cost-effective erosion control as described in *Preservation of mature vegetation.*

Preservation of mature vegetation – provides for natural buffer zones and improves storm water quality by minimizing erosion (see permanent vegetation and vegetative buffer strips above) and providing aesthetic benefits. Mature vegetation can handle heavier storm events than newly planted areas because they do not require time to become established. This stabilization practice should be planned before site construction. Areas to be preserved should be clearly marked and possibly even barricaded to prevent damage during construction.

Interim Stabilization Practices	Schedule of Implementation	Location	Reason
Temporary vegetation	N/A	N/A	Vegetation growth in relatively undisturbed areas such as areas outside the limits of construction will not be discouraged. However, installation of temporary vegetation is not feasible for the same reasons permanent vegetation will not be installed as an interim stabilization practice.
Mulching	N/A	N/A	Mulching will not be used as an interim practice due to the repeated disturbance of soil on site.
Geotextiles	N/A	N/A	Geotextiles (i.e. matting) will not be used as an interim practice due to the repeated disturbance of soil on site.
Sod stabilization	N/A	N/A	Sod stabilization will not be used as an interim practice due to repeated disturbance of the site.
Vegetative buffer strips	N/A	N/A	No interim vegetative buffer strips are planned for this site.
Protection of trees	N/A	N/A	No interim tree protection will be necessary for this site.
Preservation of mature vegetation	N/A	N/A	As little, if any, desirable mature vegetation exists on site; no preservation of mature vegetation is expected.

Permanent Stabilization Practices	Schedule of Implementation	Location	Reason
Permanent vegetation – such as trees, shrubs, and grasses	During site landscaping	At various landscaped areas throughout the site	Permanent vegetation will be installed to prevent erosion primarily for aesthetic reasons. Secondary considerations were infiltration, and improvement of storm water quality.
Mulching	During site landscaping	At various landscaped areas throughout the site	Mulching will be used to reduce erosion and soil water loss, especially in planted areas until vegetation becomes well established.
Geotextiles	N/A	N/A	Geotextile matting will not be used on site as stabilization will be achieved by other methods such as hydromulching or sod stabilization.
Sod stabilization	During site landscaping	Vegetated areas	Hydromulching or sod stabilization will be used to quickly establish vegetative cover to prevent erosion.
Vegetative buffer strips	N/A	N/A	No permanent vegetative buffer strips are planned for this site.
Protection of trees	N/A	N/A	No permanent tree protection will be necessary for this site.
Preservation of mature vegetation	N/A	N/A	As little, if any, desirable mature vegetation exists on site; no preservation of mature vegetation is expected.

FALL 2005 MCH

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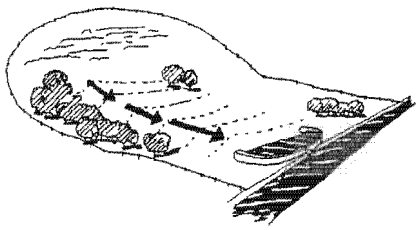


Figure I-6 Retention of Eroded Sediment on Site

I.3 Temporary Erosion Control BMPs

Temporary erosion controls should be considered the first line of defense for prevention of water pollution during construction activities. It is much simpler to maintain the soil cover than to trap the sediment once it has been mobilized. In addition effective erosion prevention can result in cost savings, since repair of erosion damage can be minimized.

The primary goal of erosion control is to divert runoff away from unstable areas or to provide a stable surface that will resist the effects of rain and runoff. The principle measures for diverting runoff include perimeter swales and dikes, and slope drains. These measures can direct flow around the active construction area or transport stormwater runoff across unstable areas.

The flow in swales, dikes, and storm drain systems should be discharged in such a way that erosion is minimized. Therefore, outlet stabilization and level spreaders should be implemented to reduce the effects of concentrated flow.

Existing trees and vegetation should be protected to help maintain a stable ground surface and prevent loss of valuable topsoil. Where temporary vegetation is used to prevent erosion, blankets, matting and mulches can stabilize the area until the vegetation is established.

The following sections describe some of the common erosion controls. The types and application of the controls are summarized in Table I-1.

Table I-1 Summary of Temporary Erosion Control Practices

Practice	Area	Application	Notes
Interceptor Swale	< 5 ac	Used as a perimeter control or to shorten slope	Maximum flow velocity ft/s unless stabilized
Diversion Dike	<10 ac	Used to route runoff away from disturbed areas	
Pipe Slope Drain	<5 ac	Transport runoff down steep, erodible slopes	
Polyacrylamide (PAM)	NA	Erosion control	
Outlet Stabilization	NA	Prevent erosion at outlet of channel or conduit	
Level Spreader	Based on flow	Outlet device for dikes and diversions	Slope <10% and stable, flowrate <20 cfs
Subsurface Drain	NA	Prevent soils from becoming saturated and prevent seeps	
Temporary Vegetation	NA	Temporary stabilization of disturbed areas	One of the most effective measures, highly recommended
Blankets/Matting	NA	Used in channels and on steep slopes	Slope <15%
Hydraulic Mulch	NA	Stabilization of newly seeded areas	Slope <15%
Sod	NA	Immediate stabilization in channels, around inlets, or for aesthetics	
Dust Control	NA	In areas subject to surface and air movement of dust where on- or off-site damage may occur	

I.3.1 Interceptor Swale

Interceptor swales are used to shorten the length of exposed slope by intercepting runoff and can also serve as perimeter swales preventing off-site runoff from entering the disturbed area or prevent sediment-laden runoff from leaving the construction site or disturbed area. They may have a vshape or be trapezoidal with a flat bottom and side slopes of 3:1 or flatter. The outflow from a swale should be directed to a stabilized outlet or sediment-trapping device. The swales should remain in place until the disturbed area is permanently stabilized. A schematic of an interceptor swale is shown in Figure I-7.

Materials:

(1) Stone stabilization should be used when grades exceed 2% or velocities exceed 6 feet per second and should consist of a layer of crushed stone three inches thick, riprap or high velocity erosion control mats.

(2) Stabilization should extend across the bottom of the swale and up both sides of the channel to a minimum height of three inches above the design water surface elevation based on a 2-year, 24-hour storm.

Installation:

(3) An interceptor swale should be installed across exposed slopes during construction and should intercept no more than 5 acres of runoff.

(4) All earth removed and not needed in construction should be disposed of in an approved spoils site so that it will not interfere with the functioning of the swale or contribute to siltation in other areas of the site.

(5) All trees, brush, stumps, obstructions and other material should be removed and disposed of so as not to interfere with the proper functioning of the swale.

(6) Swales should have a maximum depth of 1.5 feet with side slopes of 2:1 or flatter. Swales should have positive drainage for its entire length to an outlet.

(7) When the slope exceeds 2 percent, or velocities exceed 6 feet per second (regardless of slope), stabilization is required. Stabilization should be crushed stone placed in a layer of at least 3 inches thick or may be high velocity erosion control matting. Check dams are also recommended to reduce velocities in the swales possibly reducing the amount of stabilization necessary.

(8) Minimum compaction for the swale should be 90% standard proctor density.

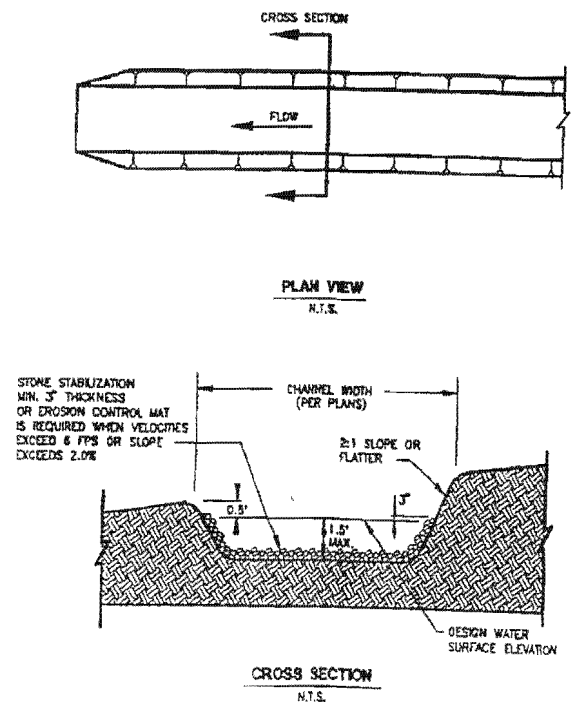


Figure I-7 Schematic Diagram of an Interceptor Swale

Inspection and Maintenance Guidelines:

(1) Interceptor swales should be inspected weekly and after each rain event to locate and repair any damage to the channel or clear debris or other obstructions so as not to diminish flow capacity.

(2) Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization should be repaired as soon as practical.

1.3.2 Diversion Dikes

A temporary diversion dike is a barrier created by the placement of an earthen embankment to reroute the flow of runoff to an erosion control device or away from an open, easily erodible area. A diversion dike intercepts runoff from small upland areas and diverts it away from exposed slopes to a stabilized outlet, such as a rock berm, sandbag berm, or stone outlet structure. These controls can be used on the perimeter of the site to prevent runoff from entering the construction area. Dikes are generally used for the duration of construction to intercept and reroute runoff from disturbed areas to prevent excessive erosion until permanent drainage features are installed and/or slopes are stabilized. A schematic of a diversion dike is shown in Figure 1-8.

Materials:

(1) Stone stabilization (required for velocities in excess of 6 fps) should consist of riprap placed in a layer at least 3 inches thick and should extend a minimum height of 3 inches above the design water surface up the existing slope and the upstream face of the dike. Stabilization riprap should conform to the following specifications

Channel Grade	Riprap Stabilization
0.5 – 1%	4 inch rock
1.1 – 2%	6 inch rock
2.1 – 4 %	8 inch rock
4.1 – 5%	8 – 12 inch riprap

(2) Geotextile fabric should be a non-woven polypropylene fabric designed specifically for use as a soil filtration media with an approximate weight of 6 oz./yd^2, a Mullen burst rating of 140 psi, and having an equivalent opening size (EOS) greater than a #50 sieve.

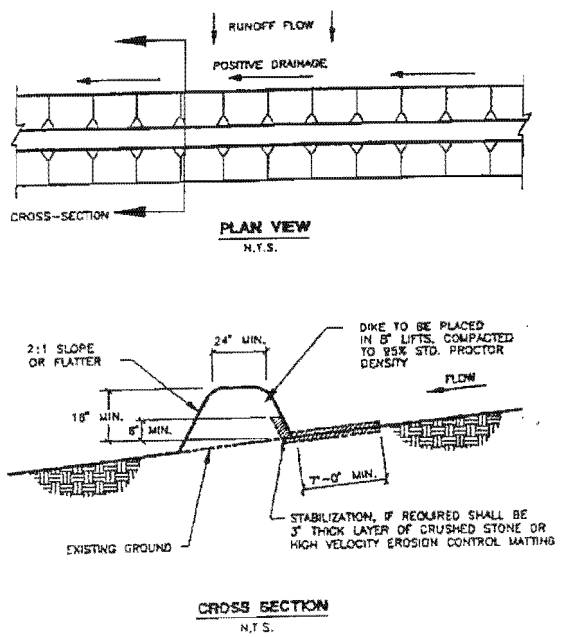


Figure 1-8 Schematic of a Diversion Dike (NCTCOG, 1993b)

Installation:

(1) Diversion dikes should be installed prior to and maintained for the d construction and should intercept no more than 10 acres of runoff.

(2) Dikes should have a minimum top width of 2 feet and a minimum height of compacted fill of 18 inches measured form the top of the existing ground at the upslope toe to top of the dike and having side slopes of 2:1 or flatter.

(3) The soil for the dike should be placed in lifts of 8 inches or less and be compacted to 95 % standard proctor density.

(4) The channel, which is formed by the dike, must have positive drainage for its entire length to an outlet.

(5) When the slope exceeds 2 percent, or velocities exceed 6 feet per second (regardless of slope), stabilization is required. Situations in which velocities do not exceed 6 feet per second, vegetation may be used to control erosion.

Inspection and Maintenance Guidelines:

(1) Swales should be inspected weekly and after each rain event to determine if silt is building up behind the dike or if erosion is occurring on the face of the dike. Locate and repair any damage to the channel or clear debris or other obstructions so as not to diminish flow capacity.

(2) Silt should be removed in a timely manner to prevent remobilization and to maintain the effectiveness of the control.

(3) If erosion is occurring on the face of the dike, the slopes of the face should either be stabilized through mulch or seeding or the slopes of the face should be reduced.

(4) Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization should be repaired as soon as practical.

1.3.3 Pipe Slope Drain

A temporary pipe slope drain is an erosion control device that combines an earthen embankment and a pipe to carry runoff over an exposed slope to a stabilized outlet apron. The maximum area contributing to any one drain should be 5 acres or less and the pipe should be sized to convey the 10-yr, 3-hr storm. A diagram of a slope drain is shown in Figure 1-9.

Materials:

(1) The drain pipe may be made of any material, rigid or flexible, which is capable of conveying runoff. The drainpipe should be completely watertight so that no water leaks on to the slope to be protected.

(2) Riprap to be used in the outlet apron should consist of either crushed stone or broken Portland cement concrete. All stones used should weigh between 50 and 150 pounds each and should be as nearly uniform as is practical.

Installation:

(1) A diversion dike should be constructed at the top of the slope that is to be protected. This dike should be sized so that no runoff may overtop the dike. The soil around and under the entrance section of the drainpipe should be hand-tamped in 8-inch lifts to prevent piping failure around the inlet.

(2) The height of the diversion dike at the centerline of the inlet should be equal to the diameter of the pipe plus 12 inches.

(3) A rigid section of pipe should be installed through the dike. A standard flared-end section with an integral toe plate extending a minimum of 6-inches from the bottom of the end section should be attached to the inlet end of the pipe using watertight fittings.

(4) A riprap-lined apron should be excavated to accept the runoff from the pipe dissipate the energy of the flow. The width of the bottom of the apron should times the pipe diameter and the length should be a minimum of 6 times the pip diameter. The apron should be a minimum of 12-inches deep and lined with riprap with a thickness of at least 12 inches. The apron should be designed so that the released flow has a velocity less than 3 feet per second.

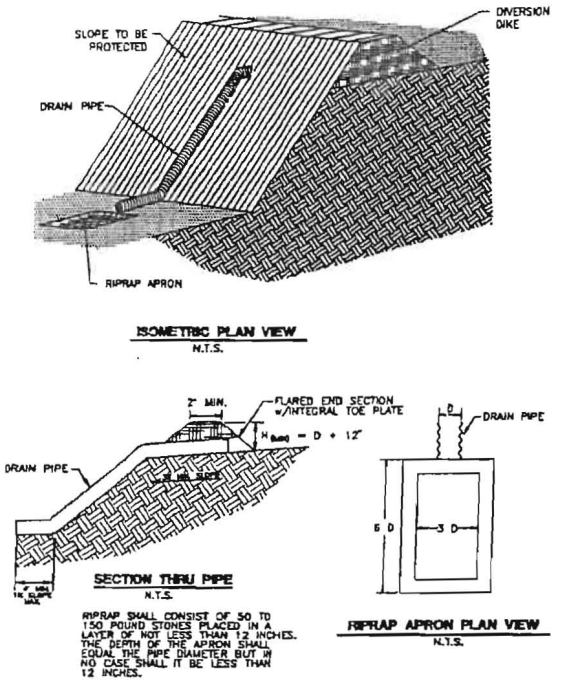


Figure 1-9 Schematic Diagram of a Slope Drain (NCTCOG, 1993)

Inspection and Maintenance Guidelines:

(1) Pipe slope drains should be inspected weekly and after each rain event to locate and repair any damage to joints or clogging of the pipe.

(2) In cases where the diversion dike has deteriorated around the entrance of the pipe, it may be necessary to reinforce the dike with sandbags or to install a concrete collar to prevent failure.

(3) Signs of erosion around the pipe drain should be addressed in a timely manner by stabilizing the area with erosion control mats, crushed stone, concrete or other appropriate method.

1.3.4 Polyacrylamide

Polyacrylamide (PAM) is a chemical that can be applied to disturbed soils at construction sites to reduce erosion and improve settling of suspended sediment. PAM increases the soil's available pore volume, thus increasing infiltration and reducing the quantity of stormwater runoff that can cause erosion. Suspended sediments from PAM treated soils exhibit increased flocculation over untreated soils. The increased flocculation aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Pam shall be used in conjunction with other BMPs and not in place of other erosion and sediment control BMPs. Stormwater runoff from PAM treated soils should pass through a sediment control BMP prior to discharging to surface waters. Do not add PAM to water discharging from site.

On PAM treated sites, the use of silt fence and fiber rolls shall be maximized to limit the discharges of sediment to sediment traps and sediment basins. All areas not being actively worked should be covered and protected from rainfall. PAM should not be the only cover BMP used.

Materials:

(1) Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.

(2) The specific PAM copolymer formulation must be anionic. **Cationic PAM shall not be used in any application because of known aquatic toxicity problems.** Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, will be used for soil applications. Formulations that meet this standard are available at: http://www.nsf.org/Certified/PwsChemicals/Listings.asp?CompanyName=&TradeName=&ChemicalName=Polyacrylamide&ProductFunction=&PlantState=&PlantCountry=

(3) PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked"

(4) Recent high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer". All PAMs are polymer, but not all polymers are PAM, and not all PAM products comply with ANSI/NSF Standard 60.

(5) The PAM anionic charge density may vary from 2-30%; a value of 18% is typical. Studies conducted by the United States Department of Agriculture (USDA)/Agricultural Research Service (ARS) demonstrated that soil stabilization was optimized by using very high molecular weight (12-15 mg/mole), highly anionic (>20% charge density) PAM.

Installation:

(1) PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.

(2) Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in three months after exposure to sunlight and air.

(3) Proper application and re-application plans are necessary to ensure total effectiveness of PAM usage.

(4) PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent over spray from reaching pavement, as pavement will become slippery. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water this only makes cleanup messier and longer.

(5) PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5-1 lb per 1,000 gallons of water in a hydro mulch machine. Some tackifier product instructions say to use at a rate of 3-5 lbs per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

(6) The preferred application method for PAM is dissolved in water. Other options include application in dry, granular, or powered form.

(7) PAM is to be applied at a maximum rate of ½ pound PAM per 1000 gallons water per 1 acre of bare soil. Table 1-2 can be used to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM do not provide any additional effectiveness. Pre-measure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate.

(8) PAM has infinite solubility in water, but dissolves very slowly. Dissolve pre-measured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight. Mechanical mixing will help dissolve the PAM. Always add PAM to water – not water to PAM.

(9) Pre-fill the water truck about 1/8 full with water. The water does not have to be potable, but it must have relatively low turbidity – in the range of 20 NTU or less.

(10) Add the dissolved PAM and water mixture to the truck.

(11) Fill the water truck to specified volume for the amount of PAM to be applied.

(12) Spray the PAM/water mixture onto dry soil until the soil surface is uniformly and completely wetted.

Table 1-2 Application Rates for PAM

Disturbed Area (ac)	PAM (lbs)	Water (gallons)
0.50	0.25	500
1.00	0.50	1000
1.50	0.75	1,500
2.00	1.00	2,000
2.50	1.25	2,500
3.00	1.50	3,000
3.50	1.75	3,500
4.00	2.00	4,000
4.50	2.25	4,500
5.00	2.50	5,000

Alternate Installation:

PAM may also be applied as a powder at the rate of 5 lbs per acre. This must be applied on a day that is dry. For areas less than 5-10 acres, a hand held "organ grinder" fertilizer spreader set to the smallest setting will work. Tractor mounted spreaders will work for larger areas.

Inspection and Maintenance Guidelines:

(1) PAM must be reapplied on actively worked areas after a 48-hour period if PAM is to remain effective.

(2) Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application.

(3) If PAM treated soil is left undisturbed a reapplication may be necessary after two months.

(4) More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), and long grades.

(5) When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.

1 3.5 Outlet Stabilization

The goal of outlet stabilization is to prevent erosion at the outlet of a channel or conduit by reducing the velocity of flow and dissipating the energy. This practice applies where the discharge velocity of a pipe, box culvert, diversion, open channel, or other water conveyance structure exceeds the permissible velocity of the receiving channel or disposal area.

The outlets of channels, conduits, and other structures are points of high erosion potential, because they frequently carry flows at velocities that exceed the allowable limit for the area downstream. To prevent scour and undermining, an outlet stabilization structure is needed to absorb the impact of the flow and reduce the velocity to non-erosive levels. A riprap-lined apron is the most commonly used practice for this purpose because of its relatively low cost and ease of installation. The riprap apron should be extended downstream until stable conditions are reached even though this may exceed the length calculated for design velocity control.

Riprap-stilling basins or plunge pools reduce flow velocity rapidly. They should be considered in lieu of aprons where overfalls exit at the ends of pipes or where high flows would require excessive apron length. Consider other energy dissipaters such as concrete impact basins or paved outlet structures (see Figure 1-10) where site conditions warrant.

Materials:

(1) Materials—Ensure that riprap consists of a well-graded mixture of stone. Larger stone should predominate, with sufficient smaller sizes to fill the voids between the stones. The maximum stone diameter should be no greater than 1.5 times the d_{50} size.

(2) Thickness—Make the minimum thickness of riprap 1.5 times the maximum stone diameter.

(3) Stone quality—Select stone for riprap from field stone or quarry stone. The stone should be hard, angular, and highly weather-resistant. The specific gravity of the individual stones should be at least 2.5.

(4) Geotextile Fabric—Install appropriate barrier to prevent soil movement through the openings in the riprap. The barrier should consist of a graded gravel layer or a synthetic filter cloth.

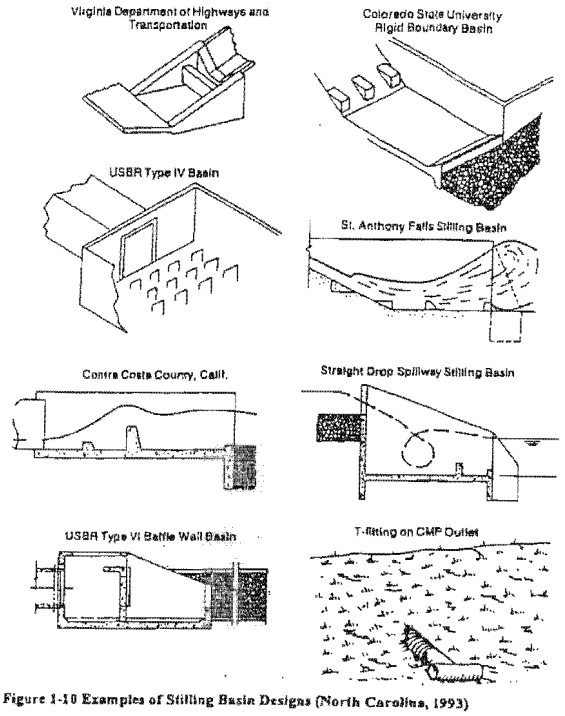


Figure 1-10 Examples of Stilling Basin Designs (North Carolina, 1993)

Design Guidelines:

(1) Capacity—10-yr, 3-hour peak runoff or the design discharge of the water conveyance structure, whichever is greater.

(2) Apron size—If the water conveyance structure discharges directly into a well-defined channel, extend the apron across the channel bottom and up the channel banks to an elevation of 0.5 ft above the maximum tailwater depth or to the top of the bank, whichever is less (see Figure 1-11). Determine the maximum allowable velocity for the receiving stream, and design the riprap apron to reduce flow to this velocity before flow leaves the apron. Calculate the apron length for velocity control or use the length required to meet stable conditions downstream, whichever is greater.

(3) Grade—Ensure that the apron has zero grade. There should be no overfall at the end of the apron; that is, the elevation of the top of the riprap at the downstream end should be the same as the elevation of the bottom of the receiving channel or the adjacent ground if there is no channel.

(4) Alignment—The apron should be straight throughout its entire length, but if a curve is necessary to align the apron with the receiving stream, locate the curve in the upstream section of riprap.

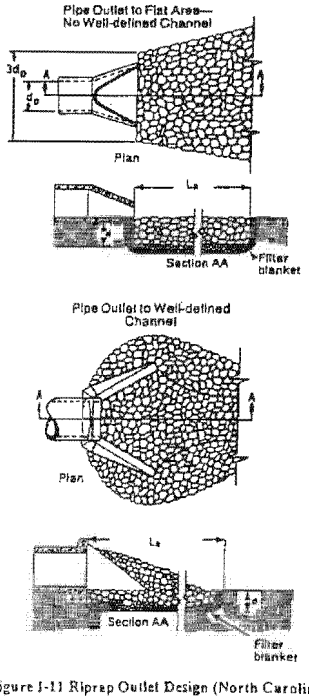
Installation:

(1) Ensure that the subgrade for the fabric and riprap follows the required lines and grades shown in the plan. Compact any fill required in the subgrade to the density of the surrounding undisturbed material. Low areas in the subgrade on undisturbed soil may also be filled by increasing the riprap thickness.

(2) The riprap and fabric must conform to the specified grading limits shown on the plans.

(3) Filter cloth must be properly protected from punching or tearing during installation. Repair any damage by removing the riprap and placing another piece of filter cloth over the damaged area. All connecting joints should overlap a minimum of 1 ft. If the damage is extensive, replace the entire filter cloth.

(4) Riprap may be placed by equipment, but take care to avoid damaging the fabric.



Notes

1. L_a is the length of the riprap apron.
2. d = 1.5 times the maximum stone diameter but not less than 6".
3. In a well-defined channel extend the apron up the channel banks to an elevation of 6" above the maximum tailwater depth or to the top of the bank, whichever is less.
4. A filter blanket or filter fabric should be installed between the riprap and soil foundation.

Figure J-11 Riprap Outlet Design (North Carolina, 1993)

(5) The minimum thickness of the riprap should be 1.5 times the maximum stone diameter.

(6) Riprap may be field stone or rough quarry stone. It should be hard, angular, highly weather-resistant and well graded.

(7) Construct the apron on zero grade with no overfall at the end. Make the top of the riprap at the downstream end level with the receiving area or slightly below it.

(8) Ensure that the apron is properly aligned with the receiving stream and preferably straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron.

(9) Immediately after construction, stabilize all disturbed areas with vegetation.

Inspection and Maintenance Guidelines:

(1) Inspect riprap outlet structures after heavy rains to see if any erosion around or below the riprap has taken place or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

1.3.6 Level Spreaders

A level spreader is used as an outlet device for dikes and diversions and consists of an excavated depression constructed at zero grade across a slope. The purpose is to convert concentrated runoff to sheet flow and release it uniformly onto areas stabilized by existing vegetation.

Level spreaders should be used where there is a need to divert stormwater away from disturbed areas to avoid overstressing erosion control measures or where sediment free storm runoff can be released in sheet flow down a stabilized slope without causing erosion. A perspective view of a level spreader is shown in Figure 1-12.

This practice applies only in those situations where the spreader can be constructed on undisturbed soil and the area below the level lip is uniform with a slope of 10% or less and is stabilized by natural vegetation. The runoff water should not be allowed to re-concentrate after release unless it occurs during interception by another measure (such as a permanent pond or detention basin) located below the level spreader.

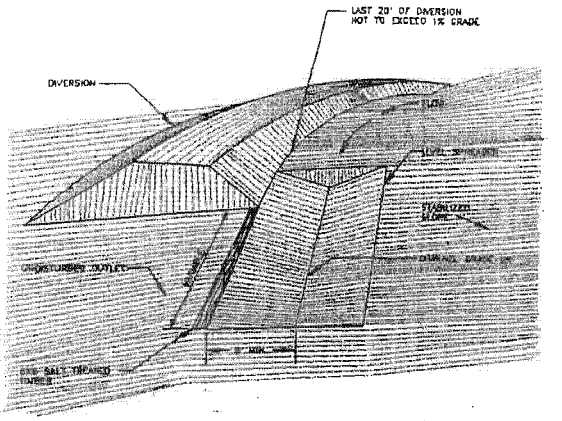


Figure 1-12 Perspective View of a Level Spreader (VA Dept of Conservation, 1992)

Particular care should be taken to construct the outlet lip completely level in a stable, undisturbed soil. Any depressions in the lip will concentrate the flow, resulting in erosion. Under higher design flow conditions, a rigid outlet lip design should be used to create the desired sheet flow conditions. Runoff water containing high sediment loads must be treated in a sediment-trapping device before being released to a level spreader.

Installation:

(1) Level spreaders should be constructed on undisturbed soil (not fill material).

(2) The entrance to the spreader should be shaped in such a manner as to insure that runoff enters directly onto the 0% grade channel.

(3) Construct a 20-ft. transition section from the diversion channel to blend smoothly to the width and depth of the spreader.

(4) The level lip should be constructed at 0% grade to insure uniform spreading of stormwater runoff.

(5) The level lip may be stabilized by vegetation if the flow from the 2-year, 24-hour storm is expected to be less than 4 cfs, otherwise a rigid non-erodible material should be used.

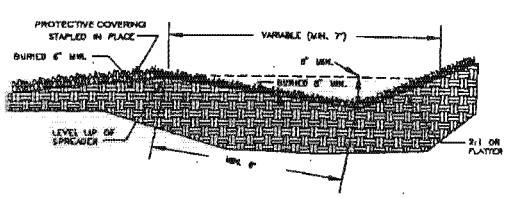
(6) Protective covering for vegetated lip should be a minimum of 4 feet wide extending 6 inches over the lip and buried 6 inches deep in a vertical trench on the lower edge. The upper edge should butt against smoothly cut sod and be securely held in place with closely spaced heavy-duty wire staples (see Figure 1-13).

(7) Rigid level lip should be entrenched at least 2 inches below existing ground and securely anchored to prevent displacement. An apron of coarse aggregate should be placed to top of level lip and extended down slope at least 3 feet. Place filter fabric under stone and use galvanized wire mesh to hold stone securely in place (see Figure 1-13).

(8) The released runoff must outlet onto undisturbed stabilized areas with slope not exceeding 10%. Slope must be sufficiently smooth to preserve sheet flow and prevent flow from concentrating.

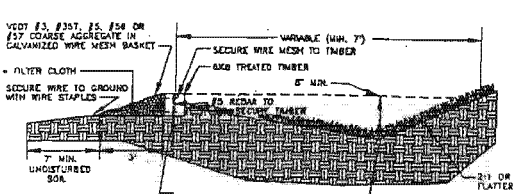
(9) Immediately after its construction, appropriately seed and mulch the entire disturbed area of the spreader.

CROSS SECTION



LEVEL SPREADER WITH VEGETATED LIP

CROSS SECTION



LEVEL SPREADER WITH RIGID LIP

Figure 1-13 Cross-Section of a Level Spreader (VA Dept of Conservation, 1992)

Inspection and Maintenance Guidelines:

(1) The measure should be inspected after every rainfall and repairs made, if required.

(2) Level spreader lip should remain at 0% slope to allow proper function of measure.

(3) The contractor should avoid the placement of any material on and prevent construction traffic across the structure. If the measure is damaged by construction traffic, it should be repaired immediately.

1.3.7 Subsurface Drains

A subsurface drain is a perforated conduit such as pipe, tubing or tile installed beneath the ground to intercept and convey ground water. The main purposes are to: prevent sloping soils from becoming excessively wet and subject to sloughing, improve the quality of the growth medium in excessively wet areas by lowering the water table (see Figure 1-14), or drain stormwater detention areas or structures.

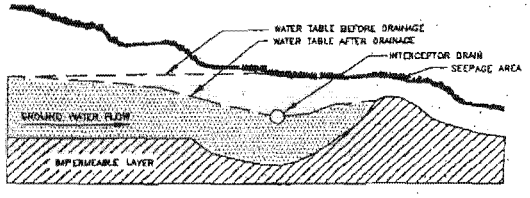


Figure 1-14 Effect of Subsurface Drain (VA Dept. of Conservation, 1992)

This measure is appropriate wherever excess water must be removed from the soil. This is generally not a problem on the recharge zone of the Edwards, but may be encountered in the contributing zone. The soil must be deep and permeable enough to allow an effective system to be installed. Either a gravity outlet must be available or pumping must be provided. These standards do not apply to foundation drains.

Subsurface drainage systems are of two types, relief drains and interceptor drains. Relief drains are used either to lower the water table in order to improve the growth of vegetation, or to remove surface water. They are installed along a slope and drain in the direction of the slope. They can be installed in a gridiron pattern, a herringbone pattern, or a random pattern (see Figure 1-15).

Interceptor drains are used to remove water as it seeps down a slope to prevent the soil from becoming saturated and subject to slippage. They are installed across a slope an drain to the side of the slope. They usually consist of a single pipe or series of singl pipes instead of a patterned layout.

Materials:

Acceptable materials for subsurface drains include perforated, continuous closed-joint conduits of corrugated plastic, concrete, corrugated metal, asbestos cement, and bituminous fiber. The strength and durability of the pipe should meet the requirements of the site in accordance with the manufacturer's specifications.

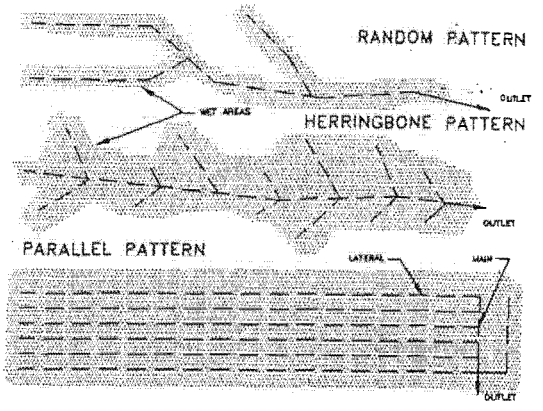


Figure 1-15 Subsurface Drainage Patterns (VA Dept. of Conservation, 1992)

General Installation Requirements:

(1) The trench should be constructed on a continuous grade with no reverse grades or low spots.

(2) Soft or yielding soils under the drain should be stabilized with gravel or other suitable material.

(3) Deformed, warped, or otherwise unsuitable pipe should not be used. The minimum diameter for a subsurface drain should be 4 inches.

(4) Envelopes or filter material should be placed as specified with at least 3 inches of material on all sides of the pipe.

(5) The trench should be backfilled immediately after placement of the pipe. No sections of pipe should remain uncovered overnight or during a rainstorm. Backfill material should be placed in the trench in such a manner that the drain pipe is not displaced or damaged.

Relief Drain Installation:

(1) Relief drains should be located through the center of wet areas. They should drain in the same direction as the slope.

(2) Relief drains installed in a uniform pattern should remove a minimum of 1 inch of groundwater in 24 hours (0.042 cfs/acre). Relief drains installed in a random pattern should remove a minimum of 1.5 cfs/1000 feet of length. The design capacity should be increased accordingly to accommodate any surface water which enters directly into the system (see Figure 1-16).

(3) Relief drains installed in a uniform pattern should have equal spacing between drains and the drains should be at the same depth. Maximum depth is limited by the allowable load on the pipe, depth to impermeable layers in the soil, and outlet requirements. The minimum depth is 24 inches under normal conditions. Twelve inches is acceptable where the drain will not be subject to equipment loading. Spacing between drains is dependent on soil permeability and the depth of the drain. In general, however, a depth of 3 feet and a spacing of 50 feet will be adequate.

(4) The minimum velocity required to prevent silting is 1.4 ft/sec. The line should be graded to achieve at least this velocity. Steep grades should be avoided, however.

(5) Envelopes should be used around all drains for proper bedding and improved flow of groundwater into the drain. The envelope should consist of 3 inches of aggregate placed completely around the drain. The stone should be encompassed by a filter cloth separator to prevent the migration of surrounding soil particles

into the drain (see Figure 1-17). Filter cloth must be designed specifically for soil filtration

(6) The outlet of the subsurface drain should empty into a channel or some other watercourse that will remove the water from the outlet. It should be above the mean water level in the receiving channel. It should be protected from erosion, undermining, damage from periods of submergence, and the entry of small animals into the drain.

Interceptor Drain Installation:

(1) Interceptor drains should remove a minimum of 1.5 cfs/1000 feet of length. This value should be increased for sloping land. In addition, if a flowing spring or surface water enters directly into the system, this flow must be accommodated and the design capacity should be increased accordingly to take care of this flow.

(2) The depth of installation of an interceptor drain is influenced mainly by the depth to which the water table is to be lowered. The maximum depth is limited by the allowable load on the pipe and the depth to an impermeable layer. Minimum depth should be the same as for relief drains.

(3) One interceptor drain is usually sufficient; however, if multiple drains are to be used, determining the required spacing can be difficult. The best approach is to install the first drain - then if seepage or high water table problems occur down slope, install an additional drain a suitable distance down slope.

Inspection and Maintenance Guidelines:

(1) Subsurface drains should be checked weekly and after rainfall events to ensure that they are free flowing and not clogged with sediment.

(2) The outlet should be kept clean and free of debris.

(3) Surface inlets should be kept open and free of sediment and other debris.

(4) Trees located too close to a subsurface drain often clog the system with their roots. If a drain becomes clogged, relocate the drain.

(5) Where heavy vehicles cross drains, the line should be checked to ensure that it is not crushed.

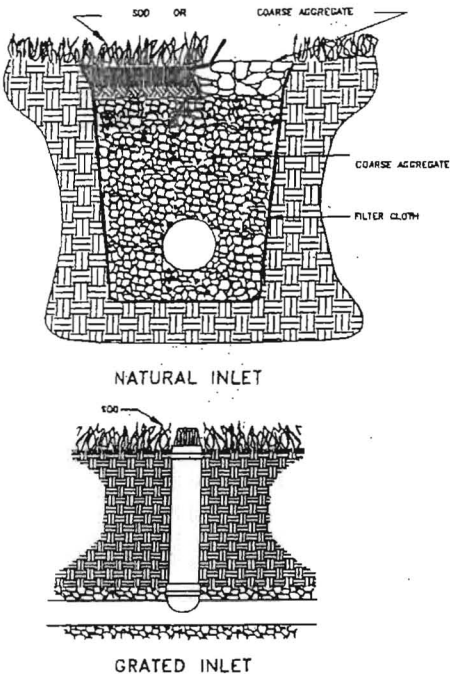


Figure 1-16 Surface Inlets for Subsurface Drains (VA Dept. of Conservation, 1992)

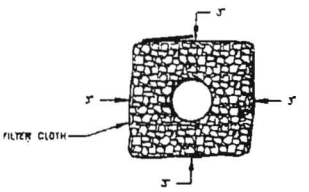


Figure 1-17 Subsurface Drain Envelope (VA Dept. of Conservation, 1992)

1.3.8 Temporary Vegetation

Vegetation is used as a temporary or permanent stabilization technique for areas disturbed by construction, but not covered by pavement, buildings, or other structures. As a temporary control, vegetation can be used to stabilize stockpiles and barren areas that are inactive for long periods of time.

Vegetative techniques can and should apply to every construction project with few exceptions. Vegetation effectively reduces erosion in swales, stockpiles, berms, mild to medium slopes, and along roadways.

Other techniques may be required to assist in the establishment of vegetation. These other techniques include erosion control matting, mulches, surface roughening, swales and dikes to direct runoff around newly seeded areas, and proper grading to limit runoff velocities during construction. (NCTCOG, 1993b)

Materials:

The type of temporary vegetation used on a site is a function of the season and the availability of water for irrigation. For areas that are not irrigated, the year can be divided into two temporary planting seasons and one season for planting of permanent warm weather groundcovers. These periods are shown in Figure 1-18 for Hays, Travis, and Williamson Counties. Planting times for Bexar, Comal, Kinney, Medina, and Uvalde Counties are shown in Figure 1-19. Appropriate temporary vegetation for these two areas are shown in Table 1-3 and Table 1-4.

Other vegetation may perform as well as the recommended varieties, especially where irrigation is available. County agricultural extension agents are a good source for suggestions for other types of temporary vegetation. All seed should be high quality, U.S. Dept. of Agriculture certified seed.

Installation:

(1) Interim or final grading must be completed prior to seeding, minimizing all steep slopes. In addition, all necessary erosion structures such as dikes, swales, diversions, should also be installed.

(2) Seedbed should be well pulverized, loose, and uniform.

3) Fertilizer should be applied at the rate of 40 pounds of nitrogen and 40 pounds of phosphorus per acre, which is equivalent to about 1.0 pounds of nitrogen and phosphorus per 1000 square feet. Compost can be used instead of fertilizer and applied at the same time as the seed.

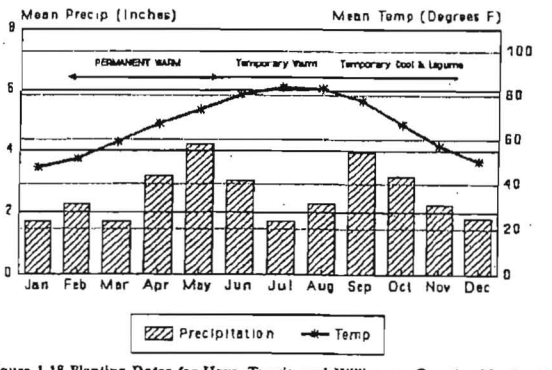


Figure 1-18 Planting Dates for Hays, Travis, and Williamson Counties (Northcutt, 1993)

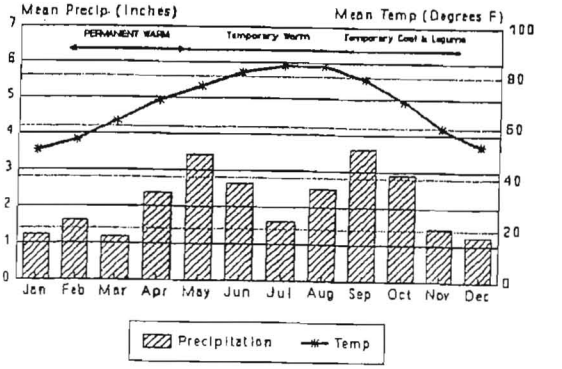


Figure 1-19 Planting Dates for Bexar, Comal, Kinney, Medina, and Uvalde Counties (Northcutt, 1993)

Table 1-3 Temporary Seeding for Hays, Travis, and Williamson Counties (Northcutt, 1993)

Dates	Climate	Species (lb/ac)	
Sept 1 to Nov 30	Temporary Cool Season	Tall Fescue	4.0
		Oats	21.0
		Wheat (Red, Winter)	30.0
		Total	55.0
Sept 1 to Nov 30	Cool Season Legume	Hairy Vetch	8.0
May 15 to Aug 31	Temporary Warm Season	Foxtail Millet	30.0

Table 1-4 Temporary Seeding for Bexar, Comal, Kinney, Medina, and Uvalde Counties (Northcutt, 1993)

Dates	Climate	Species (lb/ac)	
Sept 1 to Nov 30	Temporary Cool Season	Tall Fescue	4.0
		Oats	21.0
		Wheat (Red, Winter)	30.0
		Total	55.0
Sept 1 to Nov 30	Cool Season Legume	Hairy Vetch	8.0
May 1 to Aug 31	Temporary Warm Season	Foxtail Millet	30.0

(4) Seeding rates should be as shown in Table 1-3 and Table 1-4 or as recommended by the county agricultural extension agent.

(5) The seed should be applied uniformly with a cyclone seeder, drill, cultipacker seeder or hydroseeder (slurry includes seed, fertilizer and binder).

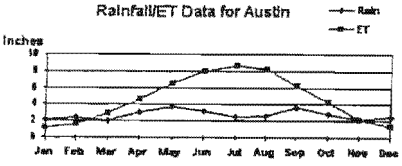
(6) Slopes that are steeper than 3:1 should be covered with appropriate soil stabilization matting as described in the following section to prevent loss of soil and seed.

Irrigation

Temporary irrigation should be provided according to the schedule described below, or to replace moisture loss to evapotranspiration (ET), whichever is greater. Significant rainfall (on-site rainfall of ½" or greater) may allow watering to be postponed until the next scheduled irrigation.

Time Period	Irrigation Amount and Frequency
Within 2 hours of installation	Irrigate entire root depth, or to germinate seed
During the next 10 business days	Irrigate entire root depth every Monday, Wednesday, and Friday
During the next 30 business days or until Substantial Completion	Irrigate entire root depth a minimum of once per week, or as necessary to ensure vigorous growth
During the next 4 months or until Final Acceptance of the Project	Irrigate entire root depth once every two weeks, or as necessary to ensure vigorous growth

Refer to Figure 1, below, for average rainfall/ET data for the Edwards aquifer area. This data shall serve as a guide to the overall watering regime; however, actual frequency and amount of irrigation water used shall be weather-dependent.



If cool weather induces plant dormancy, water only as necessary to maintain plant health. Irrigate in a manner that will not erode the topsoil but will sufficiently soak the entire depth of roots.

Inspection and Maintenance Guidelines:

(1) Temporary vegetation should be inspected weekly and after each rain event to locate and repair any erosion.

(2) Erosion from storms or other damage should be repaired as soon as practical by regrading the area and applying new seed.

(3) If the vegetated cover is less than 80%, the area should be reseeded.

1.3.9 Blankets and Matting

Blankets and matting material can be used as an aid to control erosion on critical sites during establishment period of protective vegetation. The most common uses are: in channels where designed flow exceeds 3.5 feet per second; on interceptor swales and diversion dikes when design flow exceeds 6 feet per second; on short, steep slopes where erosion hazard is high and planting is likely to be slow to establish adequate protective cover; and on stream banks where moving water is likely to wash out new vegetative plantings.

Blankets and matting can also be used to create erosion stops on steep, highly erodible watercourses. Erosion stops should be placed approximately 3 feet down channel from point of entry of a concentrated flow such as from culverts, tributary channels or diversions or at points where a change in gradient or course of channel occurs. Spacing of erosion stops on long slopes will vary, depending on the erodibility of the soil and velocity and volume of flow. Erosion stops are placed beneath blankets and matting.

Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.

Jute is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Excelsior (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life.

Straw blanket should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket.

Wood fiber blanket is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation.

The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Coconut fiber blanket should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket.

Coconut fiber mesh is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Straw coconut fiber blanket should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

Plastic netting is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Plastic mesh is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Synthetic fiber with netting is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots,

and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Bonded synthetic fibers consist of a three dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Combination synthetic and biodegradable RECPs consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Materials:

New types of blankets and matting materials are continuously being developed. The Texas Department of Transportation (TxDOT) has defined the critical performance factors for these types of products, and has established minimum performance standards which must be met for any product seeking to be approved for use within any of TxDOT's construction or maintenance activities. The products that have been approved by TxDOT are also appropriate for general construction site stabilization. TxDOT maintains a web site at:

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/erosion/contents.htm

which is continually updated as new products are evaluated. The following tables list applications and products approved by TxDOT as of February 2001.

CLASS 1 "SLOPE PROTECTION"

Type A - Slopes 1:3 or Flatter - Clay Soils:

Airtrol
Anti-wash/Geojute
BioD-Mesh 60
Carthage Mills Veg Net
C-Jute
Contech Standard
Contech Standard Plus
Contech Straw/Coconut Fiber Mat w/Kraft Net
Contech C-35
Conwed 3000
Curlex I
Curlex™-LT
Earth Bound
EcoAegis™
Econo-Jute
ECS Excelsior Blanket Standard
ECS High Velocity Straw Mat
ECS Standard Straw
EnviroGuard Plus
Formula 480 Liquid Clay
Futerra®
Grass Mat
Greenfix WSO72
GeoTech TechMat™ SCKN
Green Triangle Regular
Green Triangle Superior
Greenstreak Pec-Mat
Landlok BonTerra EcoNet™ ENS2
Landlok BonTerra EcoNet™ ENCS2
Landlok BonTerra S1
Landlok BonTerra S2
Landlok BonTerra CS2
Landlok BonTerra SFB12
Landlok 407GT
Landlok FRS 3112
Landlok TRM 435
Miramat TM8
North American Green S150
North American Green S75
North American Green® S75 BN
North American Green SC150
North American Green® S150 BN
Maccaferri MX287
Pennzsuppress®
Poplar Erosion Blanket
Soil Guard
Soil Saver
SuperGro
Terra-Control®
TerraJute
verdyol Ero-Mat
verdyol Excelsior High Velocity
verdyol Excelsior Standard
Webtec Terraguard 44P
Xcel Regular
Xcel Superior

Type B - 1:3 or Flatter - Sandy Soils:

C-Jute
Carthage Mills Veg Net
Contech Standard
Contech Standard Plus
Contech Straw/Coconut Fiber Mat w/Kraft Net
Contech C-35
Curlex LT
Earth Bound
ECS Standard Straw
ECS Excelsior Blanket Standard
ECS High Velocity Straw Mat
EcoAegis™
EnviroGuard Plus
Futerra®
Greenfix WSO72
Geojute Plus 1
GeoTech TechMat™ SCKN
Green Triangle Regular
Green Triangle Superior
Landlok® BonTerra S1
Landlok® BonTerra S2
Landlok® BonTerra CS2
Landlok®
BonTerra®EcoNet™ENCS2™
Landlok® BonTerra®EcoNet™ ENS2
Landlok FRS 3112
Landlok 407GT
Landlok TRM 435
Maccaferri MX287
Miramat 1000
Miramat TM8
North American Green S75
North American Green® S75 BN
North American Green S150
North American Green SC150
North American Green® S150 BN
Poplar Erosion Blanket
Soil Guard
Terra-Control®
TerraJute
verdyol Ero-Mat
verdyol Excelsior Standard
Webtec Terraguard 44P
Xcel Regular
Xcel Superior

Type C - Slopes Steeper than 1:3 - Clay Soils:

Airtrol
Anti-Wash/Geojute
Carthage Mills Veg Net
C-Jute
Contech Standard Plus
Contech Straw/Coconut Fiber Mat w/Kraft Net
Contech C-35
Conwed 3000
Curlex I
Earth Bound
Econo Jute
ECS High Velocity Straw Mat
ECS Standard Straw
EnviroGuard Plus
Formula 480 Liquid Clay
Futerra®
Greenfix WSO72
Green Triangle Superior
GeoTech TechMat™ SCKN
Greenstreak Pec-Mat
Landlok® BonTerra® EcoNet™ ENCS2
Landlok® BonTerra S2
Landlok BonTerra CS2
Landlok® BonTerra SFB12
Landlok 407GT
Landlok FRS 3112
Landlok TRM 435
Maccaferri MX287
Miramat TM8
North American Green S150
North American Green S75
North American Green SC150
North American Green® S150 BN
Pennzsuppress®
Poplar Erosion Blanket
Soil Guard
Soil Saver
SuperGro
TerraJute
verdyol Excelsior High Velocity
Webtec Terraguard 44P
Xcel Superior

Type D - Slopes Steeper than 1:3 - Sandy Soils:

C-Jute
Carghage Mills Veg Net
Contech Standard Plus
Contech Straw/Coconut Fiber Mat w/Kraft Net
Contech C-35
Curlex I
ECS High Velocity Straw Mat
ECS Standard Straw
EnviroGuard Plus
Futerra®
Greenfix WSO72
Geojute Plus I
GeoTech TechMat™ SCKN
Green Triangle Superior
Landlok® BonTerra S2
Landlok® BonTerra CS2
Landlok®
BonTerra®EcoNet™ENCS2™
Landlok 407GT
Landlok FRS 3112
Landlok TRM 435
Maccaferri MX287
Miramat 1000
Miramat TM8
North American Green S150
North American Green SC150
North American Green® S150 BN
Soil Guard
TerraJute
Webtec Terraguard 44P
Xcel Superior

CLASS 2 - "FLEXIBLE CHANNEL LINER"

Type E - Shear Stress Range 0 - 96 Pascal (0 - 2 Pounds Per Square Foot):

Contech TRM C-45
Contech C-35
Contech C50
Contech Coconut/Poly Fiber Mat
Contech Coconut Mat w/Kraft Net
Curlex® II Stitched
Curlex® III Stitched
Curlex® Channel Enforcer I
Curlex® Channel Enforcer II
Earth-Lock
Earth-Lock II
ECS High Impact Excelsior
ECS Standard Excelsior
ECS High Velocity Straw Mat
Enkamat 7018
Enkamat 7020
Enkamat Composite 30
Enkamat Composite NPK**
Enviromat
Geotech TechMat™ CP 3-D
Geotech TechMat™ CKN
Greenfix CFO 72RP **
Greenfix CFO 72RR
Greenstreak Pec-Mat
Koirmat™ 700
Landlok® BonTerra® C2
Landlok® BonTerra® CP2
Landlok® BonTerra® EcoNet™ ENC2
Landlok® BonTerra® SFB™
Landlok® BonTerra SFB12
Landlok TRM 435
Landlok TRM 450
Landlok TRM 1050
Landlok TRM 1060
Maccaferri MX287
Miramat TM8
Multimat 100
North American Green C125 BN
North American Green C350 Three Phase
North American Green SC150 BN
North American Green S350
North American Green® P350
North American Green S150
Pyramat®
Webtec Terraguard 44P
Webtec Terraguard 45P
Xcel PP-5

Type F - Shear Stress Range 0 - 192 Pascal (0 - 4 Pounds Per Square Foot):

Curlex® II Stitched
Curlex® III Stitched
Curlex® Channel Enforcer I
Curlex® Channel Enforcer II
Contech C50
Contech TRM C-45
Contech C-35
Contech Coconut/Poly Fiber Mat
Contech Coconut Mat w/Kraft Net
Earth-Lock
Earth-Lock II
ECS High Impact Excelsior
ECS High Velocity Straw Mat
ECS Standard Excelsior
Enkamat 7018
Enkamat Composite 30
Enkamat Composite NPK **
Enkamat Composite P/T**
Enviromat
Geotech TechMat™ CP 3-D
Geotech TechMat™ CKN
Greenfix CFO 72RP **
Greenfix CFO 72RR
Greenstreak Pec-Mat
Koirmat™ 700
Landlok® BonTerra® C2
Landlok® BonTerra® CP2
Landlok® BonTerra® EcoNet™ ENC2
Landlok BonTerra® SFB™
Landlok BonTerra SFB12
Landlok TRM 435
Landlok TRM 450
Landlok TRM 1050
Landlok TRM 1060
Maccaferri MX287
Miramat TM8
Multimat 100
North American Green C125 BN
North American Green C350 Three Phase
North American Green SC150 BN
North American Green S350
North American Green® P350
North American Green S150
Pyramat®
Webtec Terraguard 44P
Webtec Terraguard 45P
Xcel PP-5

Type G - Shear Stress Range 0 - 287 Pascal (0 - 6 Pounds Per Square Foot):

Contech TRM C-45
Contech C-35
Contech C50
Contech Coconut/Poly Fiber Mat
Curlex® III Stitched
Curlex® Channel Enforcer II
Earth-Lock
Earth-Lock II
Enkamat 7018
Enkamat Composite 30
Geotech TechMat™ CP 3-D
Greenstreak Pec-Mat
Koirmat™ 700
Landlok® BonTerra® CP2
Landlok® BonTerra® SFB™
Landlok® BonTerra SFB12
Landlok TRM 1050
Landlok TRM 1060
Landlok TRM 435
Landlok TRM 450
North American Green C350 Three Phase
North American Green S350
North American Green® P350
Pyramat®
Webtec Terraguard 44P
Webtec Terraguard 45P

Type H - Shear Stress Range 0 - 383 Pascal (0 - 8 Pounds Per Square Foot):

Contech TRM C-45
Contech C-35
Contech C50
Contech Coconut/Poly Fiber Mat
Curlex® III Stitched
Gentech TechMat™ CP 3-D
Landlok® BonTerra SFB12
Landlok TRM 435
Landlok TRM 450
Landlok TRM 1050
Landlok TRM 1060
North American Green C350 Three Phase
North American Green S350
North American Green® P350
Pyramat®
Webtec Terraguard 44P
Webtec Terraguard 45P

"SEEDING FOR EROSION CONTROL"

Cellulose Fiber Mulches

Clay or Tight Soils:

Agri-Fiber
American Fiber Mulch
American Fiber Mulch (with Hydro-Stick)
Conwed Hydro Mulch
Enviro-Gro
Evercycle™ Hydro-Mulch
Excel Fibermulch II (with Exact-Tac)
Lay-Low Mulch
Oasis Fiber Mulch
Pennzsuppress®
Pro Mat
Pro Mat (with RMBplus)
Pro Mat XL
Second Nature Regenerated Paper Fiber Mulch
Silva Fiber Plus

Sandy or Loose Soils:

American Fiber Mulch
American Fiber Mulch (with Hydro-Stick)
American Fiber Mulch with Stick Plus
Conwed Hydro Mulch
Enviro-Gro
Evercycle™ Hydro-Mulch
Excel Fibermulch II (with Exact-Tac)
Lay-Low Mulch
Oasis Fiber Mulch
Pennzsuppress®
Pro Mat
Pro Mat (with RMBplus)
Pro Mat XL
Second Nature Regenerated Paper Fiber Mulch

Installation:

Proper installation of blankets and matting is necessary for these materials to function as intended. They should always be installed in accordance with the manufacturer's recommendations. Proper anchoring of the material and preparation of the soil are two of the most important aspects of installation. Typical anchoring methods are shown in Figure 1-20 and Figure 1-21.

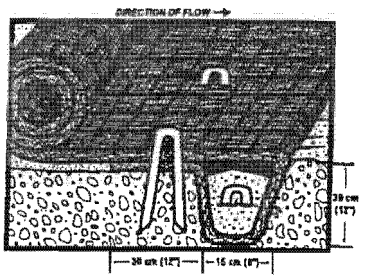


Figure 1-20 Initial Anchor Trench for Blankets and Mats

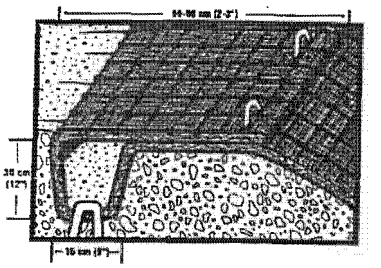


Figure 1-21 Terminal Anchor Trench for Blankets and Mats

Soil Preparation

(1) After site has been shaped and graded to approved design, prepare a friable seed bed relatively free from clods and rocks more than 1.5 inches in diameter and any foreign material that will prevent contact of the protective mat with the soil surface.

(2) Fertilize and seed in accordance with seeding or other type of planting plan.

(3) The protective matting can be laid over sprigged areas where small grass plants have been planted. Where ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Erosion Stops

(1) Erosion stops should extend beyond the channel liner to full design cross-section of the channel to check any rills that might form outside the channel lining.

(2) The trench may be dug with a spade or a mechanical trencher, making sure that the down slope face of the trench is flat; it should be uniform and perpendicular to line of flow to permit proper placement and stapling of the matting.

(3) The erosion stop should be deep enough to penetrate solid material or below level of tilling in sandy soils. In general, erosion stops will vary from 6 to 12 inches in depth.

(4) The erosion stop mat should be wide enough to allow a minimum of 2 inch turnover at bottom of trench for stapling, while maintaining the top edge flush with channel surface.

(5) Tamp backfill firmly and to a uniform gradient of channel.

Final Check:

- Make sure matting is uniformly in contact with the soil.
- All lap joints are secure.
- All staples are flush with the ground.
- All disturbed areas seeded.

Inspection and Maintenance Guidelines:

(1) Blankets and matting should be inspected weekly and after each rain event to locate and repair any damage. Apply new material if necessary to restore function.

1.3.10 Hydraulic Mulch

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix, and a stabilizing emulsion or tackifier with hydro-mulching equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind. Hydraulic mulch is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity. It is not appropriate for slopes of 3:1 or steeper or for use in channels.

Wood fiber hydraulic mulches are generally short lived and need 24 hours to dry before rainfall occurs to be effective. May require a second application in order to remain effective for an entire rainy season.

Materials:

Hydraulic Mulches: Wood fiber mulch can be applied alone or as a component of hydraulic matrices. Wood fiber applied alone is typically applied at the rate of 2,000 to 4,000 lb/acre. Wood fiber mulch is manufactured from wood or wood waste from lumber mills or from urban sources.

Hydraulic Matrices: Hydraulic matrices include a mixture of wood fiber and acrylic polymer or other tackifier as binder. Apply as a liquid slurry using a hydraulic application machine (i.e., hydro seeder) at the following minimum rates, or as specified by the manufacturer to achieve complete coverage of the target area: 2,000 to 4,000 lb/acre wood fiber mulch, and 5 to 10% (by weight) of tackifier (acrylic copolymer, guar, psyllium, etc.)

Bonded Fiber Matrix: Bonded fiber matrix (BFM) is a hydraulically applied system of fibers and adhesives that upon drying forms an erosion resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,000 lb/acre to 4,000 lb/acre based on the manufacturer's recommendation. A biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Installation:

(1) Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.

(2) To be effective, hydraulic matrices require 24 hours to dry before rainfall occurs.

(3) Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Inspection and Maintenance Guidelines:

(1) Mulched areas should be inspected weekly and after each rain event to locate and repair any damage.

(2) Areas damaged by storms or normal construction activities should be regraded and hydraulic mulch reapplied as soon as practical.

1.3.11 Sod

Sod is appropriate for disturbed areas which require immediate vegetative covers, or where sodding is preferred to other means of grass establishment. Locations particularly suited to stabilization with sod are waterways carrying intermittent flow, areas around drop inlets or in grassed swales, and residential or commercial lawns where quick use or aesthetics are factors.

The advantages of properly installed sod include:

- Immediate erosion control.
- An instant green surface with no dust or mud.
- Nearly year-round establishment capability.
- Less chance of failure than seed.
- Freedom from weeds.
- Quick use of the sodded surface.
- The option of buying a quality-controlled product with predictable results.

It is initially more costly to install sod than to seed. However, this cost is justified in places where sod can perform better than seed in controlling erosion. In swales and waterways where concentrated flow will occur, properly pegged sod is preferable to seed because there is no lag time between installation and the time when the channel is protected by vegetation. Drop inlets, which will be placed in grassed areas, can be kept

free of sediment, and the grade immediately around the inlet can be maintained, by framing the inlet with sod strips.

Sod can be laid during times of the year when seeded grass may fail, so long as the adequate water available for irrigation in the early weeks. Ground preparation and maintenance are as important with sod as with seed. Sod is composed of living pla those plants must receive adequate care in order to provide vegetative stabilizatio disturbed area.

Materials:

(1) Sod should be machine cut at a uniform soil thickness of ¾ inch (± ¼ inch) at the time of cutting. This thickness should exclude shoot growth and thatch.

(2) Pieces of sod should be cut to the supplier's standard width and length, with a maximum allowable deviation in any dimension of 5%. Torn or uneven pads should not be acceptable.

(3) Standard size sections of sod should be strong enough to support their own weight and retain their size and shape when suspended from a firm grasp on one end of the section.

(4) Sod should be harvested, delivered, and installed within a period of 36 hours.

Site Preparation:

(1) Prior to soil preparation, areas to be sodded should be brought to final grade in accordance with the approved plan.

(2) The surface should be cleared of all trash, debris and of all roots, brush, wire, grade stakes and other objects that would interfere with planting, fertilizing or maintenance operations.

(3) Fertilize according to soil tests. Fertilizer needs can be determined by a soil testing laboratory or regional recommendations can be made by county agricultural extension agents. Fertilizer should be worked into the soil to a depth of 3 inches with a disc, springtooth harrow or other suitable equipment. On sloping land, the final harrowing or discing operation should be on the contour.

General Installation (VA Dept of Conservation, 1992):

(1) Sod should not be cut or laid in excessively wet or dry weather. Sod also should not be laid on soil surfaces that are frozen.

(2) During periods of high temperature, the soil should be lightly irrigated immediately prior to laying the sod, to cool the soil and reduce root burning and dieback.

(3) The first row of sod should be laid in a straight line with subsequent rows placed parallel to and butting tightly against each other. Lateral joints should be staggered to promote more uniform growth and strength. Care should be exercised to ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause drying of the roots (see Figure 1-22).

(4) On slopes 3:1 or greater, or wherever erosion may be a problem, sod should be laid with staggered joints and secured by stapling or other approved methods. Sod should be installed with the length perpendicular to the slope (on the contour).

(5) As sodding of clearly defined areas is completed, sod should be rolled or tamped to provide firm contact between roots and soil.

(6) After rolling, sod should be irrigated to a depth sufficient that the underside of the sod pad and the soil 4 inches below the sod is thoroughly wet.

(7) Until such time a good root system becomes developed, in the absence of adequate rainfall, watering should be performed as often as necessary to maintain moist soil to a depth of at least 4 inches.

(8) The first mowing should not be attempted until the sod is firmly rooted, usually 2-3 weeks. Not more than one third of the grass leaf should be removed at any one cutting.

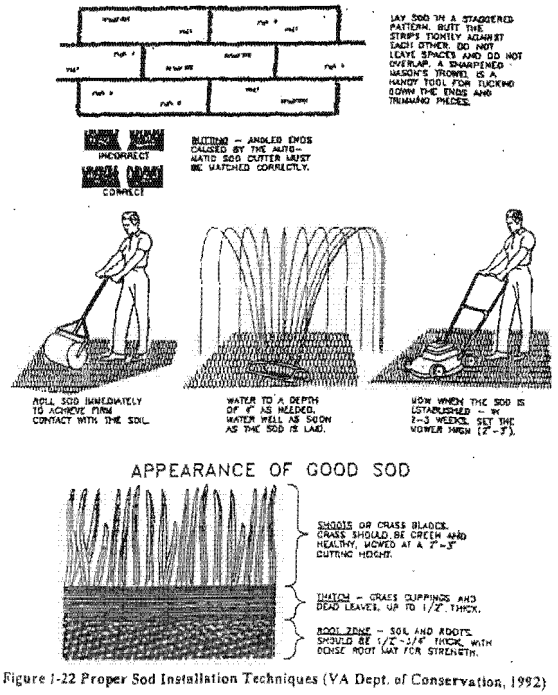


Figure 1-22 Proper Sod Installation Techniques (VA Dept. of Conservation, 1992)

Installation in Channels:

(1) Sod strips in waterways should be laid perpendicular to the direction of flow. Care should be taken to butt ends of strips tightly (see Figure 1-23).

(2) After rolling or tamping, sod should be pegged or stapled to resist washout during the establishment period. Mesh or other netting may be pegged over the sod for extra protection in critical areas.

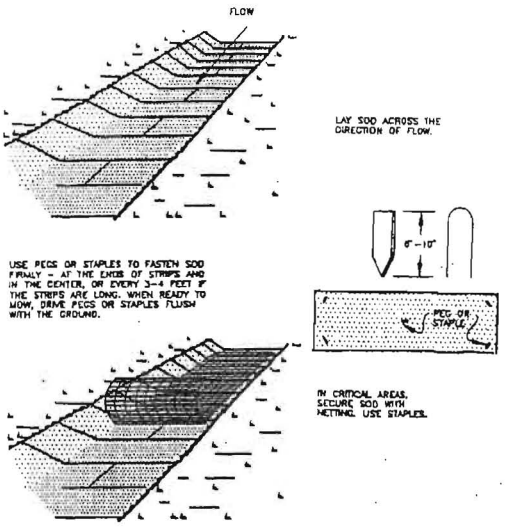


Figure 1-23 Installation of Sod in a Channel (VA Dept. of Conservation, 1992)

Inspection and Maintenance Guidelines:

(3) Sod should be inspected weekly and after each rain event to locate and repair any damage.

(4) Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization should be repaired as soon as practical.

1.3.12 Dust Control

The purpose of dust control is to prevent blowing and movement of dust from exposed soil surfaces, reduce on and off-site damage, health hazards and improve traffic safety. This practice is applicable to areas subject to dust blowing and movement where on and off-site damage is likely without treatment.

Construction activities inevitably result in the exposure and disturbance of soil. Fugitive dust is emitted both during the activities (i.e., excavation demolition, vehicle traffic, human activity) and as a result of wind erosion over the exposed earth surfaces. Large quantities of dust are typically generated in 'heavy' construction activities, such as road and street construction and subdivision, commercial or industrial development, which involve disturbance of significant areas of the soil surface. Research on construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction (VA Dept of Conservation, 1992). Earth moving activities comprise the major source of construction dust emissions, but traffic and general disturbance of the soil also generate significant dust emissions.

Temporary Methods:

(1) Vegetative Cover – See Section 1.3.8.

(2) Mulches – See Section 1.3.10 – Chemical mulch binders may be used to bind mulch material. Commercial binders should be used according to manufacturer's recommendations.

(3) Commercially available dust suppressors if applied in accordance with the manufacturers' directions

(4) Tillage – to roughen surface and bring clods to the surface. This is an emergency measure that should be used before soil blowing starts. Begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows and similar plows are examples of equipment that may produce the desired effect.

(5) Irrigation – Site is sprinkled with water until the surface is moist. Repeat as needed. Irrigation can be particularly effective for controlling dust during trenching operations. A dedicated water truck placed next to the trencher and using a "pulse" fog pattern applied to the discharge belt can effectively control dust. This method is more effective than spraying the ground ahead of the trencher or the trench itself as it is being dug.

(6) Barriers – Solid board fences, snow fences, burlap fences, crate walls, bales of hay and similar materials can be used to control air currents and soil blowing.

Barriers placed at right angles to prevailing currents at intervals of about 15 times their height are effective in controlling soil blowing.

Permanent Methods:

(1) Permanent Vegetation – trees or large shrubs may afford valuable protection if left in place.

(2) Topsoil – Covering with less erosive soil material.

(3) Stone – Cover surface with crushed stone or coarse gravel.

Inspection and Maintenance Guidelines:

(1) When dust is evident during dry weather, reapply dust control BMPs.

1.4 Temporary Sediment Control BMPs

1.4.1 General Guidelines

Construction activities normally result in disturbance on the site due to grading operations, clearing and other activities. Erosion will occur in the disturbed areas and BMPs should be used to contain the sediment transported by stormwater runoff. Although the names of many controls suggest that filtration is an important component of sediment removal, almost all reduction in sediment load is the result of particle settling under relatively quiescent conditions. Consequently, sediment barriers, such as silt fences and rock berms, should be designed and installed as temporary (although leaky) dams.

When viewed as temporary dams, it is easier to see the importance of installing these devices along the contour or with a constant top elevation to prevent concentrating the runoff at the lowest spot in the barrier. Concentrating the runoff in this fashion can result in more erosion than if no barrier was installed at all. Therefore, great care should be taken in the placement and installation of these types of controls.

For larger areas or where effective installation of sediment barriers is not an option, sediment traps and sediment basins should be used to control sediment in runoff. These devices are essentially larger, more permanent dams that temporarily detain stormwater runoff.

All of the sediment control BMPs are potentially very effective for removing sediment from stormwater runoff when properly maintained and installed. However, this potential is often squandered. Casual observation of many active construction sites reveals silt fences that are torn or damaged by equipment, evidence of stormwater bypass, or controls installed in inappropriate locations (i.e., silt fences used in channels). In these cases, significant funds are expended for little in the way of water quality protection. Consequently, proper installation and maintenance should form a key component of any temporary sediment control plan.

A list of the temporary sediment controls and their appropriate siting criteria are contained in Table 1-5. More detailed guidance on siting and maintenance are contained in the subsequent sections. Note that hay bales are no longer considered an effective sediment control measure. Compost amended soils can be used to promote vegetation growth, but they are not considered a sediment control technology. Compost berms for sediment control are considered to be an experimental technology and should not be used in the areas covered by the Edwards Rules.

Table 1-5 Guidelines for Selection of Sediment Control BMPs

Control Type	Applications	Drainage Area	
Construction Exit	Should be used at all designated access points.	NA	NA
Silt Fence (interior)	Areas of minor sheet flow.	< ¼ acre/100 ft of fence	< 20%
Silt Fence (exterior)	Down slope borders of site; up slope border is necessary to divert offsite drainage. For larger areas use diversion swale or berm.	< ¼ acre/100 ft of fence	< 20%
Triangular Filter Dike	Areas within site requiring frequent access.	< 1 acre	< 10%
Rock Berm	Drainage swales and ditches with and below site.	< 5 acres	< 30%
High Service Rock Berm	Around sensitive features, high flow areas within and below site.	< 5 acres	< 30%
Brush Berm	Small areas of sheet flow	< 2 acres	< 20%
Sand Bag Berm	For construction activities in streambeds.	5-10 acres	<15%
Vegetative Buffer Strips	On floodplains, next to wetlands, along stream banks, and on steep slopes.	NA	NA
Inlet Protection	Prevent sediment from entering storm drain system.	< 1 acre	NA
Sediment Trap	Used where flows concentrated in a swale or channel	1-5 acres	NA
Sediment Basin	Appropriate for large disturbed areas	5 - 100 acres	NA
Filter Rolls	On slopes to interrupt slope	< 1 acre	<30%
Dewatering Operations	Used to remove groundwater or accumulated stormwater from excavations	NA	NA
Spill Prevention	Used on all sites to reduce spills	NA	NA
Utility Line Crossings	Crossings of drainage ways and creeks	>40 acres	NA
Concrete Washout	Use on all concrete pouring operations	NA	NA

1.4.2 Temporary Construction Entrance/Exit

The purpose of a temporary gravel construction entrance is to provide a stable entrance/exit condition from the construction site and keep mud and sediment off public roads. A stabilized construction entrance is a stabilized pad of crushed stone located at any point traffic will be entering or leaving the construction site from a public right-of-way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or flowing of sediment onto public rights-of-way. This practice should be used at all points of construction ingress and egress. Schematic diagrams of a construction entrance/exit are shown in Figure 1-24 and Figure 1-25.

Excessive amounts of mud can also present a safety hazard to roadway users. To minimize the amount of sediment loss to nearby roads, access to the construction site should be limited to as few points as possible and vegetation around the perimeter should be protected were access is not necessary. A rock stabilized construction entrance should be used at all designated access points.

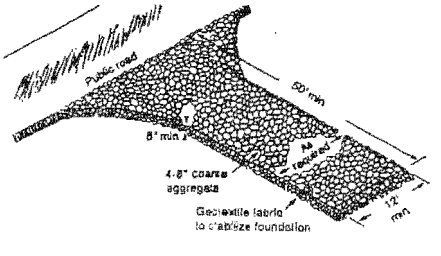


Figure 1-24 Schematic of Temporary Construction Entrance/Exit (after NC, 1993)

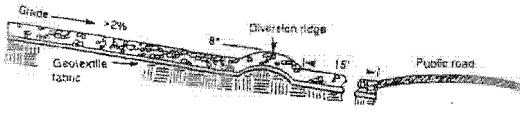


Figure 1-25 Cross-section of a Construction Entrance/Exit (NC, 1993)

Materials:

(1) The aggregate should consist of 4 to 8 inch washed stone over a stable foundation as specified in the plan.

(2) The aggregate should be placed with a minimum thickness of 8 inches.

(3) The geotextile fabric should be designed specifically for use as a soil filtration media with an approximate weight of 6 oz/yd^2, a mullen burst rating of 140 lb/in^2, and an equivalent opening size greater than a number 50 sieve.

(4) If a washing facility is required, a level area with a minimum of 4 inch diameter washed stone or commercial rack should be included in the plans. Divert wastewater to a sediment trap or basin.

Installation: (North Carolina, 1993)

(1) Avoid curves on public roads and steep slopes. Remove vegetation and other objectionable material from the foundation area. Grade crown foundation for positive drainage.

(2) The minimum width of the entrance/exit should be 12 feet or the full width of exit roadway, whichever is greater.

(3) The construction entrance should be at least 50 feet long.

(4) If the slope toward the road exceeds 2%, construct a ridge, 6 to 8 inches high with 3:1 (H:V) side slopes, across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.

(5) Place geotextile fabric and grade foundation to improve stability, especially where wet conditions are anticipated.

(6) Place stone to dimensions and grade shown on plans. Leave surface smooth and slope for drainage.

(7) Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.

(8) Install pipe under pad as needed to maintain proper public road drainage.

Common trouble points

(1) Inadequate runoff control – sediment washes onto public road.

(2) Stone too small or geotextile fabric absent, results in muddy condition as stone is pressed into soil.

(3) Pad too short for heavy construction traffic – extend pad beyond the minimum 50 foot length as necessary.

(4) Pad not flared sufficiently at road surface, results in mud being tracked on to road and possible damage to road edge.

(5) Unstable foundation – use geotextile fabric under pad and/or improve foundation drainage.

Inspection and Maintenance Guidelines:

(1) The entrance should be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.

(2) All sediment spilled, dropped, washed or tracked onto public rights-of-way should be removed immediately by contractor.

(3) When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way.

(4) When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.

(5) All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

1.4.3 Silt Fence

A silt fence is a barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. When properly used, silt fences can be highly effective at controlling sediment from disturbed areas. They cause runoff to pond, allowing heavier solids to settle out. If not properly installed, silt fences are not likely to be effective. A schematic illustration of a silt fence is shown in Figure 1-26.

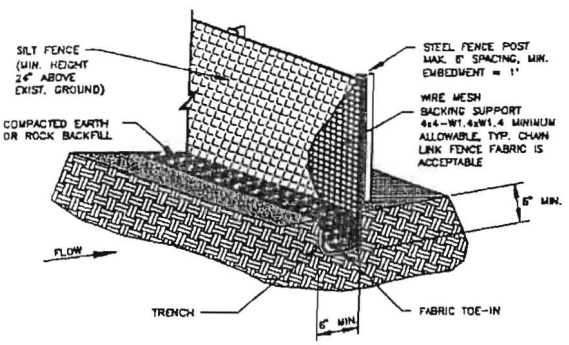


Figure 1-26 Schematic of a Silt Fence Installation (NCTCOG, 1993b)

The purpose of a silt fence is to intercept and detain water-borne sediment from unprotected areas of a limited extent. Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way. If concentrated flow occurs after installation, corrective action must be taken such as placing a rock berm in the areas of concentrated flow.

Silt fencing within the site may be temporarily moved during the day to allow construction activity provided it is replaced and properly anchored to the ground at th end of the day. Silt fences on the perimeter of the site or around drainage ways should . be moved at any time.

Materials:

(1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in^2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.

(2) Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or Y-bar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft^2, and Brindell hardness exceeding 140.

(3) Woven wire backing to support the fabric should be galvanized 2" x 4" welded wire, 12 gauge minimum.

Installation:

(1) Steel posts, which support the silt fence, should be installed on a slight angle toward the anticipated runoff source. Post must be embedded a minimum of 1-foot deep and spaced not more than 8 feet on center. Where water concentrates, the maximum spacing should be 6 feet.

(2) Lay out fencing down-slope of disturbed area, following the contour as closely as possible. The fence should be sited so that the maximum drainage area is ¼ acre/100 feet of fence.

(3) The toe of the silt fence should be trenched in with a spade or mechanical trencher, so that the down-slope face of the trench is flat and perpendicular to the line of flow. Where fence cannot be trenched in (e.g., pavement or rock outcrop), weight fabric flap with 3 inches of pea gravel on uphill side to prevent flow from seeping under fence.

(4) The trench must be a minimum of 6 inches deep and 6 inches wide to allow for the silt fence fabric to be laid in the ground and backfilled with compacted material.

(5) Silt fence should be securely fastened to each steel support post or to woven wire, which is in turn attached to the steel fence post. There should be a 3-foot overlap, securely fastened where ends of fabric meet.

(6) Silt fence should be removed when the site is completely stabilized so as not to block or impede storm flow or drainage.

Common Trouble Points:

(1) Fence not installed along the contour causing water to concentrate and flow over the fence.

(2) Fabric not seated securely to ground (runoff passing under fence)

(3) Fence not installed perpendicular to flow line (runoff escaping around sides)

(4) Fence treating too large an area, or excessive channel flow (runoff overtops or collapses fence)

Inspection and Maintenance Guidelines:

(1) Inspect all fencing weekly, and after any rainfall.

(2) Remove sediment when buildup reaches 6 inches.

(3) Replace any torn fabric or install a second line of fencing parallel to the torn section.

(4) Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.

(5) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

1.4.4 Triangular Sediment Filter Dikes

The purpose of a triangular sediment filter dike (Figure 1-27) is to intercept and detain water-borne sediment from unprotected areas of limited extent. The triangular sediment filter dike is used where there is no concentration of water in a channel or other drainage way above the barrier and the contributing drainage area is less than one acre. If the uphill slope above the dike exceeds 10%, the length of the slope above the dike should be less than 50 feet. If concentrated flow occurs after installation, corrective action should be taken such as placing rock berm in the areas of concentrated flow.

This measure is effective on paved areas where installation of silt fence is not possible or where vehicle access must be maintained. The advantage of these controls is the ease with which they can be moved to allow vehicle traffic, then reinstalled to maintain sediment control.

Materials:

(1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in^2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.

(2) The dike structure should be 6 gauge 6" x 6" wire mesh folded into triangular form being eighteen (18) inches on each side.

Installation:

(1) As shown in the diagram (Figure 1-27), the frame should be constructed of 6" x 6", 6 gauge welded wire mesh, 18 inches per side, and wrapped with geotextile fabric the same composition as that used for silt fences.

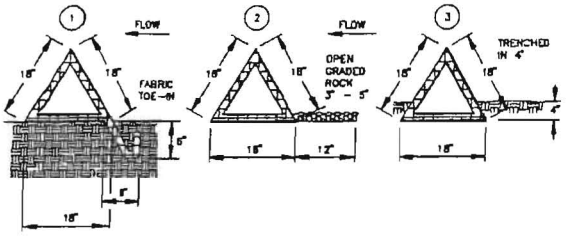
(2) Filter fabric should lap over ends six (6) inches to cover dike to dike junction; each junction should be secured by shoat rings.

(3) Position dike parallel to the contours, with the end of each section closely abutting the adjacent sections.

(4) There are several options for fastening the filter dike to the ground as shown in Figure 1-27. The fabric skirt may be toed-in with 6 inches of compacted material, or 12 inches of the fabric skirt should extend uphill and be secured with a minimum of 3 inches of open graded rock, or with staples or nails. If these two options are not feasible the dike structure may be trenched in 4 inches.

(5) Triangular sediment filter dikes should be installed across exposed slopes during construction with ends of the dike tied into existing grades to prevent failure and should intercept no more than one acre of runoff.

(6) When moved to allow vehicular access, the dikes should be reinstalled as soon as possible, but always at the end of the workday.



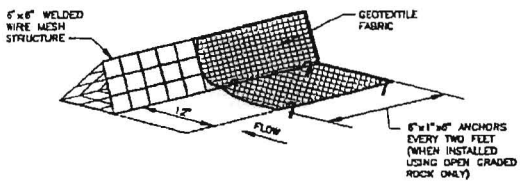


Figure 1-27 Schematic of a Triangular Filter Dike (NCTCOG, 1993)

Common Trouble Points:

(1) Fabric skirt missing, too short, or not securely anchored (flows passing under dike).

(2) Gap between adjacent dikes (runoff passing between dikes).

(3) Dike not placed parallel to contour (runoff flowing around dike).

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly or after each rainfall event and repair or replacement should be made promptly as needed by the contractor.

(2) Inspect and realign dikes as needed to prevent gaps between sections.

(3) Accumulated silt should be removed after each rainfall, and disposed of in a manner which will not cause additional siltation.

(4) After the site is completely stabilized, the dikes and any remaining silt should be removed. Silt should be disposed of in a manner that will not contribute to additional siltation.

1.4.5 Rock Berms

The purpose of a rock berm is to serve as a check dam in areas of concentrated flow, to intercept sediment-laden runoff, detain the sediment and release the water in sheet flow. The rock berm should be used when the contributing drainage area is less than 5 acres. Rock berms are used in areas where the volume of runoff is too great for a silt fence to contain. They are less effective for sediment removal than silt fences, particularly for fine particles, but are able to withstand higher flows than a silt fence. As such, rock berms are often used in areas of channel flows (ditches, gullies, etc.). Rock berms are most effective at reducing bed load in channels and should not be substituted for other erosion and sediment control measures farther up the watershed.

Materials:

(1) The berm structure should be secured with a woven wire sheathing having maximum opening of 1 inch and a minimum wire diameter of 20 gauge galvanized and should be secured with shoat rings.

(2) Clean, open graded 3- to 5-inch diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rocks may be used.

Installation:

(1) Lay out the woven wire sheathing perpendicular to the flow line. The sheathing should be 20 gauge woven wire mesh with 1 inch openings.

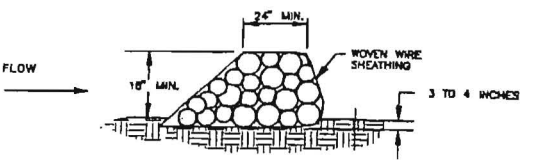
(2) Berm should have a top width of 2 feet minimum with side slopes being 2:1 (H:V) or flatter.

(3) Place the rock along the sheathing as shown in the diagram (Figure 1-28), to a height not less than 18".

(4) Wrap the wire sheathing around the rock and secure with tie wire so that the ends of the sheathing overlap at least 2 inches, and the berm retains its shape when walked upon.

(5) Berm should be built along the contour at zero percent grade or as near as possible.

(6) The ends of the berm should be tied into existing upslope grade and the berm should be buried in a trench approximately 3 to 4 inches deep to prevent failure of the control.



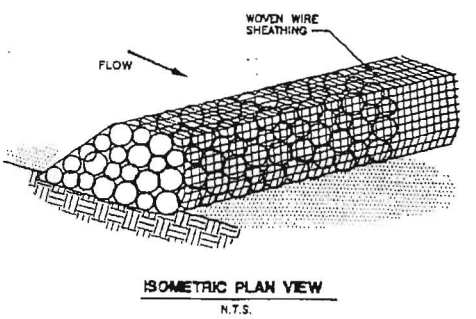


Figure 1-28 Schematic Diagram of a Rock Berm (NCTCOG, 1993)

Common Trouble Points:

(1) Insufficient berm height or length (runoff quickly escapes over the top or around the sides of berm)

(2) Berm not installed perpendicular to flow line (runoff escaping around one side)

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall by the responsible party. For installations in streambeds, additional daily inspections should be made.

(2) Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt in an approved manner that will not cause any additional siltation.

(3) Repair any loose wire sheathing.

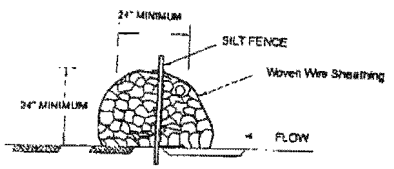
(4) The berm should be reshaped as needed during inspection.

(5) The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.

(6) The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

1.4.6 High Service Rock Berms

A high service rock berm should be designated in areas of important environm significance such as in steep canyons or above permanent springs, pools, rec features, or other environmentally sensitive areas that may require a higher lev protection. This type of sediment barrier combines the characteristics of a silt fence and a rock berm to provide a substantial level of sediment reduction and a sturdy enough barrier to withstand higher flows. The drainage area to this device should not exceed 5 acres and the slope should be less than 30%.



Cross - Section

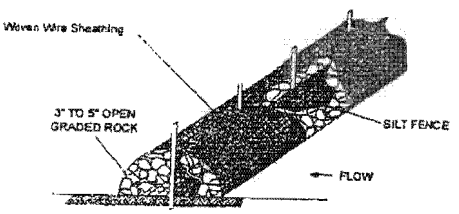


Figure 1-29 Schematic Diagram of High Service Rock Berm (LCRA, 1998)

Materials:

(1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in^2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.

(2) Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or Y-bar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft^2, and Brindell hardness exceeding 140. Rebar (either #5 or #6) may also be used to anchor the berm.

(3) Woven wire backing to support the fabric should be galvanized 2" x 4" welded wire, 12 gauge minimum.

(4) The berm structure should be secured with a woven wire sheathing having maximum opening of 1 inch and a minimum wire diameter of 20 gauge galvanized and should be secured with shoat rings.

(5) Clean, open graded 3- to 5-inch diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rocks may be used.

Installation:

(1) Lay out the woven wire sheathing perpendicular to the flow line. The sheathing should be 20 gauge woven wire mesh with 1-inch openings.

(2) Install the silt fence along the center of the proposed berm placement, as with a normal silt fence described in Section 2.4.3.

(3) Place the rock along the sheathing on both sides of the silt fence as shown in the diagram (Figure 1-29), to a height not less than 24 inches. Clean, open graded 3-5" diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5- to 8-inch diameter rock may be used.

(4) Wrap the wire sheathing around the rock and secure with tie wire so that the ends of the sheathing overlap at least 2 inches, and the berm retains its shape when walked upon.

(5) The high service rock berm should be removed when the site is revegetated or otherwise stabilized or it may remain in place as a permanent BMP if drainage is adequate.

Common Trouble Points:

(1) Insufficient berm height or length (runoff quickly escapes over top or around sides of berm).

(2) Berm not installed perpendicular to flow line (runoff escaping around one side).

(3) Internal silt fence not anchored securely to ground (high flows displacing berm).

(4) When installed in streambeds, they often result in diversion scour, so their use in this setting is not recommended.

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall by the responsible party. For installations in streambeds, additional daily inspections should be made on rock berm.

(2) Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt of in an approved manner.

(3) Repair any loose wire sheathing.

(4) The berm should be reshaped as needed during inspection.

(5) The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.

(6) The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

1.4.7 Brush Berms

Organic litter and spoil material from site clearing operations is usually burned or hauled away to be dumped elsewhere. Much of this material can be used effectively on the construction site itself. In areas where dense juniper (know locally as "cedar") thickets must be cleared, construction of brush berms from the cut juniper branches can be an effective alternative to installation of silt fences. The key to constructing an efficient brush berm is in the method used to obtain and place the brush. It will not be acceptable to simply take a bulldozer and push whole trees into a pile. This method does not assure continuous ground contact with the berm and will allow uncontrolled flows under the berm.

Brush berms may be used where there is little or no concentration of water in a channel or other drainage way above the berm. The size of the drainage area should be no greater than one-fourth of an acre per 100 feet of barrier length; the maximum slope length behind the barrier should not exceed 100 feet; and the maximum slope gradient behind the barrier should be less than 50 percent (2:1). Figure 1-30 illustrates a brush berm.

Materials:

(1) The brush should consist of woody brush and branches, preferably juniper less than 2 inches in diameter.

(2) The filter fabric should conform to the specifications for filter fence fabric.

(3) The rope should be ¼ inch polypropylene or nylon rope.

(4) The anchors should be 3/8-inch diameter rebar stakes that are 18-inches long.

Guidelines for installation:

(1) Lay out the brush berm following the contour as closely as possible.

(2) The juniper limbs should be cut and hand placed with the vegetated part of the limb in close contact with the ground. Each subsequent branch should overlap the previous branch providing a shingle effect.

(3) The brush berm should be constructed in lifts with each layer extending the entire length of the berm before the next layer is started.

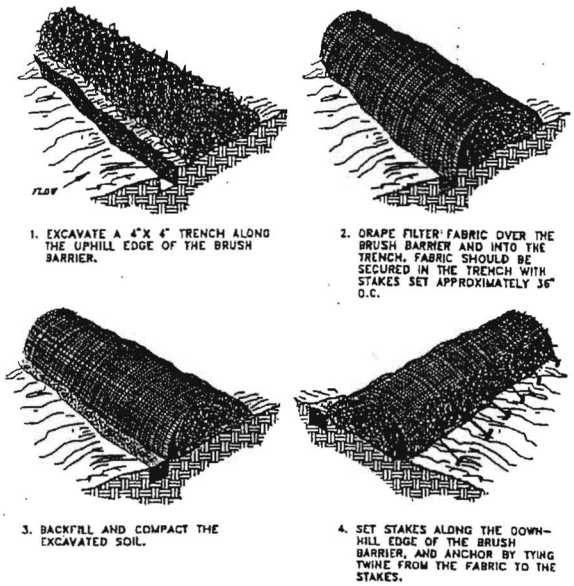


Figure 1-30 Schematic Diagram of a Brush Berm (VA Dept. of Conservation, 1992)

(4) A trench should be excavated 6-inches wide and 4-inches deep along the length of the barrier and immediately uphill from the barrier.

(5) The filter fabric should be cut into lengths sufficient to lay across the barrier from its up-slope base to just beyond its peak. The lengths of filter fabric should be draped across the width of the barrier with the uphill edge placed in the trench and the edges of adjacent pieces overlapping each other. Where joints are necessary, the fabric should be spliced together with a minimum 6-inch overlap and securely sealed.

(6) The trench should be backfilled and the soil compacted over the filter fabric.

(7) Set stakes into the ground along the downhill edge of the brush barrier, and anchor the fabric by tying rope from the fabric to the stakes. Drive the rope anchors into the ground at approximately a 45-degree angle to the ground on 6-foot centers.

(8) Fasten the rope to the anchors and tighten berm securely to the ground with a minimum tension of 50 pounds.

(9) The height of the brush berm should be a minimum of 24 inches after the securing ropes have been tightened.

Common Trouble Points:

(1) Gaps between berm and ground due to uneven ground surface, inadequately compacted berm, or inadequately secured berm (runoff passing directly under berm).

(2) Berm receiving excessive volumes or velocities of flow (runoff overtopping or displacing berm).

Inspection and Maintenance Guidelines:

(1) The area upstream from the brush berm should be maintained in a condition that will allow accumulated silt to be removed following the runoff of a rainfall event.

(2) The berm should be inspected weekly or after each rainfall event.

(3) When the silt reaches a depth of 6 inches is should be removed and disposed of appropriately and in a manner that will not contribute to additional siltation.

(4) Periodic tightening of the anchoring ropes may be required due to shrinkage of the brush berm as it deteriorates over time;

(5) Brush berms should be replaced after 3 months or be repaired or reconstructed when loss of foliage occurs or, in the opinion of the TCEQ, they no longer function as intended.

1.4.8 Check Dams

Check dams are small barriers consisting of rock or earthen berms placed across a drainage swale or ditch. They reduce the velocity of small concentrated flows, provide a limited barrier for sediment and help disperse concentrated flows, reducing potential erosion.

They are used primarily in long drainage swales or ditches in which permanent vegetation may not be established and erosive velocities are present. They are typically used in conjunction with other techniques such as inlet protection, riprap or other sediment reduction techniques. Check dams provide limited treatment. They are more useful in reducing flow to acceptable levels for other techniques (NCTCOG, 1993b).

Although check dams are effective in reducing flow velocity and thereby the potential for channel erosion, it is usually better to establish a protective vegetative lining before flow is confined or to install a structural channel lining. However, under circumstances where this is not feasible, check dams are useful.

Materials:

Although many different types of material can be used to create check dams, aggregate and riprap produce a more stable structure.

(1) If the drainage area is less than 2 acres, coarse aggregate alone can be used for the dam.

(2) For drainage areas between 2 and 10 acres, a combination of coarse aggregate and riprap as shown in Figure 1-31 should be used.

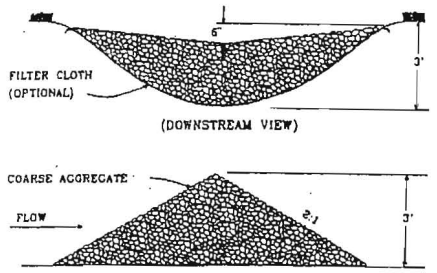
Guidelines for Installation:

(1) The dam height should be between 18 and 36 inches.

(2) The center of the check dam should be at least 6 inches lower than the outer edges. Field experience has shown that many dams are not constructed to promote this "weir" effect. Stormwater flows are then forced to the stone-soil interface, thereby promoting scour at that point and subsequent failure of the structure to perform its intended function.

(3) The dam should be designed so that the 2-year, 24-hour storm can pass the dam without causing excessive upstream flooding.

2 ACRES OR LESS OF DRAINAGE AREA:



2-10 ACRES OF DRAINAGE AREA:

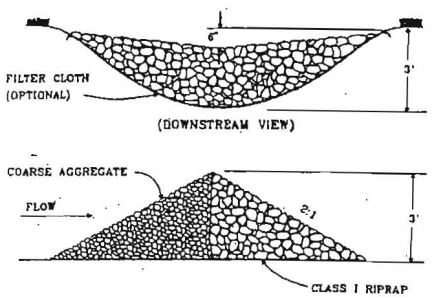


Figure 1-31 Diagram of a Rock Check Dam (VA Dept. of Conservation, 1992)

(4) For added stability, the base of the check dam can be keyed into the soil approximately 6 inches.

(5) The maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

(6) Stone should be placed according to the configuration in Figure 1-31. Hand or mechanical placement will be necessary to achieve complete coverage of the ditch or swale and to insure that the center of the dam is lower than the edges.

(7) Filter cloth may be used under the stone to provide a stable foundation and to facilitate the removal of the stone.

Common Trouble Points:

(1) Check dams installed in grass-lined channels may kill the vegetative lining if submergence after rains is too long and/or silting is excessive.

(2) If check dams are used in grass-lined channels that will be mowed, care should be taken to remove all the stone when the dam is removed. Stones often wash downstream and can damage mowing equipment and present a safety hazard.

Inspection and Maintenance Guidelines:

(1) Check dams should be inspected and checked for sediment accumulation after each runoff-producing storm event.

(2) Sediment should be removed when it reaches one half of the original height of the measure.

(3) Regular inspections should be made to insure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam should be corrected immediately.

1.4.9 Sand Bag Berm

The purpose of a sandbag berm (Figure 1-32) is to intercept sediment-laden water from disturbed areas such as construction in streambeds, create a retention pond, detain sediment and release water in sheet flow. Sand bag berms are used only during construction activities in streambeds when the contributing drainage area is between 5 and 10 acres and the slope is less than 15%, i.e., utility construction in channels, temporary channel crossing for construction equipment, etc.

An additional option for use in streambeds is a rock berm, appropriately sized for the channel. Plastic facing should be installed on the upstream side and the berm anchored to be streambed by drilling into the rock and driving in "T" posts or rebar (#5 or #6) spaced appropriately.

Materials:

(1) The sand bag material should be polypropylene, polyethylene, polyamide or cotton burlap woven fabric, minimum unit weight 4 oz/yd^2, mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70 percent.

(2) The bag length should be 24 to 30 inches, width should be 16 to 18 inches and thickness should be 6 to 8 inches.

(3) Sandbags should be filled with coarse grade sand, free from deleterious material. All sand should pass through a No. 10 sieve. The filled bag should have an approximate weight of 40 pounds.

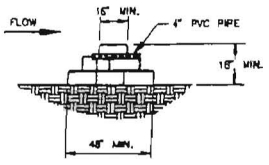
(4) Outlet pipe should be schedule 40 or stronger polyvinyl chloride (PVC) having a nominal internal diameter of 4 inches.

Guidelines for Installation:

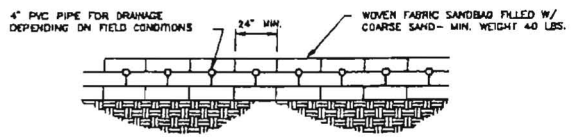
(1) The berm should be a minimum height of 18 inches, measured from the top of the existing ground at the upslope toe to the top of the berm.

(2) The berm should be sized as shown in the plans but should have a minimum width of 48 inches measured at the bottom of the berm and 16 inches measured at the top of the berm.

(3) Runoff water should flow over the tops of the sandbags or through 4-inch diameter PVC pipes embedded below the top layer of bags as shown in Figure 1-32.



CROSS SECTION
N.T.S.



PROFILE VIEW
N.T.S.

Figure 1-32 Schematic of a Sand Bag Berm (NCTCOG, 1993)

(4) When a sandbag is filled with material, the open end of the sandbag should be stapled or tied with nylon or poly cord.

(5) Sandbags should be stacked in at least three rows abutting each other, and in staggered arrangement.

(6) The base of the berm should have at least 3 sandbags. These can be reduced to 2 and 1 bag in the second and third rows respectively.

(7) For each additional 6 inches of height, an additional sandbag must be added to each row width.

(8) A bypass pump-around system, or similar alternative, should be used in conjunction with the berm for effective dewatering of the work area.

Common Trouble Points:

(1) Ponding will occur directly upstream from the berm creating the possibility of flooding, which should be considered prior to its placement.

(2) Berms are often damaged during periods of high flow, which increases the maintenance requirements.

Inspection and Maintenance Guidelines:

(1) The sand bag berm should be inspected weekly and after each rain.

(2) The sandbags should be reshaped or replaced as needed during inspection.

(3) When the silt reaches 6 inches, the accumulated silt should be removed and disposed of at an approved site in a manner that will not contribute to additional siltation.

(4) The sandbag berm should be left in place until all upstream areas are stabilized and accumulated silt removed; removal should be done by hand.

1.4.10 Vegetative Buffers

Buffer zones are undisturbed strips of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities. Natural buffer zones are used along streams and other bodies of water that need protection from erosion and sedimentation. Vegetative buffers can be used to protect natural swales and be incorporated into natural landscaping of an area. They can provide critical habitat adjacent to streams and wetlands, as well as assisting in controlling erosion, especially on unstable steep slopes.

The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted. If buffer zones are preserved, existing vegetation, good planning, and site management are needed to prevent disturbances such as grade changes, excavation, damage from equipment, and other activities. The creation of new buffer strips requires the establishment of a good dense turf (at least 80% coverage), trees, and shrubs.

Guidelines for installation:

(1) Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.

(2) All unstable steep slopes should be left in natural vegetation.

(3) Fence or flag clearing limits and keep all equipment and construction debris out of the natural areas.

(4) Keep all excavations outside the dripline of trees and shrubs.

(5) Debris or extra soil should not be pushed into the buffer zone area because it will cause damage from burying and smothering.

(6) The minimum width of a vegetative buffer used for sediment control should be 50 feet.

Inspection and Maintenance Guidelines:

Inspection and careful maintenance are important to ensure healthy vegetation. The need for routine maintenance such as mowing, fertilizing, irrigating, and weed and pest control will depend on the species of plants and trees, soil types, location and climatic conditions. County agricultural extension agencies are a good source of this type of information.

1.4.11 Inlet Protection

Storm sewers that are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural drainage ways. In case of extreme sediment loading, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets. The following guidelines for inlet protection are based primarily on recommendations by the Virginia Dept. of Conservation and Recreation (1992) and the North Central Texas Council of Governments (NCTCOG, 1993b).

In developments for which drainage is to be conveyed by underground storm sewers (i.e., streets with curbs and gutters), all inlets that may receive storm runoff from disturbed areas should be protected. Temporary inlet protection is a series of different measures that provide protection against silt transport or accumulation in storm sewer systems. This clogging can greatly reduce or completely stop the flow in the pipes. The different measures are used for different site conditions and inlet types.

Care should be taken when choosing a specific type of inlet protection. Field experience has shown that inlet protection that causes excessive ponding in an area of high construction activity may become so inconvenient that it is removed or bypassed, thus transmitting sediment-laden flows unchecked. In such situations, a structure with an adequate overflow mechanism should be utilized.

It should also be noted that inlet protection devices are designed to be installed on construction sites and not on streets and roads open to the public. When used on public streets these devices will cause ponding of runoff, which can cause minor flooding and can present a traffic hazard. An example of appropriate siting would be a new subdivision where the storm drain system is installed before the area is stabilized and the streets open to the general public. When construction occurs adjacent to active streets, the sediment should be controlled on site and not on public thoroughfares. Occasionally, roadwork or utility installation will occur on public roads. In these cases, inlet protection is an appropriate temporary BMP.

The following inlet protection devices are for drainage areas of one acre or less. Runoff from larger disturbed areas should be routed to a temporary sediment trap or basin.

Filter barrier protection using silt fence is appropriate when the drainage area is less than one acre and the basin slope is less than five percent. This type of protection is not applicable in paved areas.

Block and gravel protection is used when flows exceed 0.5 cubic feet per second and it is necessary to allow for overtopping to prevent flooding. This form of protection is also useful for curb type inlets as it works well in paved areas.

Wire mesh and gravel protection is used when flows exceed 0.5 cubic feet per second and construction traffic may occur over the inlet. This form of protection may be used with both curb and drop inlets.

Excavated impoundment protection around a drop inlet may be used for protection against sediment entering a storm drain inlet. With this method, it is necessary to install weep holes to allow the impoundment to drain completely. If this measure is implemented, the impoundment should be sized such that the volume of excavation is 3,600 cubic feet per acre (equivalent to 1 inch of runoff) of disturbed area entering the inlet.

Materials:

(1) Filter fabric should be a nylon reinforced polypropylene fabric which meets the following minimum criteria: Tensile Strength, 90 lbs.; Puncture Rating, 60 lbs.; Mullen Burst Rating, 280 psi; Apparent Opening Size, U.S. Sieve No. 70.

(2) Posts for fabric should be 2" x 4" pressure treated wood stakes or galvanized steel, tubular in cross-section or they may be standard fence "T" posts.

(3) Concrete blocks should be standard 8" x 8" x 16" concrete masonry units.

(4) Wire mesh should be standard hardware cloth or comparable wire mesh with an opening size not to exceed 1/2 inch.

Guidelines for installation:

Silt Fence Drop Inlet Protection

(1) Silt fence should conform to the specifications listed above and should be cut from a continuous roll to avoid joints.

(2) For stakes, use 2 x 4-inch wood or equivalent metal with a minimum length of 3 feet.

(3) Space stakes evenly around the perimeter of the inlet a maximum of 3 feet apart, and securely drive them into the ground, approximately 18 inches deep (Figure 1-33).

(4) To provide needed stability to the installation, a frame with 2 x 4- inch wood strips around the crest of the overflow area at a maximum of 1½ feet above the drop inlet crest should be provided.

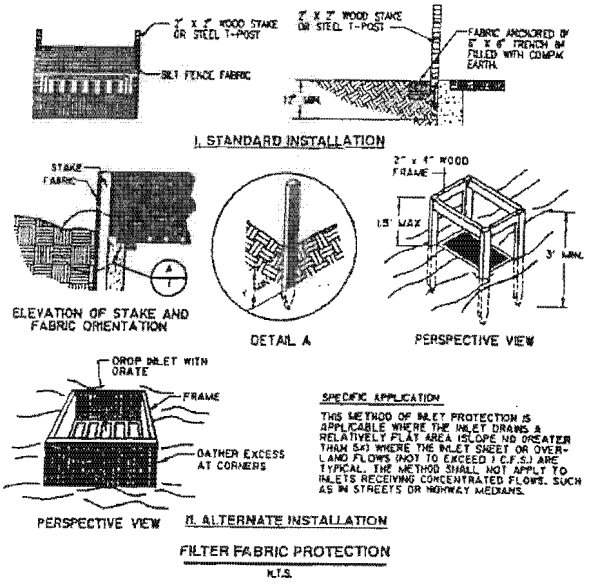


Figure 1-33 Filter Fabric Inlet Protection (NCTCOG, 1993)

(5) Place the bottom 12 inches of the fabric in a trench and backfill the trench with 12 inches of compacted soil.

(6) Fasten fabric securely by staples or wire to the stakes and frame. Joints must be overlapped to the next stake.

(7) It may be necessary to build a temporary dike on the down slope side of the structure to prevent bypass flow.

If the drop inlet is above the finished grade, the grate may be completely covered with filter fabric. The fabric should be securely attached to the entire perimeter of the inlet using 1"x 2" wood strips and appropriate fasteners.

Gravel and Wire Mesh Drop Inlet Sediment Filter

(1) Wire mesh should be laid over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure. Wire mesh with 1/2-inch openings should be used. If more than one strip of mesh is necessary, the strips should be overlapped (see Figure 1-34).

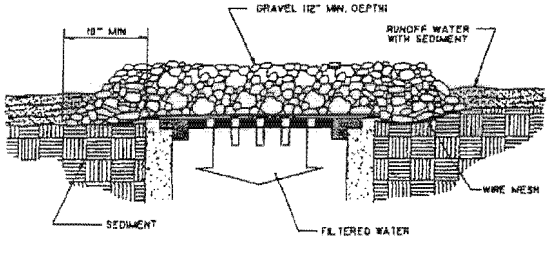


Figure 1-34 Wire Mesh and Gravel Inlet Protection (NCTCOG, 1993)

(2) Coarse aggregate should be placed over the wire mesh as indicated in Figure 1-34. The depth of stone should be at least 12 inches over the entire inlet opening. The stone should extend beyond the inlet opening at least 18 inches on all sides.

(3) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and/or replaced.

Note: This filtering device has no overflow mechanism; therefore, ponding is likely especially if sediment is not removed regularly. This type of device should never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc.

Block and Gravel Drop Inlet Sediment Filter

(1) Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, with the ends of adjacent blocks abutting. The height of the barrier can be varied, depending on design needs, by stacking combinations of 4-inch, 8-inch and 12-inch wide blocks. The barrier of blocks should be between 12 and 24 inches high.

(2) Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings should be used.

(3) Stone should be piled against the wire to the top of the block barrier, as shown in Figure 1-35.

(4) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

Block and Gravel Curb Inlet Sediment Filter

(1) Two concrete blocks should be placed on their sides abutting the curb at either side of the inlet opening.

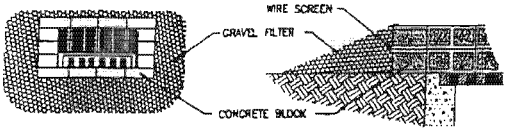
(2) A 2-inch x 4-inch stud should be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.

(3) Concrete blocks should be placed on their sides across the front of the inlet and abutting the spacer blocks as depicted in Figure 1-35.

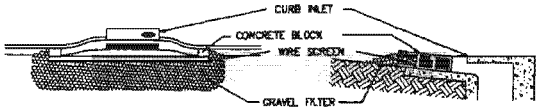
(4) Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire mesh with 1/2-inch openings should be used.

(5) Coarse aggregate should be piled against the wire to the top of the barrier as shown in Figure 1-35.

(6) If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and/or replaced.



DROP INLET PROTECTION
N.T.S.

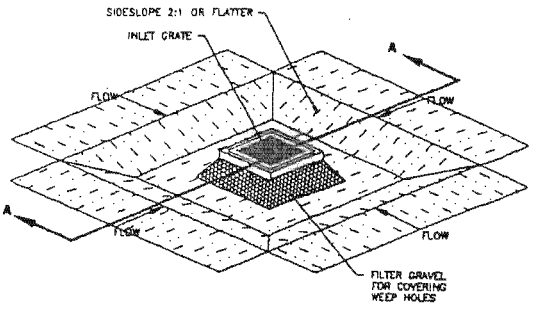


CURB INLET PROTECTION
N.T.S.

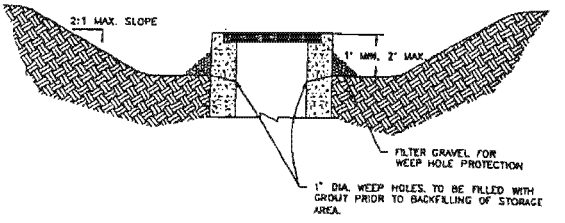
Figure 1-35 Block and Gravel Inlet Protection (NCTCOG, 1993)

Excavated Drop Inlet Sediment Trap

(1) The excavated trap should be sized to provide a minimum storage capacity calculated at 3,600 cubic feet per acre of drainage area. A trap should be no less than 1-foot nor more than 2 feet deep measured from the top of the inlet structure. Side slopes should not be steeper than 2:1 (see Figure 1-36).



ISOMETRIC PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

Figure 1-36 Excavated Inlet Protection (NCTCOG, 1993)

(2) The slope of the basin may vary to fit the drainage area and terrain. Observations must be made to check trap efficiency and modifications should be made as necessary to ensure satisfactory trapping of sediment. Where an inlet is located so as to receive concentrated flows, such as in a highway median, it is recommended that the basin have a rectangular shape in a 2:1 (length/width) ratio, with the length oriented in the direction of the flow.

(3) Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Removed sediment should be deposited in a suitable area and in a manner such that it will not erode.

Curb Inlet Protection with 2-inch x 4-inch Wooden Weir

(1) Attach a continuous piece of wire mesh (30-inch minimum width x inlet throat length plus 4 feet) to the 2-inch x 4-inch wooden weir (with a total length of throat length plus 2 feet) as shown in Figure 1-37. Wood should be "construction grade" lumber.

(2) Place a piece of approved filter cloth of the same dimensions as the wire mesh over the wire mesh and securely attach to the 2-inch x 4-inch weir.

(3) Securely nail the 2-inch x 4-inch weir to the 9-inch long vertical spacers which are to be located between the weir and inlet face at a maximum 6-foot spacing.

(4) Place the assembly against the inlet throat and nail 2-foot (minimum) lengths of 2-inch x 4-inch board to the top of the weir at spacer locations. These 2-inch x 4-inch anchors should extend across the inlet tops and be held in place by sandbags or alternate weight.

(5) The assembly should be placed so that the end spacers are a minimum 1 foot beyond both ends of the throat opening.

(6) Form the wire mesh and filter cloth to the concrete gutter and against the face of curb on both sides of the inlet. Place coarse aggregate over the wire mesh and filter fabric in such a manner as to prevent water from entering the inlet under or around the filter cloth.

(7) This type of protection should be inspected frequently and the filter cloth and stone replaced when clogged with sediment.

(8) Assure that storm flow does not bypass inlet by installing temporary earth or asphalt dikes directing flow into inlet.

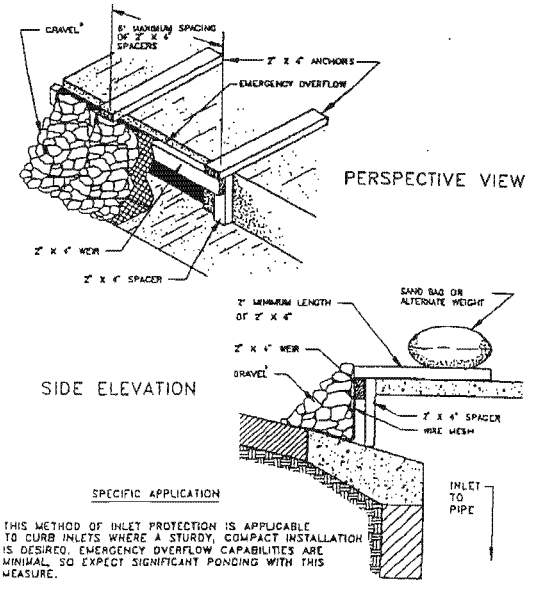


Figure 1-37 Wooden Weir Curb Inlet Protection (VA Dept of Conservation, 1992)

Common Trouble Points:

(1) Gaps between the inlet protection and the curb (flows bypass around side of filter).

(2) Filter fabric skirt not anchored to pavement (flows pass under filter).

Bagged Gravel Inlet Filter

Sandbags filled with pea gravel can also be used to construct a sediment barrier around curb and drain inlets. The sandbags should be filled with washed pea gravel and stacked to form a continuous barrier about 1 foot high around the inlets. The bags should be tightly abutted against each other to prevent runoff from flowing between the bags. This measure should be installed as shown in Figure 1-38.

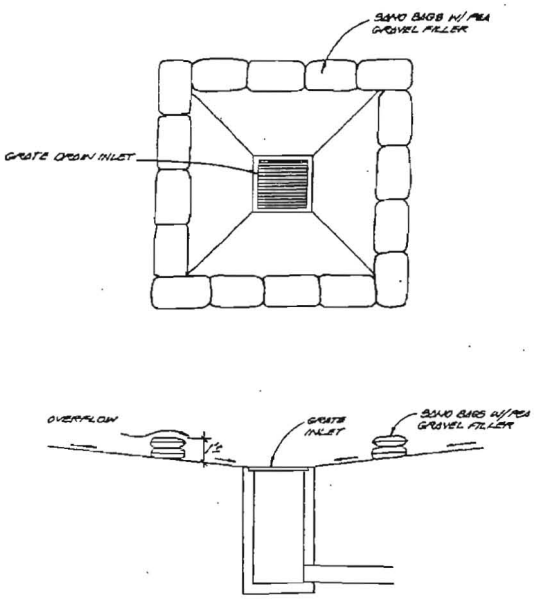


Figure 1-38 Diagram of Bagged Gravel Grate Inlet Protection (Pape-Dawson)

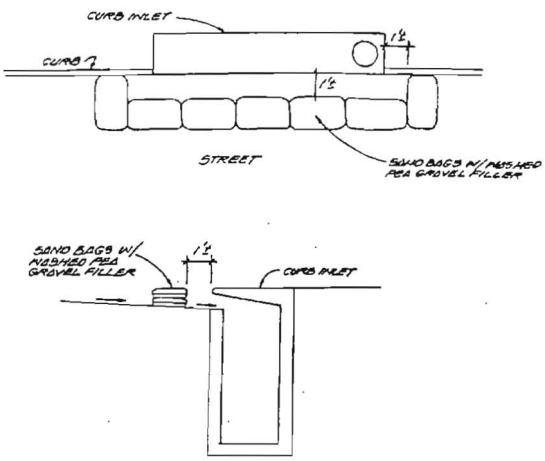


Figure 1-39 Diagram of Bagged Gravel Curb Inlet Protection (Pape-Dawson).

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall. Repair or replacement should be made promptly as needed by the contractor.

(2) Remove sediment when buildup reaches a depth of 3 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode.

(3) Check placement of device to prevent gaps between device and curb.

(4) Inspect filter fabric and patch or replace if torn or missing.

(5) Structures should be removed and the area stabilized only after the remaining drainage area has been properly stabilized.

1.4.12 Stone Outlet Sediment Trap

A stone outlet sediment trap is an impoundment created by the placement of an earthen and stone embankment to prevent soil and sediment loss from a site. The purpose of a sediment trap is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties and rights of way below the sediment trap from sedimentation. A sediment trap is usually installed at points of discharge from disturbed areas. The drainage area for a sediment trap is recommended to be less than 5 acres. Larger areas should be treated using a sediment basin. A sediment trap differs from a sediment basin mainly in the type of discharge structure. A schematic of a sediment trap is shown in Figure 1-40.

The trap should be located to obtain the maximum storage benefit from the terrain, for ease of cleanout and disposal of the trapped sediment and to minimize interference with construction activities. The volume of the trap should be at least 3600 cubic feet per acre of drainage area.

Materials:

(1) All aggregate should be at least 3 inches in diameter and should not exceed a volume of 0.5 cubic foot.

(2) The geotextile fabric specification should be woven polypropylene, polyethylene or polyamide geotextile, minimum unit weight of 4.5 oz/yd^2, mullen burst strength at least 250 lb/in^2, ultraviolet stability exceeding 70%, and equivalent opening size exceeding 40.

Installation:

(1) Earth Embankment: Place fill material in layers not more than 8 inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the material. Compact each layer to 95 percent standard proctor density. Do not place material on surfaces that are muddy or frozen. Side slopes for the embankment are to be 3:1. The minimum width of the embankment should be 3 feet.

(2) A gap is to be left in the embankment in the location where the natural confluence of runoff crosses the embankment line. The gap is to have a width in feet equal to 6 times the drainage area in acres.

(3) Geotextile Covered Rock Core: A core of filter stone having a minimum height of 1.5 feet and a minimum width at the base of 3 feet should be placed across the opening of the earth embankment and should be covered by geotextile fabric

which should extend a minimum distance of 2 feet in either direction from the base of the filter stone core.

(4) Filter Stone Embankment: Filter stone should be placed over the geotextile and is to have a side slope which matches that of the earth embankment of 3:1 and should cover the geotextile/rock core a minimum of 6 inches when installation is complete. The crest of the outlet should be at least 1 foot below the top of the embankment.

Common Trouble Points:

(1) Can cause minor flooding upstream of dam, impacting construction operations.

(2) The cost of construction, availability of materials, and the amount of land required limit the application of this measure.

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Repair should be made promptly as needed by the contractor.

(2) Trash and other debris should be removed after each rainfall to prevent clogging of the outlet structure.

(3) Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to half of the design depth of the trap.

(4) Sediment removed from the trap should be deposited in an approved spoils area and in such a manner that it will not cause additional siltation.

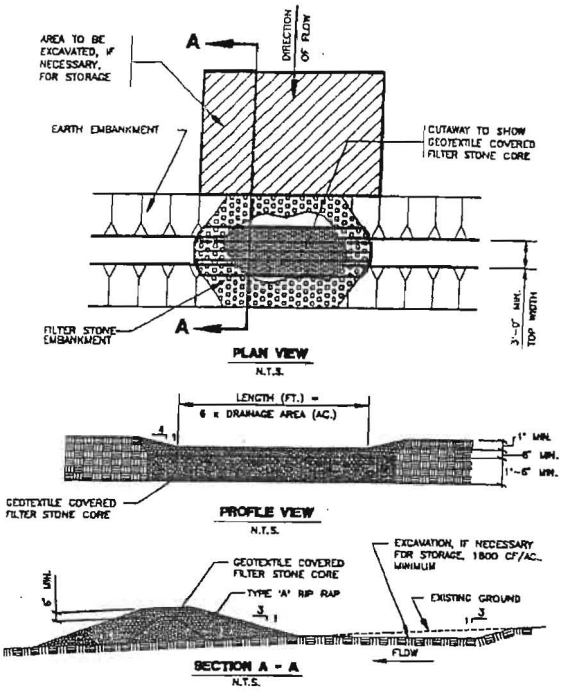


Figure 1-40 Schematic Diagram of a Sediment Trap (NCTCOG, 1993)

1.4.13 Sediment Basins

The purpose of a sediment basin is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties and rights of way below the sediment basin from sedimentation. A sediment basin is usually installed at points of discharge from disturbed areas. The drainage area for a sediment basin is recommended to be less than 100 acres.

Sediment basins are effective for capturing and slowly releasing the runoff from larger disturbed areas thereby allowing sedimentation to take place. A sediment basin can be created where a permanent pond BMP is being constructed. Guidelines for construction of the permanent BMP should be followed, but revegetation, placement of underdrain piping, and installation of sand or other filter media should not be carried out until the site construction phase is complete. A schematic of a sediment basin is shown in Figure 1-41.

Materials:

(1) Riser should be corrugated metal or reinforced concrete pipe or box and should have watertight fittings or end to end connections of sections.

(2) An outlet pipe of corrugated metal or reinforced concrete should be attached to the riser and should have positive flow to a stabilized outlet on the downstream side of the embankment.

(3) An anti-vortex device and rubbish screen should be attached to the top of the riser and should be made of polyvinyl chloride or corrugated metal.

Basin Design and Construction:

(1) For common drainage locations that serve an area with ten or more acres disturbed at one time, a sediment basin should provide storage for a volume of runoff from a two-year, 24-hour storm from each disturbed acre drained. The rainfall depths for the design storm are shown for each county in Table 1-6.

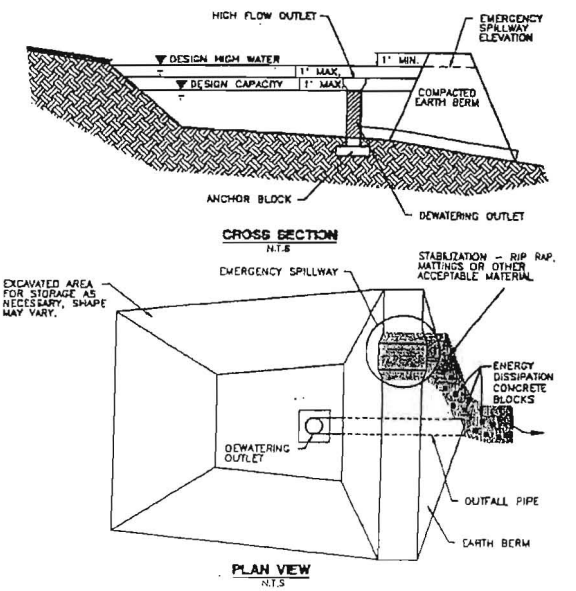


Figure 1-41 Schematic of a Sediment Basin (NCTCOG, 1993)

Table 1-6 Design Storm Depth by County (Asquith and Roussel, 2004)

County	2-year, 24-hour Storm Depth (in)
Bexar	3.8
Comal	3.7
Hays	3.5
Kinney	3.2
Medina	3.4
Travis	3.4
Uvalde	3.3
Williamson	3.4

(2) The basin length to width ratio should be at least 2:1 to improve trapping efficiency. The shape may be attained by excavation or the use of baffles. The lengths should be measured at the elevation of the riser de-watering hole.

(3) Place fill material in layers not more than 8 inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the material. Compact each layer to 95 percent standard proctor density. Do not place material on surfaces that are muddy or frozen. Side slopes for the embankment should be 3:1 (H:V).

(4) An emergency spillway should be installed adjacent to the embankment on undisturbed soil and should be sized to carry the full amount of flow generated by a 10-year, 3-hour storm with 1 foot of freeboard less the amount which can be carried by the principal outlet control device.

(5) The emergency spillway should be lined with riprap as should the swale leading from the spillway to the normal watercourse at the base of the embankment.

(6) The principal outlet control device should consist of a rigid vertically oriented pipe or box of corrugated metal or reinforced concrete. Attached to this structure should be a horizontal pipe, which should extend through the embankment to the toe of fill to provide a de-watering outlet for the basin.

(7) An anti-vortex device should be attached to the inlet portion of the principal outlet control device to serve as a rubbish screen.

(8) A concrete base should be used to anchor the principal outlet control device and should be sized to provide a safety factor of 1.5 (downward forces = 1.5 buoyant forces).

(9) The basin should include a permanent stake to indicate the sediment level in the pool and marked to indicate when the sediment occupies 50% of the basin volume (not the top of the stake).

(10) The top of the riser pipe should remain open and be guarded with a trash rack and anti-vortex device. The top of the riser should be 12 inches below the elevation of the emergency spillway. The riser should be sized to convey the runoff from the 2-year, 3-hour storm when the water surface is at the emergency spillway elevation. For basins with no spillway the riser must be sized to convey the runoff from the 10-yr, 3-hour storm.

(11) Anti-seep collars should be included when soil conditions or length of pipe make piping through the backfill a possibility.

(12) The 48-hour drawdown time will be achieved by using a riser pipe perforated at the point measured from the bottom of the riser pipe equal to ⅓ the volume of the basin. This is the maximum sediment storage elevation. The size of the perforation may be calculated as follows:

$$A_o = \frac{A_s \times \sqrt{2h}}{C_d \times 980{,}000}$$

Where:

A_o = Area of the de-watering hole, ft^2
A_s = Surface area of the basin, ft^2
C_d = Coefficient of contraction, approximately 0.6
h = head of water above the hole, ft

Perforating the riser with multiple holes with a combined surface area equal to A_o is acceptable.

Common Trouble Points:

(1) Storm events that exceed the design storm event can cause damage to the spillway structure of the basin and may cause adverse impacts downstream.

(2) Piping (flow occurring in the fill material) around outlet pipe can cause failure of the embankment.

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Repair should be made promptly as needed by the contractor.

(2) Trash and other debris should be removed after each rainfall to prevent clogging of the outlet structure.

(3) Accumulated silt should be removed and the basin should be re-graded to its original dimensions at such point that the capacity of the impoundment has been reduced to 75% of its original storage capacity.

(4) The removed sediment should be stockpiled or redistributed in areas that are protected from erosion.

1.4.14 Fiber Rolls

A fiber roll consists of straw, coconut fibers, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations:

- Fiber rolls are not effective unless trenched
- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated,
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Material:

(1) Core material: Core material should be biodegradable or recyclable. Material may be compost, mulch, aspen wood fibers, chipped site vegetation, agricultural rice or wheat straw, coconut fiber, 100% recyclable fibers, or similar materials.

(2) Containment Mesh: Containment mesh should be 100% biodegradable, photodegradable or recyclable such as burlap, twine, UV photodegradable plastic, polyester, or similar material. When the fiber role will remain in place as part of a vegetative system use biodegradable or photodegradable mesh. For temporary installation recyclable mesh is recommended.

Implementation:

(1) Locate fiber rolls on level contours spaced as follows:

Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

(2) Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.

(3) Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.

(4) Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

(5) Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

(6) If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Inspection and Maintenance Guidelines:

(1) Inspect prior to forecast rain, daily during extended rain events, after rain events, and weekly.

(2) Repair or replace split, torn, unraveling, or slumping fiber rolls.

(3) If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates behind the role must be periodically removed tin order to maintain its effectiveness. Sediment should be removed when the accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.

1.4.15 Dewatering Operations

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation or groundwater must be removed from a work location so that construction work may be accomplished.

The controls detailed in this BMP only allow for minimal settling time for sediment particles and should only be used when site conditions restrict the use of the other control methods. When possible avoid dewatering discharges by using the water for dust control, by infiltration, allowing to evaporate, etc.

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. When pumping water out or through any of these devices, a floatation device should be attached to the pump inlet.

Sediment controls are low to high cost measures depending on the dewatering system that is selected. Pressurized filters tend to be more expensive than gravity settling, but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months). Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

(1) Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly to verify continued BMP implementation.

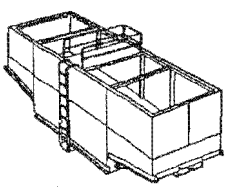
(2) Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

(3) Unit-specific maintenance requirements are included with the description of each technology.

(4) Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized, or disposed of at a disposal site.

(5) Sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations.

Weir Tanks



Description:
A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:
The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:
Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

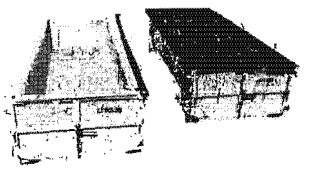
Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

Periodic cleaning is required based on visual inspection or reduced flow.

Oil and grease disposal must be by licensed waste disposal company.

Dewatering Tanks



Description:
A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:
The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

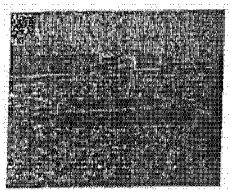
Implementation:
Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

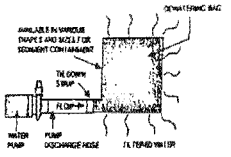
Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to determine appropriate size of tank.

Maintenance:
Periodic cleaning is required based on visual inspection or reduced flow.

Oil and grease disposal must be by licensed waste disposal company.

Gravity Bag Filter





Description:
A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.

Appropriate Applications:

Effective for the removal of sediments (gravel, sand, and silt). Some metals are removed with the sediment.

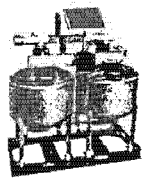
Implementation:
Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.

A secondary barrier, such as a rock filter bed or straw/hay bale barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag.

Maintenance:
Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier is required.

Replace the bag when it no longer filters sediment or passes water at a reasonable rate. The bag is disposed of offsite.

Sand Media Particulate Filter



Description:
Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Appropriate Applications:
Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.

Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.

Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

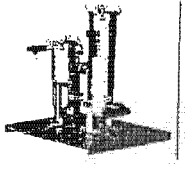
Implementation:
The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

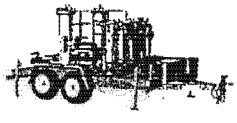
Maintenance:
The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.

Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use, and cleaned when head loss reaches target levels.

If cleaned by backwashing, the backwash water may need to be hauled away for disposal, or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

Pressurized Bag Filter





Description:
A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

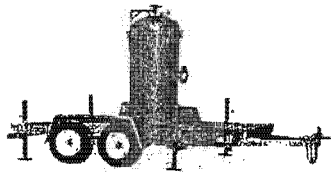
Appropriate Applications:
Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.

Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:
The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:
The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Cartridge Filter



Description:
Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:
Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.

Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:
The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:
The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

1.4.16 Spill Prevention and Control

The objective of this section is to describe measures to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill cleanup materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

(8) Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

(9) Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

(1) Clean up leaks and spills immediately.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:

(5) Contain the spread of the spill.

(6) Recover spilled materials.

(7) Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

(1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

(5) Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

ore information on spill rules and appropriate responses is available on the TCEQ ebsite at: http://www.intrc.state.tx.us/enforcement/emergency_response.html

Vehicle and Equipment Maintenance

(1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

(2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under paving equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tanks.

(3) Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

1.4.17 Utility Line Creek Crossings

Creek crossings represent particularly important areas to employ effective erosion and sedimentation control. Underground utility construction across creeks requires special measures, as detailed below.

(1) Unless prior approval is received from TCEQ, utility line creek crossings should be made perpendicular to the creek flowline.

(2) If baseflow is present, TCEQ personnel should be consulted, as it may be necessary to divert or pump water around the construction area.

(3) Every effort should be made to keep the zone of immediate construction free of surface water. For construction in the creek channel, a pipe of adequate size to divert normal stream flow should be provided around the construction area. Diversion may be by pumping or gravity flow using temporary dams

(4) Where water must be pumped from the construction zone, discharges should be in a manner that will not cause scouring or erosion. All discharges shall be on the upstream or upslope side of emplaced erosion control structures. If discharges are necessary in easily erodible areas, a stabilized, energy-dissipating discharge apron shall be constructed of riprap with minimum stone diameter of 6 inches and minimum depth of 12 inches. Size of the apron in linear dimensions shall be approximately 10 times the diameter of the discharge pipe.

(5) Before any trenching, install two high service rock berms at 100-ft spacing across the channel (perpendicular to the flowline) downstream of the proposed trench. These berms should be located between 100 and 300 feet downstream of the proposed trench. Lay pipe or other utility line and bury as soon as possible after trenching.

(6) After installation is complete (or at the end of work day, if installation cannot be completed by end of day), install silt fencing along trench line on either side of creek at 25-ft intervals, as shown in Figure 1-42.

(7) Material excavated from the trench in the creek channel should not be deposited on the channel banks. Excavation should be hauled out of the channel or used in backfill of open trench. No loose excavated material should be left in the channel at the end of a work day

(8) A concrete cap should be placed over buried pipe within the creek, and the streambed should be restored to proper grade.

(9) Revegetate the disturbed area using appropriate native or adapted grass species applied either with hydromulch at twice the normal application rate or incorporated with erosion protection matting.

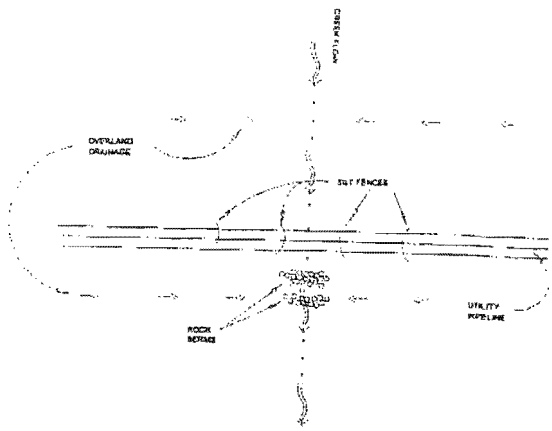


Figure 1-42 Utility Line Creek Crossing (LCRA, 1998)

1.4.18 Concrete Washout Areas

The purpose of concrete washout areas is to prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employees and subcontractors.

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.

For onsite washout:

- Locate washout area at least 50 feet from sensitive features, storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
- Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.

Below grade concrete washout facilities are typical. These consist of a lined excavation sufficiently large to hold expected volume of washout material. Above grade facilities are used if excavation is not practical. Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this section, with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

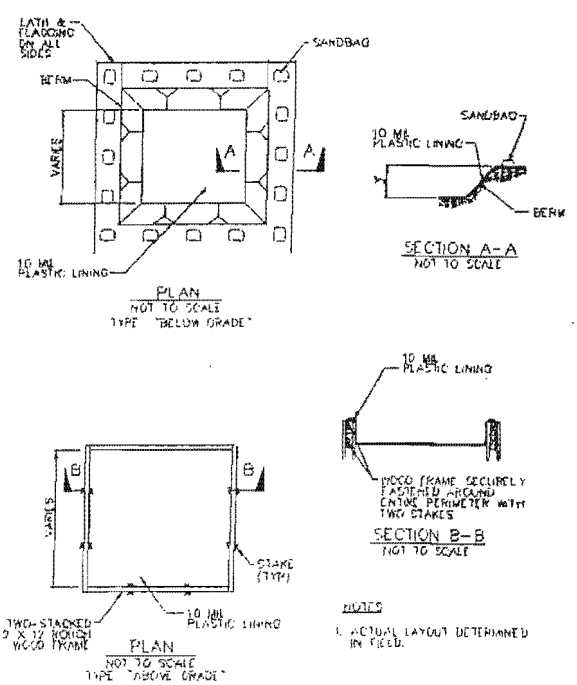


Figure 1-43 Schematics of Concrete Washout Areas

SPILL RESPONSE

V. Spill Prevention and Response

Spills will be prevented utilizing Best Management Practices previously described beginning on page 18 such as proper material storage, handling, and disposal practices. However, despite such efforts, a spill may occur on site. If a spill occurs, the following procedures will be utilized.

- ***Stop the spill, if possible.*** This can include shutting off power to a pump, righting an overturned container, or plugging a hole in a damaged container.
- ***Contain the spill, safely.*** Spill containment can be accomplished using a variety of materials and methods such as the use of absorbents (i.e. sawdust, Oil Dri, rags, soil, polypropylene pads or booms, etc.) to dike the area around the spill, or placing a leaking container inside one which is not leaking. Spill containment should only be attempted if it is safe to do so. Proper safety equipment such as gloves and eye protection should be used as directed on the Material Safety Data Sheet for the spilled material.
- ***Report the spill, if necessary.*** Certain quantities of hazardous or toxic materials such as pesticides, paint thinners, gasoline, etc. are required by Federal Law to be reported to the National Response Center (NRC) at 1-800-424-8802 as soon as you have knowledge of the spill. Since most of the quantities which require reporting to the NRC are larger than that found on a typical construction site, spill reporting to the State or Local authorities is more likely. When in doubt, report the spill. The reporting requirements which may apply to the sites covered in this SW3P are:

Texas Commission on Environmental Quality (TCEQ) at 1-800-832-8224

TCEQ requires reporting of spills of 25 gallons or greater, especially those which might impact a waterway.

- ***Clean the spill up, properly.*** Spill clean up should be performed in accordance with applicable regulations or according to the manufacturer's recommendations on the Material Safety Data Sheet. In most cases, proper spill clean up is to use a dry method such as absorbing the spill and containerize for disposal via a licensed disposal company. For non-hazardous and non-toxic materials this may be through your solid waste disposal service with prior approval.
- ***Fill in table on next page.***

The SW3P must be modified within 14 days of a release to provide a description of the spill, the circumstances leading to the spill, and the date of the spill. Spill clean-up materials, methods, and additional Best Management Practices addressing spill prevention should also be included.

Spill Date	Material Spilled	~ amount of spill *(in gallons)*	Circumstance of Spill *(what caused the spill)*	Corrective Action	Correction Date & sign-off

INSPECTIONS

VI. Inspections

At least once every seven (7) days **and** within 24 hours of the end of a storm event of 0.5 inches or greater the SW3P provides for a thorough inspection of disturbed areas of the construction site that have not been finally stabilized. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. This site inspection will be performed by qualified personnel familiar with the site and with the authority to ensure necessary maintenance of controls. Documentation of the inspection and actions taken is provided on forms shown in the back of the SW3P.

Based on the results of the inspection, the SW3P shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SW3P shall be completed within 7 calendar days following the inspection.

A report summarizing the scope of the inspection, name and qualification of personnel making the inspection, the date of the inspection and major observations relating to the implementation of the SW3P shall be made and retained as part of the SW3P for at least three years from the date the site is finally stabilized. Reports shall identify incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the SW3P. An authorized representative shall sign the report.

Qualified personnel performing inspections are familiar with the BMPs, have knowledge to determine when a failed control is inadequate and needs to be replaced, have access to the construction schedule, have knowledge of stabilization, and have authority to make changes to the SW3P.

JSR, Inc. has elected to have Compliance Resources, Inc. staff perform the required inspections. General qualifications for CRI staff include over 20 years combined experience in storm water pollution prevention and the performance of thousands of inspections and development of thousands of construction storm water plans in Texas and various other states.

Inspector Qualifications for Compliance Resources, Inc.

Kyle Craig (with CRI since September 2008)

- Bachelor of Arts (BA) in History and Geography from The University of Texas, San Antonio, Texas
- Associates in Liberal Arts with a focus in History from Northwest Vista College, San Antonio, Texas
- Participated in a summer study program which covered Physical and Cultural Geography of the American Southwest
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector

Had Darling (with CRI since February 2010)

- Bachelor of Science in Bioenvironmental Sciences from Texas A&M University, College Station, Texas
- Coursework in environmental remediation, environmental sampling, environmental micro-biology, and hydrology
- Experience as a micro-biology lab technician for Texas A&M University
- Attended the City of Waco Storm Water 101 seminar in April 2010 and the San Antonio Water System (SAWS) TPDES Inspector Workshop in June 2010
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector

Sarah E. Davis, CESSWI - IT (with CRI since August 2008)

- Bachelor or Arts (BA) in Political Science from Texas A&M University, College Station, Texas
- Coursework in ecology, environmental policy and sociology, and conservation studies
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- CESSWI – IT #1061 – Certified Erosion, Sediment and Storm Water Inspector In-Training (August 2010)

Garet Forbis, CESSWI (with CRI since September 2007)

- Bachelor of Science (BS) in Geography and Planning from Texas State University, San Marcos, Texas
- Coursework in water resource management as well as drought mitigation and comprehensive resource management while attending the University of Nebraska at Lincoln, headquarters for the National Drought Mitigation Center
- Other major areas of study include Geographic Information Systems (GIS) and meteorology
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Field Team Leader (May 2008)
- CESSWI #1054 – Certified Erosion, Sediment and Storm Water Inspector (August 2010)

Bo Galan (with CRI since March 2010)

- Bachelor of Science in Agriculture Leadership and Development from Texas A&M University, College Station, Texas
- Coursework in environmental law, wildlife and fisheries, turf management, and geology
- Attended the City of Waco Storm Water 101 seminar in April 2010 and the San Antonio Water System (SAWS) TPDES Inspector Workshop in June 2010
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector

Karan Kinton (with CRI since October 2000)

- Bachelor of Science (BS) in Mathematics with a minor in Biology from Southwest Texas State University, San Marcos, Texas
- Program manager for a national environmental consulting firm (3 years), has developed and written hundreds of Storm Water Pollution Prevention Plans, conducted environmental compliance inspections, prepared and presented training for various clients, regulatory experience dealing with EPA/TCEQ and local agencies, vendor for various trade shows, prepared Industrial Discharge Monitoring Reports and permit applications
- "IECA Trained" in Inspector Training, Texas Pollutant Discharge Elimination System, Phase II Construction, MS4 Storm Water Permits, "How to Select, Install and Inspect Construction Site Erosion and Sediment Control BMPs for TPDES Storm Water Permit Compliance", "How to Put the BEST Back into your Erosion Control BMPs"
- Member of International Erosion Control Association (IECA), National Home Builders Association (NHBA), Texas Association of Homebuilders, Association of General Contractors (AGC), Homebuilders Associations (Temple, Highland Lakes, Dallas, Fort Worth, Houston), Greater Austin Contractors and Engineers Association (ACEA), and Capital Area Erosion Control Network (CAECN)

- Certifications: State of Texas Historically Underutilized Business (HUB), City of Austin Woman-Owned Business Enterprise (WBE), South Central Texas Regional Certification Agency (SCTRCA), Minority and Women Owned Business Enterprise (MWBE) Program
- As President and Owner of CRI she has developed internal Storm Water Pollution Prevention Plans and training program for CRI, trained CRI employees, developed and presented storm water inspector training for regulatory agencies, homebuilders, general contractors, engineering firms, and developers
- Developed an Industrial Storm Water Monitoring Program for the State of New Jersey
- Qualified Inspector

Anthony Krupp, CESSWI - IT (with CRI since May 2008)

- Bachelor of Science (BS) in Geography concentrating in Resource and Environmental Studies from Texas State University, San Marcos, Texas
- Bachelor of Science (BS) in General Biology from Texas State University, San Marcos, Texas
- Coursework in environmental and river basin management, water policy, wetland ecology, and limnology
- Certified Texas Watch Water Quality Monitor
- Member of the San Marcos Greenbelt Alliance
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- CESSWI – IT #1062 – Certified Erosion, Sediment and Storm Water Inspector In-Training (August 2010)

Rusty Landers, CESSWI (with CRI since March 2006)

- Attended Bee County College and coursework toward a degree in Business Administration from the University of Houston, Houston, Texas
- 25 years experience in Management, business owner, EPA compliance officer for General Shelters of Texas
- Member of ICEA, Greater Houston Home Builders Association, Associated General Contractors
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Houston Manager
- CESSWI #0771 – Certified Erosion, Sediment and Storm Water Inspector (March 2010)

Michael Mobley, CESSWI (with CRI since July 2006)

- Bachelor of Science (BS) in GIS/Cartography from Texas State University, San Marcos, Texas
- Coursework in natural resources use and planning, and energy resource management
- Experience as a stereoplotter operator for Petroleum Place Energy Solutions (1 year)
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- CESSWI #0682 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Jason Natho, CESSWI (with CRI since June 2006)

- Bachelor of Science (BS) in Wildlife Biology from Texas State University, San Marcos, Texas
- Coursework in wildlife and range management, plant taxonomy, and ecology
- Internship at the Flying A Ranch, Bandera, Texas guiding, data collection and mapping, and habitat maintenance
- Experience as Ranch Hand (7 years), Carpenter assistant (4 months), Wildlife Biologist in Wimberly, Texas conducting deer population census and wildlife habitat maintenance (1 year)
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Field Team Leader (March 2008)
- CESSWI #0684 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Gretchen Reutzel, CESSWI (with CRI since November 2005)

- Bachelor of Science (BS) in Environmental Science and Resource Management from Texas State University, San Marcos, Texas
- Coursework in environmental science, natural resource protection, aquatic biology, land planning, and watershed management
- Environmental Education Coordinator at Texas State University (8 years)
- Watershed Manager at the Upper Guadalupe River Authority (2 years)
- San Antonio Area Informal Education Association (SAIEA) Board Member
- Developed and published environmental curriculum distributed to local museums, river authorities, and universities

- Worked with federal, state and local regulations agencies to develop watershed and water quality programs to manage Central Texas rivers and the Edwards Aquifer
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Field Team Leader (November 2006)
- CESSWI #0689 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Kassie Richter, CESSWI (with CRI since September 2006)

- Bachelor of Science (BS) in Bioenvironmental Science from Texas A&M University, College Station, Texas
- Coursework in soil and crop science, bioremediation, and bioenvironmental science
- Internship with Texas A&M University Geochemical and Environmental Research Group, working as a lab technician testing various tissue and water samples for hazardous contaminants
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- CESSWI #0774 – Certified Erosion, Sediment and Storm Water Inspector (March 2010)

Misti Shafer, CPESC, CESSWI (with CRI since September 2002)

- Bachelor of Science (BS) in Environmental Design from Texas A&M University, College Station, Texas
- Bachelor of Science (BS) in Construction Science from Texas A&M University, College Station, Texas
- Applicable coursework in project management, soil science, construction materials and methods, AutoCAD, drafting, surveying, concrete and steel structural engineering, and environmental design
- Internship with DPR Construction in their OSHA/Safety department
- Two years of experience in the construction industry including permitting and project coordinating for David Weekley Homes
- Attended training with the Texas Commission on Environmental Quality for the Texas Pollutant Discharge Elimination System, Phase II Construction Storm Water Permits; International Erosion Control Association (IECA) "How to Put the BEST Back into your Erosion Control BMPs"; Compost Section of the Small Business and Environmental Assistance Division of the Texas Commission on Environmental Quality
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Office Manager (December 2002)
- Qualified Storm Water Pollution Prevention Plan Writer (July 2003)
- Storm Water Pollution Prevention Plan Manager (September 2003)
- Georgetown Manager (March 2009)
- CPESC #5381 – Certified Professional in Erosion and Sediment Control (August 2009)
- CESSWI #0698 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Darrel Solanik, CPESC, CESSWI (with CRI since May 2007)

- Masters of Science (MS) in Freshwater Aquatic Biology from Southwest Texas State University, San Marcos, Texas
- Bachelor of Science (BS) in General Biology from Southwest Texas State University, San Marcos, Texas
- Ten years of experience as an environmental consultant in the Austin area performing tasks associated with project planning, site assessment, data collection and analysis, report preparation, and permitting
- Years of experience performing environmental site assessments and wetland delineations associated with the Endangered Species Act, National Environmental Policy Act, and Clean Water Act
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- San Antonio Manager (July 2007)
- CPESC #5380 – Certified Professional in Erosion and Sediment Control (August 2009)
- CESSWI #0700 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Josh VandenBout, CESSWI (with CRI since May 2006)

- Bachelor of Science (BS) in Wildlife and Fisheries Sciences, concentrating on Wildlife Management and Ecology from Texas A&M University, College Station, Texas
- Coursework in environmental law, rangeland ecology, dendrology, botany, habitat management, and soil science
- Internship at Triple JJJ Ranch in Somerville, Texas
- Member of Coastal Conservation Association of Texas
- Developed a wildlife habitat management plan through the Texas Parks and Wildlife for land owners in Milam County
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities

- Qualified Inspector
- CESSWI #0777 – Certified Erosion, Sediment and Storm Water Inspector (March 2010)

Stuart Wilson, CESSWI (with CRI since April 2006)

- Bachelor of Science (BS) in Environmental Science with a Math minor from Stephen F. Austin State University, Nagodoches, Texas
- Coursework in environmental site assessment, Geographic Information Systems (GIS), mapping, ecology, soils, environmental measurements, biology, geography, chemistry, physics
- Member of the Greater Houston Builders Association
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Field Team Leader (August 2006)
- CESSWI #0778 – Certified Erosion, Sediment and Storm Water Inspector (March 2010)

Storm Water Pollution Prevention Plan Writer Qualifications for Compliance Resources, Inc.

Karan Kinton (with CRI since October 2000)

- Bachelor of Science (BS) in Mathematics with a minor in Biology from Southwest Texas State University, San Marcos, Texas
- Program manager for a national environmental consulting firm (3 years), has developed and written hundreds of Storm Water Pollution Prevention Plans, conducted environmental compliance inspections, prepared and presented training for various clients, regulatory experience dealing with EPA/TCEQ and local agencies, vendor for various trade shows, prepared Industrial Discharge Monitoring Reports and permit applications
- "IECA Trained" in Inspector Training, Texas Pollutant Discharge Elimination System, Phase II Construction, MS4 Storm Water Permits, "How to Select, Install and Inspect Construction Site Erosion and Sediment Control BMPs for TPDES Storm Water Permit Compliance", "How to Put the BEST Back into your Erosion Control BMPs"
- Member of International Erosion Control Association (IECA), National Home Builders Association (NHBA), Texas Association of Homebuilders, Association of General Contractors (AGC), Homebuilders Associations (Temple, Highland Lakes, Dallas, Fort Worth, Houston), Greater Austin Contractors and Engineers Association (ACEA), and Capital Area Erosion Control Network (CAECN)
- Certifications: State of Texas Historically Underutilized Business (HUB), City of Austin Woman-Owned Business Enterprise (WBE), South Central Texas Regional Certification Agency (SCTRCA), Minority and Women Owned Business Enterprise (MWBE) Program
- As President and Owner of CRI she has developed internal Storm Water Pollution Prevention Plans and training program for CRI, trained CRI employees, developed and presented storm water inspector training for regulatory agencies, homebuilders, general contractors, engineering firms, and developers
- Developed an Industrial Storm Water Monitoring Program for the State of New Jersey
- Qualified Inspector
- Qualified Storm Water Pollution Prevention Plan Writer (October 2000)

Amber Scheler (with CRI since January 2005)

- Coursework in Computer-Aided Design at Temple College in Temple, Texas
- Applicable coursework in computer-aided design, AutoCAD, drafting, and environmental science
- Experience as an Administrative/Research Assistant for surveying company (2 years) and an SWP3 Writer since January 2005
- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Storm Water Pollution Prevention Plan Writer (June 2005)
- Storm Water Pollution Prevention Plan Team Leader (January 2007)

Misti Shafer, CPESC, CESSWI (with CRI since September 2002)

- Bachelor of Science (BS) in Environmental Design from Texas A&M University, College Station, Texas
- Bachelor of Science (BS) in Construction Science from Texas A&M University, College Station, Texas
- Applicable coursework in project management, soil science, construction materials and methods, AutoCAD, drafting, surveying, concrete and steel structural engineering, and environmental design
- Internship with DPR Construction in their OSHA/Safety department
- Two years of experience in the construction industry including permitting and project coordinating for David Weekley Homes
- Attended training with the Texas Commission on Environmental Quality for the Texas Pollutant Discharge Elimination System, Phase II Construction Storm Water Permits; International Erosion Control Association (IECA) "How to Put the BEST Back into your Erosion Control BMPs"; Compost Section of the Small Business and Environmental Assistance Division of the Texas Commission on Environmental Quality

- Successfully completed an internal training course on Best Management Practices and Texas Pollutant Discharge Elimination System (TPDES) requirements for construction activities
- Qualified Inspector
- Office Manager (December 2002)
- Qualified Storm Water Pollution Prevention Plan Writer (July 2003)
- Storm Water Pollution Prevention Plan Manager (September 2003)
- Georgetown Manager (March 2009)
- CPESC #5381 – Certified Professional in Erosion and Sediment Control (August 2009)
- CESSWI #0698 – Certified Erosion, Sediment and Storm Water Inspector (August 2009)

Retention of Records

The permittee shall retain a copy of the SW3P at the construction site (or other accessible location) from the date of project initiation to the date of final stabilization. The permittee shall retain copies of the NOI, SW3P, all reports, and records of all data covered by the permit for three years from the date the site is finally stabilized. All NOIs, SW3P, reports, certifications, NOTs, and information that this permit requires be maintained by the permittee shall be signed by a duly authorized representative.

Inspection and Entry

The permittee shall allow the Director or authorized representative of EPA, the State/Tribal, or municipal separate storm sewer authorized representative, upon the presentation of credentials and other documents as may be required by law to enter upon the permittee's premises where a regulated facility is located or conducted, have access to and copy any records that must be kept, and inspect any facility or equipment.

COMPLIANCE RESOURCES
INCORPORATED

Storm Water Inspection Report

Site Name:
Current Inspection Date:
Last inspection Date:

CRI Division:
Report #:
Next Inspection Date:

Report Type:
Current Weather:
Phase(s) of Construction:

Inspection Type:
Rainfall Amount:

Inspector Name:

Phone Number:

Qualifications:

Critical Environmental Features on Site?:
Edwards Aquifer: **Recharge:** **Contributing:**
Recieving Water: **Impaired:**
Endagered Species: **Historical Site:**

Positive items noted on site:

SWP3	
1. Is the CRI sign posted onsite with the CSN(s) / signed NOI(s) or signed small CSN?	Yes
2. Is the inspector a qualified inspector?	Yes
3. Are the inspectors qualifications documented in the SWP3?	Yes
4. Is the SWP3 available onsite or its location posted as required?	Yes
5. Does the SWP3 match the current site conditions?	Yes
6. Are the BMP's required by the SWP3 appropriate for the existing site conditions?	Yes
7. Is there a copy of the TPDES permit language in the SWP3?	Yes
8. Was the site inspection report from the last site inspection signed by the site representative?	Yes

Scope of Work - All Areas of Site Inspected	
9. Have all discharge locations (outfalls & outlets) been inspected?	Yes
10. Have all active areas been inspected?	Yes
11. Have all disturbed areas been inspected?	Yes
12. Have all structural BMP's in place been inspected?	Yes
13. Have all construction entrances and exits been inspected?	Yes
14. Have all equipment storage areas been inspected?	Yes
15. Have all material storage areas been inspected?	Yes

Non-Structural Controls and Maintenance	
16. Are interior streets free of sediment / tracking / debris?	Yes
17. Are adjacent streets free of sediment / tracking / debris?	Yes
18. Is soil & paving free from vehicle / equipment leaks?	Yes
19. Are roll-off-dumpsters being used & regularly emptied?	Yes
20. Are trash bins being used & regularly emptied?	Yes
21. Are sanitary waste facilities (portable toilets) regularly maintained?	Yes
22. Are designated concrete washout areas being used and regulary maintained?	Yes
23. Are designated paint washout areas being used and regularly maintained?	Yes
24. Is dust control being used properly onsite?	Yes
25. Other?	Yes

Structural Controls and Maintenace	
26. Are outfalls / discharge points / outlets in good condition?	Yes
27. Are detention basins / retention basins in good condition?	Yes
28. Are temporary sediment basins in good condition?	Yes
29. Are drainage swales & channels in good condition?	Yes
30. Are construction site exits / entrances (i.e. rock rip-rap, geotextile, mulch) in good condition?	Yes
31. Are silt fences in good condition?	Yes
32. Are inlet protections in good condition?	Yes
33. Are sand /gravel bags in good condition?	Yes
34. Are socks / wattles in good condition?	Yes
35. Are rock berms in good condition?	Yes
36. Are earthen berms in good condition?	Yes
37. Are hay bales in good condition?	Yes
38. Are curb back-cuts in good condition?	Yes
39. Is tree protection in good condition?	Yes
40. Are retaining walls in good condition?	Yes
41. Are gabions in good condition?	Yes
42. Are level spreaders in good condition?	Yes
43. Are storm inlet sediment traps in good condition?	Yes
44. Is secondary containment for petroleum products in good condition?	Yes
45. Are dewatering practices being used properly onsite?	Yes
46. Other?	Yes

Stabilization Practices (Interim/Permanent)	
47. Is temporary stabilization in good condition?	Yes
48. Is permanent stabilization in good condition (% density)??	Yes
49. Are vegetated buffer strips (engineered) in good condition?	Yes
50. Is slope stabilization (i.e. rock rip-rap, geotextile, vegetation, mulch) in good condition?	Yes
51. Is geo-textile in good condition?	Yes
52. Is mulch in good condition?	Yes
53. Other?	Yes

Name of Inspector Consultant _____ Signature of Inspector Consultant _____ Date _____

I certify under the 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.

Name of Permittee	Signature of Permittee	Date

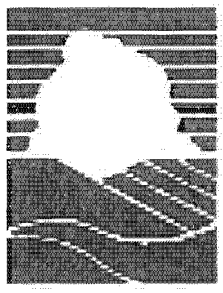
Information to Permittee: In order to maintain compliance with the terms and conditions of Stormwater General Permit, corrective actions identified in this Inspection Form must be addressed within the timeframe specified by the permit. Please note corrective actions taken on the Stormwater Inspection Form and sign where indicated.

Corrective Action Log and Punch List - Report

For action items found during this inspection					
Ref#	**Deficiency(Action Item)**	**Location**	**Addressed By**	**Date**	**Action Taken**
There are no corrective action items for this report.					
Additional Comments:					

Uncompleted Open Items From Prior Inspections				
Ref#	**Deficiency(Action Item)**	**Location**	**Inspection Date**	**Explanation**
There are no open action items for this report.				

PERMIT, NOI & NOT



LARGE CONSTRUCTION SITE NOTICE

FOR THE

Texas Commission on Environmental Quality (TCEQ)

Storm Water Program

TPDES GENERAL PERMIT TXR150000

"PRIMARY OPERATOR" NOTICE

This notice applies to construction sites operating under Part II.E.3 of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.D.2 of the general permit. This notice shall be posted along with a copy of the signed Notice of Intent (NOI), as applicable. Additional information regarding the TCEQ storm water permit program may be found on the internet at: http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	TXR15 ___ ___ ___ ___
Operator Name:	JSR, Inc.
Contact Name and Phone Number:	Bobby D. Greaves 210-653-7772
Project Description: *(Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized)*	Cranes Mill Park – Installation of Utilities and Access Roadways North and northeast of the intersection of Cranes Mill Park Road and Cranes Mill Marina Canyon Lake, Texas 78133 ~ 10 Acres Disturbed October 2010 – October 212
Location of Storm Water Pollution Prevention Plan:	8534 Greaves Lane Schertz, Texas 78154

II. SW3P Certification

Authority Signature

"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 gathered and evaluated 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."

Authority Representative Name and Title	Phone Number
Bobby D. Greaves, Vice President JSR, Inc.	210-653-7772
Signature 	Date 10-21-12

CERTIFIED MAIL
_____ - _____ - _____ - _____ - _____

October 20, 2010

Executive Director
Texas Commission on Environmental Quality (TCEQ)
Storm Water and Pretreatment Team MC-148
P.O. Box 13087
Austin, TX 78711-3087

Re: Delegation for Signatories to Reports
Cranes Mill Park – Installation of Utilities ad Access Roadways
TPDES Storm Water General Permit No. TXR15 __ __ __ __ *(attach a signed copy of NOI)*

Dear Executive Director:

This letter serves to designate the following people or positions as authorized personnel for signing reports, storm water pollution prevention plans, certifications or other information requested by the Executive Director or required by the general permit, as set forth by 30 TAC §305.128.

Name or Position	
Name or Position	
Name or Position	
Name or Position	

I understand that this authorization does not extend to the signing of a Notice of Intent for obtaining coverage under a storm water general permit.

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in 30 TAC §305.44.

Sincerely,

Signature _____ Date 10-21-10

Bobby D. Greaves, Vice President
JSR, Inc.

COMPLIANCE RESOURCES
I N C O R P O R A T E D

October 15, 2010

Mr. Bobby R. Greaves
JSR, Inc.
8534 Greaves Lane
Schertz, TX 78154

Re: Cranes Mill Park - Installation of Utilities and Access Roadways

Dear Mr. Greaves:

Attached is the Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under a TPDES General Permit.

1. Please fill in **ALL** highlighted areas on the NOI application and delegation letter, then sign and date the forms.

   NOTE: Any highlighted areas not filled in on the NOI application could result in permit rejection from TCEQ.

   NOTE: If you will not be designating another person to sign-off on inspection reports, you may discard the delegation letter.

2. Make multiple copies of the signed NOI and delegation letter (depending on the number of SWP3 binders that you have).
   a. Place a signed copy of the NOI in your Storm Water Pollution Prevention binder(s) behind the "Permit / NOI" tab divider.
   b. Place a signed copy of the delegation letter in your Storm Water Pollution Prevention binder(s) behind the "Inspections" tab divider.
3. Send the documents with the **original signatures** *(blue ink)* to the TCEQ (the NOI and delegation letter are mailed to the same location at TCEQ). *We recommend you send the information by certified mail for tracking purposes.*
4. Send a check or money order in the amount of $325.00 made out to Texas Commission on Environmental Quality under separate cover using the payment submittal form (enclosed). *We recommend you send the information by certified mail for tracking purposes. NOTE: The $325 fee is not provided by Compliance Resources, Inc.*
5. Please fax a copy of the signed NOI, delegation letter, and SWPPP Certification page to our office for our records.

Please feel free to call if you require more information or have any questions.

Sincerely,

Misti Shafer

Enc.: Notice of Intent for Storm Water Discharges

PO Box 3000 #246 • Georgetown, Texas 78627-3000
512.930.7733 phone • 512.864.7629 fax • www.complianceresourcesinc.com

COMPLIANCE RESOURCES
INCORPORATED

CERTIFIED MAIL
70083230000242224579

October 15, 2010

Texas Commission on Environmental Quality
Storm Water & General Permits Team; MC-228
PO Box 13087
Austin, Texas 78711-3087

Re: Cranes Mill Park - Installation of Utilities and Access Roadways

Dear Storm Water Team:

JSR, Inc. is submitting the enclosed Notice of Intent for Storm Water Discharges Associated with Construction Activity under a TPDES General Permit.

Please feel free to call if you require more information or have any questions.

Sincerely,

Misti Shafer

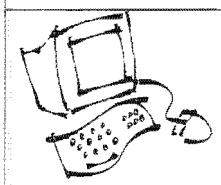
Enc.: Notice of Intent Application (3 pages)

cc: Bobby R. Greaves

PO Box 3000 #246 • Georgetown, Texas 78627-3000
512.930.7733 phone • 512.864.7629 fax • www.complianceresourcesinc.com

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

TCEQ Office Use Only
Permit No.: TXR15
RN:
CN:
Ref No:



Sign up now for ePermits NOI at www6.tceq.state.tx.us/steers
Get Instant Permit Coverage and only pay a $225 application fee.

If filing a paper NOI you can pay the application fee on line? Go to www.tceq.state.tx.us/epay
Select Fee Type: GENERAL PERMIT CONSTRUCTION STORM WATER DISCHARGE NOI APPLICATION
If submitting a paper NOI, coverage under the general permit starts seven (7) days after the date postmarked for delivery to TCEQ.

IMPORTANT:
- Use the **INSTRUCTIONS** to fill out each question in this form.
- Use the attached **CUSTOMER CHECKLIST** to make certain all you filled out all required information.
- Incomplete applications **WILL** delay approval or result in **automatic Denial.**

Renewal of General Permit

Is this NOI to renew an ACTIVE permit?

- ☐ Yes - What is your permit number? **Permit No. TXR15**_____
- ☑ No - a permit number will be issued.

Application Fee if mailing a paper NOI:

You must pay the $325 Application Fee to TCEQ for the application to be considered complete.
Payment and NOI must be mailed to separate addresses. See instructions for correct mailing addresses.

Provide your payment information below, for us to verify payment of the application fee:

Mailed:	Check/Money Order No.:	Company Name on checking account:
☐ EPAY:	Voucher No.:	Is the Payment Voucher copy attached? ☐ Yes

A. OPERATOR (applicant)

1. If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity?
   CN (Search Central Registry)

2. What is the Legal Name of the entity (applicant) applying for this permit?
   JSR, INC.
   (The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

3. What is the name and title of the person signing the application?
   (The person must be an official meeting signatory requirements in TAC 305.43(a).)
   Name: BOBBY D. GREAVES | Job Title: VICE PRESIDENT

4. What is the Operator's (applicant) mailing address as recognized by the US Postal Service? (Verify at USPS.com)
   Address: P.O. BOX 870 | Suite No./Bldg. No./Mail Code: N/A
   City: SCHERTZ | State: TEXAS | ZIP Code: 78154
   Country Mailing Information (if outside USA): | Country Code: | Postal Code:

5. Phone No.: (210) 653-7772 | Extension:

6. Fax No.: (210) 653-7778 | E-mail Address:

7. Indicate the type of Customer:

☐ Individual	☐ Sole Proprietorship-D.B.A.	☐ Limited Partnership
☑ Corporation	☐ Federal Government	☐ General Partnership
☐ State Government	☐ County Government	☐ City Government
☐ Other Government	☐ Other (describe):	

8. Independent Operator: ☑ Yes ☐ No (If governmental entity, subsidiary, or part of a larger corporation, check "No")

9. Number of Employees: ☐ 0-20: ☑ 21-100: ☐ 101-250: ☐ 251-500: or ☐ 501 or higher

10. Customer Business Tax and Filing Numbers *(This item is not applicable to Individuals, Government, GP or Sole Proprietor.)*

REQUIRED for Corporations and Limited Partnerships (Verify the entity's status and filing no. with TX SOS at 512/463-5555)

State Franchise Tax ID Number: 17607356395	Federal Tax ID: 760735639
TX SOS Charter (filing) Number: 800217242	DUNS Number (if known): 133308283

B. APPLICATION CONTACT

If TCEQ needs additional information regarding this application, who should be contacted?

1. Name: MISTI SHAFER	Title: SWP3 MANAGER	Company: Compliance Resources,Inc
2. Phone No.: (512) 930-7733	Extension: 231	
3. Fax No.: 512 864-7629	E-mail Address: misti@complianceresourcesinc.com	

C. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

1. TCEQ Issued RE Reference Number (RN): RN

(Search Central Registry)

2. Name of Project or Site (the name as known by the community where this facility/project is located):

CRANES MILL PARK - INSTALLATION OF UTILITIES AND ACCESS ROADWAYS

(example: phase and name of subdivision or name of project that's unique to the site)

3. Does the site have a physical address?

If Yes, complete **Section A** for a physical address.

If No, complete **Section B** for site location information.

Section A: Enter the physical address for the site. (verify it with USPS.com or other delivery source)

Street Number:	Street Name:
City:	ZIP Code:

Section B: Enter the site location information.

If no physical address (Street Number & Street Name), provide a written location access description to the site:

(Ex.: phase 1 of Woodland subdivision located 2 miles west from intersection of Hwy 290 & IH35 accessible on Hwy 290 South)

NORTH OF THE INTERSECTION OF CRANES MILL RD AND CRANES MILL MARINA

City where the site is located or nearest city to site: CANYON LAKE	ZIP Code where site is located: 78133

4. Identify the county where the site is located: COMAL

5. Latitude: 29°53'21"N	Longitude: 098°17'34"W

6. What is the primary business of this entity? In your own words, briefly describe the primary business of the Regulated Entity. (Do not repeat the SIC and NAICS code) GENERAL CONTRACTOR

7. What is the mailing address for the regulated entity?

Is the RE mailing address the same as the Operator? ☑ Yes, address is the same as Operator ☐ No, provide the address

Street Number:	Street Name:	
City:	State:	ZIP Code:

D. GENERAL CHARACTERISTICS

1. Is the site located on Indian Country Lands? ☑ No ☐ Yes – If Yes, do not submit this NOI. Contact EPA, Region VI

If the site is on Indian country lands, you must obtain authorization through EPA, Region VI.

What is the Standard Industrial Classification (SIC) code (see instructions for common codes): (Search Osha.gov)

Primary: 1623 Secondary: 1611

3(a) What is the total number of acres disturbed? 10 ACRES

3(b) Is the project site part of a larger common plan of development or sale? ☑ Yes ☐ No

Yes, the total number of acres disturbed can be less than 5 acres.

If **No**, the total number of acres disturbed must be 5 or more. If the total number of acres disturbed is less than 5 then the project site does not qualify for coverage through this Notice of Intent. Coverage will be denied. See the requirements in the general permit for small construction sites.

4. Discharge Information (all information MUST be provided or the permit will be denied)

4(a) What is the name of the water body(s) to receive the storm water runoff or potential runoff from the site?
CANYON LAKE

4(b) What is the segment number(s) of the classified water body(s) that the discharge or potential discharge will eventually reach? 1805

4(c) Are any of the surface water bodies receiving discharges from the construction site on the latest EPA-approved CWA 303(d) list of impaired waters?

☑ Yes ☐ No

If Yes, provide the name of the impaired water body(s). 1805 - CANYON LAKE

4(d) Is the discharge into an MS4? ☑ Yes ☐ No

If Yes, what is the name of the MS4 Operator? COMAL COUNTY

Note: The general permit requires you to send a copy of the NOI to the MS4 Operator.

4(e) Is the discharge or potential discharge within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer?

☑ Yes ☐ No

If the answer is Yes, please note that a copy of the agency approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) must be included or referenced in the Storm Water Pollution Prevention Plan.

E. CERTIFICATION

Check "Yes" to the certifications below. **Failure to certify to all items will result in denial.**

☑	Yes	I certify that I have obtained a copy and understand the terms and conditions of the general permit (TXR150000).
☑	Yes	I certify that the full legal name of the entity (Operator) applying for this permit has been provided and is legally authorized to do business in Texas.
☑	Yes	I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed.
☑	Yes	I certify that a storm water pollution prevention plan has been developed and implemented prior to construction, and that is compliant with any applicable local sediment and erosion control plans and prepared and implemented as required in the general permit TXR150000.

Operator Certification:

I, BOBBY D. GREAVES (Typed or printed name *(Required & must be legible)*) VICE PRESIDENT (Title *(Required & legible)*)

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 there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature: [signature] (Use blue ink) Date: 10-4-10

CERTIFIED MAIL

_____ - _____ - _____ - _____ - _____

October 15, 2010

Executive Director
Texas Commission on Environmental Quality (TCEQ)
Storm Water and Pretreatment Team MC-148
P.O. Box 13087
Austin, TX 78711-3087

Re: Delegation for Signatories to Reports
Cranes Mill Park – Installation of Utilities ad Access Roadways
TPDES Storm Water General Permit No. TXR15 __ __ __ __ *(attach a signed copy of NOI)*

Dear Executive Director:

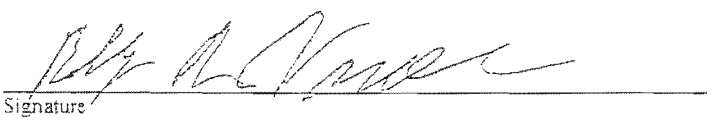
This letter serves to designate the following people or positions as authorized personnel for signing reports, storm water pollution prevention plans, certifications or other information requested by the Executive Director or required by the general permit, as set forth by 30 TAC §305.128.

Name or Position	
Name or Position	
Name or Position	
Name or Position	

I understand that this authorization does not extend to the signing of a Notice of Intent for obtaining coverage under a storm water general permit.

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in 30 TAC §305.44.

Sincerely,



Signature

10-21-10

Date

Bobby R. Greaves, Vice President
JSR, Inc.

COMPLIANCE RESOURCES
INCORPORATED

CERTIFIED MAIL
70083230000242229963

October 15, 2010

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
PO Box 13088
Austin, Texas 78711-3088

Re: Storm Water Application Fee for Cranes Mill Park - Installation of Utilities and Access Roadways

Dear Cashier:

JSR, Inc. is submitting the enclosed Storm Water Application Fee for the Notice of Intent for Storm Water Discharges Associated with Construction Activity under a TPDES General Permit.

Please feel free to call if you require more information or have any questions.

Sincerely,

Misti Shafer

Enc.: Notice of Intent Payment Submittal Form (1 page)

cc: Bobby R. Greaves

PO Box 3000 #246 • Georgetown, Texas 78627-3000
512.930.7733 phone • 512.864.7629 fax • www.complianceresourcesinc.com

Texas Commission on Environmental Quality
General Permit Payment Submittal Form
$325 for a paper Construction NOI Application Fee

Use this form to submit your Application Fee only if you are mailing your payment.

- Complete items 1 through 5 below:
- Staple your check in the space provided at the bottom of this document.
- Do not mail this form with your NOI form.
- Do not mail this form to the same address as your NOI.

Mail this form and your check to:

BY REGULAR U.S. MAIL	BY OVERNIGHT/EXPRESS MAIL
Texas Commission on Environmental Quality Financial Administration Division Cashier's Office, MC-214 P.O. Box 13088 Austin, TX 78711-3088	Texas Commission on Environmental Quality Financial Administration Division Cashier's Office, MC-214 12100 Park 35 Circle Austin, TX 78753

Fee Code: **GPA** General Permit: TXR150000

1. Check / Money Order No:
2. Amount of Check/Money Order:
3. Date of Check or Money Order:
4. Name on Check or Money Order:

5. NOI INFORMATION

If the check is for more than one NOI, list each Project/Site (RE) Name and Physical Address exactly as provided on the NOI. DO NOT SUBMIT A COPY OF THE NOI WITH THIS FORM AS IT COULD CAUSE DUPLICATE PERMIT ENTRIES.

See Attached List of Sites (If more space is needed, you may attach a list.)

Project/Site (RE) Name:

CRANES MILL PARK - INSTALLATION OF UTILITIES AND ACCESS ROADWAYS

Project/Site (RE) Physical Address:

NORTH OF THE INTERSECTION OF CRANES MILL RD AND CRANES MILL MARINA
CANYON LAKE, TEXAS 78133

Staple Check In This Space

LOCAL AND STATE REGULATIONS

Central Registry Query - Regulated Entity Information

Regulated Entity Information

RN Number: RN102677341
Name: USCOE CRANES MILL PARK
Primary Business: PARK
Street Address: No street address on file.
County: COMAL
Nearest City: No near city on file.
State: TX
Near ZIP Code: No near zip code on file.
Physical Location: NW OF STARTZVILLE AT END OF CRANES MILL ROAD

Affiliated Customers - Current

Your Search Returned **1** Current Affiliation Records (View Affiliation History)

1-1 of 1 Records

CN Number	Customer Name	Customer Role	Details
CN600918916	US ARMY CORPS OF ENGINEERS	RESPONSIBLE PARTY	⇨

Industry Type Codes

Code	Classification	Name
No NAICS or SIC Codes on file.		

Permits, Registrations, or Other Authorizations

There are a total of **2** programs and IDs for this regulated entity. Click on a column name to change the sort order.

1-2 of 2 Records

Program ▲	ID Type	ID Number	ID Status
PUBLIC WATER SYSTEM/SUPPLY	REGISTRATION	0460118	ACTIVE
WATER LICENSING	LICENSE	0460118	ACTIVE

TCEQ Docket No. 2007-1588-WQ
TPDES General Permit No. TXR150000

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
Austin, TX 78711-3087

This is a renewal of TPDES General Permit No. TXR150000, issued March 5, 2003

GENERAL PERMIT TO DISCHARGE WASTES
under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

Construction sites that discharge storm water associated with construction activity

located in the state of Texas

may discharge to surface water in the state

only according to effluent limitations, monitoring requirements and other conditions set forth in this permit, as well as the rules of the Texas Commission on Environmental Quality (TCEQ), the laws of the State of Texas, and other orders of the TCEQ. The issuance of this general permit does not grant to the permittee the right to use private or public property for conveyance of storm water and certain non-storm water discharges along the discharge route. This includes property belonging to but not limited to any individual, partnership, corporation or other entity. Neither does this permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the discharge route.

This permit and the authorization contained herein shall expire at midnight on March 5, 2013.

EFFECTIVE DATE: March 5, 2008

ISSUED DATE: FEB 15 2008

Buddy Garcia
For the Commission

TPDES GENERAL PERMIT NUMBER TXR150000 RELATING TO STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

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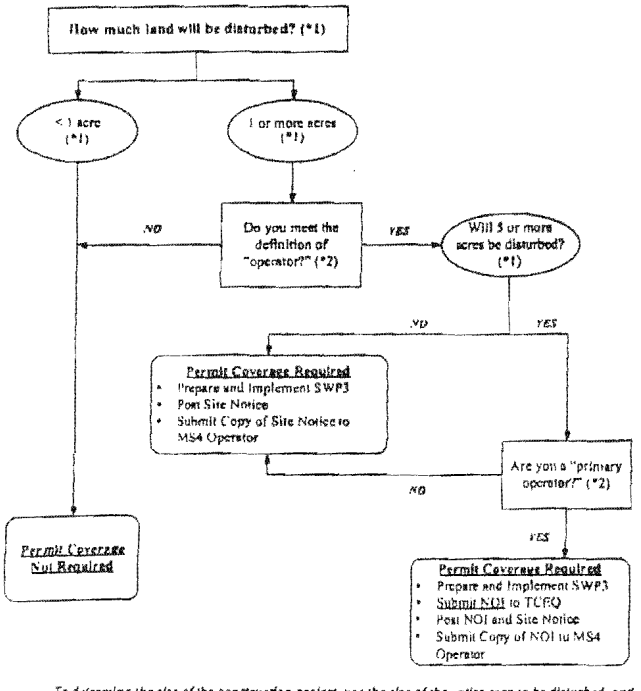
Part I. Flow Chart and Definitions

Section A. Flow Chart to Determine Whether Coverage is Required



To determine the size of the construction project, use the size of the entire area to be disturbed, and include the size of the larger common plan of development or sale, if the project is part of a larger project (refer to Part I.B., "Definitions," for an explanation of "larger common plan of development or sale").
Refer to the definitions for "operator," "primary operator," and "secondary operator" in Part I., Section B. of this permit.

Section B. Definitions

Arid Areas - Areas with an average annual rainfall of 0 to 10 inches.

Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas.

Commencement of Construction - The initial disturbance of soils associated with clearing, grading, or excavation activities, as well as other construction-related activities (e.g., stockpiling of fill material, demolition)

Common Plan of Development - A construction activity that is completed in separate stages, separate phases, or in combination with other construction activities. A common plan of development (also known as a "common plan of development or sale") is identified by the documentation for the construction project that identifies the scope of the project, and may include plats, blueprints, marketing plans, contracts, building permits, a public notice or hearing, zoning requests, or other similar documentation and activities. A common plan of development does not necessarily include all construction projects within the jurisdiction of a public entity (e.g., a city or university). Construction of roads or buildings in different parts of the jurisdiction would be considered separate "common plans," with only the interconnected parts of a project being considered part of a "common plan" (e.g., a building and its associated parking lot and driveways, airport runway and associated taxiways, a building complex, etc.). Where discrete construction projects occur within a larger common plan of development or sale but are located ¼ mile or more apart, and the area between the projects is not being disturbed, each individual project can be treated as a separate plan of development or sale, provided that any interconnecting road, pipeline or utility project that is part of the same "common plan" is not included in the area to be disturbed.

Discharge – For the purposes of this permit, the drainage, release, or disposal of pollutants in storm water and certain non-storm water from areas where soil disturbing activities (e.g., clearing, grading, excavation, stockpiling of fill material, and demolition), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck washout, fueling), or other industrial storm water directly related to the construction process (e.g., concrete or asphalt batch plants) are located.

Edwards Aquifer - As defined under Texas Administrative Code § 213.3 of this title (relating to the Edwards Aquifer), that portion of an arcuate belt of porous, water-bearing, predominantly carbonate rocks known as the Edwards and Associated Limestones in the Balcones Fault Zone trending from west to east to northeast in Kinney, Uvalde, Medina, Bexar, Comal, Hays, Travis, and Williamson Counties; and composed of the Salmon Peak Limestone, McKnight Formation, West Nueces Formation, Devil's River Limestone, Person Formation, Kainer Formation, Edwards Formation, and Georgetown Formation. The permeable aquifer units generally overlie the less-permeable Glen Rose Formation to the south, overlie the less-permeable Comanche Peak and Walnut Formations north of the Colorado River, and underlie the less-permeable Del Rio Clay regionally.

Edwards Aquifer Recharge Zone - Generally, that area where the stratigraphic units constituting the Edwards Aquifer crop out, including the outcrops of other geologic formations in proximity to the Edwards Aquifer, where caves, sinkholes, faults, fractures, or other permeable features would create a potential for recharge of surface waters into the Edwards Aquifer. The recharge zone is identified as that area designated as such on official maps located in the offices of the Texas Commission on Environmental Quality and the

appropriate regional office. The Edwards Aquifer Map Viewer, located at http://www.tceq.state.tx.us/compliance/field_ops/eapp/mapdisclaimer.html, can be used to determine where the recharge zone is located.

Edwards Aquifer Contributing Zone - The area or watershed where runoff from precipitation flows downgradient to the recharge zone of the Edwards Aquifer. The contributing zone is located upstream (upgradient) and generally north and northwest of the recharge zone for the following counties: all areas within Kinney County, except the area within the watershed draining to Segment 2304 of the Rio Grande Basin; all areas within Uvalde, Medina, Bexar, and Comal Counties; all areas within Hays and Travis Counties, except the area within the watersheds draining to the Colorado River above a point 13 miles upstream from Tom Miller Dam, Lake Austin at the confluence of Barrow Brook Cove, Segment 1403 of the Colorado River Basin; and all areas within Williamson County, except the area within the watersheds draining to the Lampasas River above the dam at Stillhouse Hollow reservoir, Segment 1216 of the Brazos River Basin. The contributing zone is illustrated on the Edwards Aquifer map viewer at http://www.tceq.state.tx.us/compliance/field_ops/eapp/mapdisclaimer.html.

Facility or Activity – For the purpose of this permit, a construction site or construction support activity that is regulated under this general permit, including all contiguous land and fixtures (e.g., ponds and materials stockpiles), structures, or appurtances used at a construction site or industrial site described by this general permit.

Final Stabilization - A construction site status where any of the following conditions are met:

(a) All soil disturbing activities at the site have been completed and a uniform (i.e., evenly distributed, without large bare areas) perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(b) For individual lots in a residential construction site by either:

(1) the homebuilder completing final stabilization as specified in condition (a) above; or

(2) the homebuilder establishing temporary stabilization for an individual lot prior to the time of transfer of the ownership of the home to the buyer and after informing the homeowner of the need for, and benefits of, final stabilization. If temporary stabilization is not feasible, then the homebuilder may fulfill this requirement by retaining perimeter controls or other best management practices, and informing the homeowner of the need for removal of temporary controls and the establishment of final stabilization.

(c) For construction activities on land used for agricultural purposes (e.g. pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to surface water and areas that are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.

(d) In arid, semi-arid, and drought-stricken areas only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:

(1) Temporary erosion control measures (e.g., degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance by the operator, and

(2) The temporary erosion control measures are selected, designed, and achieve 70 percent vegetative coverage within three years.

Hyperchlorination of Waterlines – Treatment of potable water lines or tanks with chlorine for disinfection purposes, typically following repair or partial replacement of the waterline or tank, and subsequently flushing the contents.

Indian Country Land – (from 40 CFR 122.2) (1) all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (2) all dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and (3) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

Indian Tribe - (from 40 CFR 122.2) any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian Reservation.

Large Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than five (5) acres of land. Large construction activity also includes the disturbance of less than five (5) acres of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than five (5) acres of land. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (e.g., the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Municipal Separate Storm Sewer System (MS4) - A separate storm sewer system owned or operated by the United States, a state, city, town, county, district, association, or other public body (created by or pursuant to state law) having jurisdiction over the disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, that discharges to surface water in the state.

Notice of Change (NOC) – Written notification to the executive director from a discharger authorized under this permit, providing changes to information that was previously provided to the agency in a notice of intent form.

Notice of Intent (NOI) - A written submission to the executive director from an applicant requesting coverage under this general permit.

Notice of Termination (NOT) - A written submission to the executive director from a discharger authorized under a general permit requesting termination of coverage.

Operator - The person or persons associated with a large or small construction activity that is either a primary or secondary operator as defined below:

Primary Operator – the person or persons associated with a large or small construction activity that meets either of the following two criteria:

(a) the person or persons have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

(b) the person or persons have day-to-day operational control of those activities at a construction site that are necessary to ensure compliance with a storm water pollution prevention plan (SWP3) for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

Secondary Operator – The person whose operational control is limited to the employment of other operators or to the ability to approve or disapprove changes to plans and specifications. A secondary operator is also defined as a primary operator and must comply with the permit requirements for primary operators if there are no other operators at the construction site.

Outfall - For the purpose of this permit, a point source at the point where storm water runoff associated with construction activity discharges to surface water in the state and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances that connect segments of the same stream or other water of the U.S. and are used to convey waters of the U.S.

Permittee - An operator authorized under this general permit. The authorization may be gained through submission of a notice of intent, by waiver, or by meeting the requirements for automatic coverage to discharge storm water runoff and certain non-storm water discharges.

Point Source – (from 40 CFR §122.2) Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are, or may be, discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, filter backwash, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into any surface water in the state. The term "pollutant" does not include tail water or runoff water from irrigation or rainwater runoff from cultivated or uncultivated rangeland, pastureland, and farmland. For the purpose of this permit, the term "pollutant" includes sediment.

Pollution - (from Texas Water Code §26.001(14)) The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any surface water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

Rainfall Erosivity Factor (R factor) - the total annual erosive potential that is due to climatic effects, and is part of the Revised Universal Soil Loss Equation (RUSLE).

Semiarid Areas - areas with an average annual rainfall of 10 to 20 inches

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), designed or used for collecting or conveying storm water; that is not a combined sewer, and that is not part of a publicly owned treatment works (POTW).

Small Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one (1) acre and less than five (5) acres of land. Small construction activity also includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one (1) and less than five (5) acres of land. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (e.g., the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Storm Water (or Storm Water Runoff) - Rainfall runoff, snow melt runoff, and surface runoff and drainage.

Storm Water Associated with Construction Activity - Storm water runoff from a construction activity where soil disturbing activities (including clearing, grading, excavating) result in the disturbance of one (1) or more acres of total land area, or are part of a larger common plan of development or sale that will result in disturbance of one (1) or more acres of total land area.

Structural Control (or Practice) - A pollution prevention practice that requires the construction of a device, or the use of a device, to capture or prevent pollution in storm water runoff. Structural controls and practices may include but are not limited to: silt fences, earthen dikes, drainage swales, sediment traps, check dams, subsurface drains, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins.

Surface Water in the State - Lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state (from the mean high water mark (MHWM) out 10.36 miles into the Gulf), and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable, and including the beds and banks of all water-courses and bodies of surface water, that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems which are authorized by state or federal law, regulation, or permit, and which are created for the purpose of waste treatment are not considered to be water in the state.

Temporary Stabilization - A condition where exposed soils or disturbed areas are provided a pro cover or other structural control to prevent the migration of pollutants. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either permanent stabilization can be achieved or until further construction activities take place.

Waters of the United States - (from 40 CFR, Part122, Section 2) Waters of the United States or waters of the U.S. means:

(a) all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) all interstate waters, including interstate wetlands;

(c) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds that the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce, or

(3) which are used or could be used for industrial purposes by industries in interstate commerce;

(d) all impoundments of waters otherwise defined as waters of the United States under this definition;

(e) tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) the territorial sea; and

(g) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Part II. Permit Applicability and Coverage

Section A. Discharges Eligible for Authorization

1. Storm Water Associated with Construction Activity

Discharges of storm water runoff from small and large construction activities may be authorized under this general permit.

(e) potable water sources including waterline flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life);

(f) uncontaminated air conditioning condensate;

(g) uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents; and

(h) lawn watering and similar irrigation drainage.

4. Other Permitted Discharges

Any discharge authorized under a separate NPDES, TPDES, or TCEQ permit may be combined with discharges authorized by this general permit, provided those discharges comply with the associated permit.

Section B. Concrete Truck Wash Out

The washout of concrete trucks associated with off-site production facilities may be conducted at regulated construction sites in accordance with the requirements of Part V of this general permit.

Section C. Limitations on Permit Coverage

1. Post Construction Discharges.

Discharges that occur after construction activities have been completed, and after the construction site and any supporting activity site have undergone final stabilization, are not eligible for coverage under this general permit. Discharges originating from the sites are not authorized under this general permit following the submission of the notice of termination (NOT) for the construction activity.

2. Prohibition of Non-Storm Water Discharges

Except as otherwise provided in Part II.A. of this general permit, only discharges that are composed entirely of storm water associated with construction activity may be authorized under this general permit.

3. Compliance With Water Quality Standards

Discharges to surface water in the state that would cause or contribute to a violation of water quality standards or that would fail to protect and maintain existing designated uses are not eligible for coverage under this general permit. The executive director may require an application for an individual permit or alternative general permit (see Parts II.H.2. and 3.) to authorize discharges to surface water in the state from any activity that is determined to cause a violation of water quality standards or is found to cause, or contribute to, the loss of a designated use. The executive director may also require an application for an individual permit considering factors described in Part II.H.2. of this general permit.

2. Discharges of Storm Water Associated with Construction Support Activities

Examples of construction support activities include, but are not limited to, concrete batch plants, rock crushers, asphalt batch plants, equipment staging areas, material storage yards, material borrow areas, and excavated material disposal areas. Discharges of storm water runoff from construction support activities may be authorized under this general permit, provided that the following conditions are met.

(a) the activities are located within one (1)-mile from the boundary of the permitted construction site and directly support the construction activity;

(b) a storm water pollution prevention plan is developed according to the provisions of this general permit and includes appropriate controls and measures to reduce erosion and discharge of pollutants in storm water runoff from the construction support activities; and

(c) the construction support activities either do not operate beyond the completion date of the construction activity or are authorized under separate TPDES authorization. Separate TPDES authorization may include the TPDES Multi Sector General Permit, TXR050000 (related to storm water discharges associated with industrial activity), separate authorization under this general permit if applicable, coverage under an alternative general permit if available, or authorization under an individual water quality permit.

3. Non-Storm Water Discharges

The following non-storm water discharges from sites authorized under this general permit are also eligible for authorization under this general permit:

(a) discharges from fire fighting activities (fire fighting activities do not include washing of trucks, run-off water from training activities, test water from fire suppression systems, and similar activities);

(b) uncontaminated fire hydrant flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life), which include flushings from systems that utilize potable water, surface water, or groundwater that does not contain additional pollutants (uncontaminated fire hydrant flushings do not include systems utilizing reclaimed wastewater as a source water);

(c) water from the routine external washing of vehicles, the external portion of buildings or structures, and pavement, where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials have been removed; and if local state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, or dust;

(d) uncontaminated water used to control dust;

4. Discharges to Water Quality-Impaired Receiving Waters.

New sources or new discharges of the constituents of concern to impaired waters are not authorized by this permit unless otherwise allowable under 30 TAC Chapter 305 and applicable state law. Impaired waters are those that do not meet applicable water quality standards and are listed on the EPA approved Clean Water Act Section 303(d) list. Constituents of concern are those for which the water body is listed as impaired.

Discharges of the constituents of concern to impaired water bodies for which there is a total maximum daily load (TMDL) are not eligible for this permit unless they are consistent with the approved TMDL. Permittees must incorporate the limitations, conditions, and requirements applicable to their discharges, including monitoring frequency and reporting required by TCEQ rules, into their storm water pollution prevention plan in order to be eligible for coverage under this general permit.

5. Discharges to the Edwards Aquifer Recharge Zone

Discharges cannot be authorized by this general permit where prohibited by 30 Texas Administrative Code (TAC) Chapter 213 (relating to Edwards Aquifer). **In addition, commencement of construction (i.e., the initial disturbance of soils associated with clearing, grading, or excavating activities, as well as other construction-related activities such as stockpiling of fill material and demolition) at a site regulated under 30 TAC Chapter 213, may not begin until the appropriate Edwards Aquifer Protection Plan has been approved by the TCEQ's Edwards Aquifer Protection Program.**

(a) For new discharges located within the Edwards Aquifer Recharge Zone, or within that area upstream from the recharge zone and defined as the Contributing Zone, operators must meet all applicable requirements of, and operate according to, 30 TAC Chapter 213 (Edwards Aquifer Rule) in addition to the provisions and requirements of this general permit.

(b) For existing discharges located within the Edwards Aquifer Recharge Zone, the requirements of the agency-approved Water Pollution Abatement Plan under the Edwards Aquifer Rules are in addition to the requirements of this general permit. BMPs and maintenance schedules for structural storm water controls, for example, may be required as a provision of the rule. All applicable requirements of the Edwards Aquifer Rule for reductions of suspended solids in storm water runoff are in addition to the requirements in this general permit for this pollutant.

For discharges from large construction activities located on the Edwards Aquifer recharge zone or the Edwards Aquifer contributing zone, applicants must submit a copy of the NOI to the appropriate TCEQ regional office. For discharges from small construction activities located on the Edwards Aquifer recharge zone or the Edwards Aquifer contributing zone, and for discharges from large construction activities by operators not required to submit an NOI under this general permit, applicants must submit a copy of the construction site notice to the appropriate TCEQ regional office where required by the Edwards Aquifer Rules at 30 TAC Chapter 213:

Counties: Contact:

Comal, Bexar, Medina, Uvalde, and Kinney	TCEQ Water Program Manager San Antonio Regional Office 14250 Judson Rd. San Antonio, Texas (210) 490-3096
Williamson, Travis, and Hays	TCEQ Water Program Manager Austin Regional Office 2800 South IH 35, Suite 100 Austin, Texas 78704-5712 (512) 339-2929

6. Discharges to Specific Watersheds and Water Quality Areas

Discharges otherwise eligible for coverage cannot be authorized by this general permit where prohibited by 30 TAC Chapter 311 (relating to Watershed Protection) for water quality areas and watersheds.

7. Protection of Streams and Watersheds by Other Governmental Entities

This general permit does not limit the authority or ability of federal, other state, or local governmental entities from placing additional or more stringent requirements on construction activities or discharges from construction activities. For example, this permit does not limit the authority of a home-rule municipality provided by Texas Local Government Code §401.002.

8. Indian Country Lands

Storm water runoff from construction activities occurring on Indian Country lands are not under the authority of the TCEQ and are not eligible for coverage under this general permit. If discharges of storm water require authorization under federal National Pollutant Discharge Elimination System (NPDES) regulations, authority for these discharges must be obtained from the U.S. Environmental Protection Agency (EPA).

9. Oil and Gas Production

Storm water runoff from construction activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline, are not under the authority of the TCEQ and are not eligible for coverage under this general permit. If discharges of storm water require authorization under federal NPDES regulations, authority for these discharges must be obtained from the EPA.

10. Storm Water Discharges from Agricultural Activities

Storm water discharges from agricultural activities that are not point source discharges of storm water are not subject to TPDES permit requirements. These activities may include clearing and cultivating ground for crops, construction of fences to contain livestock, construction of stock ponds, and other similar agricultural activities. Discharges of storm water runoff associated with the construction of facilities that are subject to TPDES regulations, such as the construction of confined animal feeding operations, would be point sources regulated under this general permit.

11. Other

Nothing in Part II of the general permit is intended to negate any person's ability to assert the force majeure (act of God, war, strike, riot, or other catastrophe) defenses found in 30 TAC § 70.7.

Section D. Deadlines for Obtaining Authorization to Discharge

1. Large Construction Activities

(a) New Construction - Discharges from sites where the commencement of construction occurs on or after the effective date of this general permit must be authorized, either under this general permit or a separate TPDES permit, prior to the commencement of those construction activities.

(b) Ongoing Construction - Operators of large construction activities continuing to operate after the effective date of this permit, and authorized under TPDES general permit TXR150000 (issued March 5, 2003), must submit an NOI to renew authorization under this general permit within 90 days of the effective date of this general permit. During this interim period, as a requirement of this TPDES permit, the operator must continue to meet the conditions and requirements of the previous TPDES permit.

2. Small Construction Activities

(a) New Construction - Discharges from sites where the commencement of construction occurs on or after the effective date of this general permit must be authorized, either under this general permit or a separate TPDES permit, prior to the commencement of those construction activities.

(b) Ongoing Construction - Discharges from ongoing small construction activities that commenced prior to the effective date of this general permit, and that would not meet the conditions to qualify for termination of this permit as described in Part II.E. of this general permit, must meet the requirements to be authorized, either under this general permit or a separate TPDES permit, within 90 days of the effective date of this general permit. During this interim period, as a requirement of this TPDES permit, the operator must continue to meet the conditions and requirements of the previous TPDES permit.

Section E. Obtaining Authorization to Discharge

1. Automatic Authorization for Small Construction Activities With Low Potential for Erosion:

If all of the following conditions are met, then a small construction activity is determined to occur during periods of low potential for erosion, and a site operator may be automatically authorized under this general permit without being required to develop a storm water pollution prevention plan or submit a notice of intent (NOI):

(a) the construction activity occurs in a county listed in Appendix A;

(b) the construction activity is initiated and completed, including either final or temporary stabilization of all disturbed areas, within the time frame identified in Appendix A for the location of the construction site;

(c) all temporary stabilization is adequately maintained to effectively reduce or prohibit erosion, permanent stabilization activities have been initiated, and a condition of final stabilization is completed no later than 30 days following the end date of the time frame identified in Appendix A for the location of the construction site;

(d) the permittee signs a completed construction site notice (Attachment 1 of this general permit), including the certification statement;

(e) a signed copy of the construction site notice is posted at the construction site in a location where it is readily available for viewing by the general public, local, state, and federal authorities prior to commencing construction activities, and maintained in that location until completion of the construction activity;

(f) a copy of the signed and certified construction site notice is provided to the operator of any municipal separate storm sewer system (MS4) receiving the discharge at least two days prior to commencement of construction activities;

(g) any supporting concrete batch plant or asphalt batch plant is separately authorized for discharges of storm water runoff or other non-storm water discharges under an individual TPDES permit, another TPDES general permit, or under an individual TCEQ permit where storm water and non-storm water is disposed of by evaporation or irrigation (discharges are adjacent to water in the state); and

(h) any non-storm water discharges are either authorized under a separate permit or authorization, or are not considered to be a wastewater.

Part II.G. of this general permit describes how an operator may apply for and obtain a waiver from permitting, for certain small construction activities that occur during a period with a low potential for erosion, where automatic authorization under this section is not available.

2. Automatic Authorization For All Other Small Construction Activities:

Operators of small construction activities not described in Part II.E.1 above may be automatically authorized under this general permit, and operators of these sites shall not be required to submit an NOI, provided that they meet all of the following conditions:

(a) develop a SWP3 according to the provisions of this general permit, that covers either the entire site or all portions of the site for which the applicant is the operator, and implement that plan prior to commencing construction activities;

(b) sign and certify a completed construction site notice (Attachment 2 of this general permit), post the notice at the construction site in a location where it is safely and readily available for viewing by the general public, local, state, and federal authorities, prior to commencing construction, and maintain the notice in that location until completion of the construction activity (for linear construction activities, e.g. pipeline or highway, the site notice must be placed in a publicly accessible location near where construction is actively underway; notice for these linear sites may be relocated, as necessary, along the length of the project, and the notice must be safely and readily available for viewing by the general public, local, state, and federal authorities); and

(c) provide a copy of the signed and certified construction site notice to the operator of any municipal separate storm sewer system receiving the discharge at least two days prior to commencement of construction activities.

Operators of small construction activities as defined in Part I of this general permit shall not submit an NOI for coverage unless otherwise required by the executive director.

As described in Part I (Definitions) of this general permit, large construction activities include those that will disturb less than five (5) acres of land, but that are part of a larger common plan of development or sale that will ultimately disturb five (5) or more acres of land, and must meet the requirements of Part II.E.3. below.

3. Authorization for Large Construction Activities:

Operators of large construction activities that qualify for coverage under this general permit must meet all of the following conditions:

(a) develop a SWP3 according to the provisions of this general permit that covers either the entire site or all portions of the site for which the applicant is the operator, and implement that plan prior to commencing construction activities;

(b) primary operators must submit a Notice of Intent (NOI), using a form provided by the executive director, at least seven (7) days prior to commencing construction activities, or if utilizing electronic submittal, prior to commencing construction activities. If an additional primary operator is added after the initial NOI is submitted, the new primary operator must submit an NOI at least seven (7) days before assuming operational control, or if utilizing electronic NOI submittal, prior to assuming operational control. If the primary operator changes after the initial NOI is submitted, the new primary operator must submit a paper NOI or an electronic NOI at least ten (10) days before assuming operational control;

(c) all primary operators must also post a copy of the signed NOI at the construction site in a location where it is readily available for viewing by the general public, local,

state, and federal authorities prior to commencing construction activities, and must maintain the NOI in that location until completion of the construction activity;

(d) all operators of large construction activities must post a site notice in accordance with Part III.D.2. of this permit. The site notice must be located where it is safely and readily available for viewing by the general public, local, state, and federal authorities prior to commencing construction, and must be maintained in that location until completion of the construction activity (for linear construction activities, e.g. pipeline or highway, the site notice must be placed in a publicly accessible location near where construction is actively underway; notice for these linear sites may be relocated, as necessary, along the length of the project, and the notice must be safely and readily available for viewing by the general public; local, state, and federal authorities); and

(e) all primary operators must provide a copy of the signed NOI to the operator of any municipal separate storm sewer system (MS4) receiving the discharge and to any secondary operator, at least seven (7) days prior to commencing construction activities, and must list in the SWP3 the names and addresses of all MS4 operators receiving a copy.

(f) All persons meeting the definition of "secondary operator" in Part I of this permit are hereby notified that they are regulated under this general permit, but are not required to submit an NOI, provided that another operator(s) at the site has submitted an NOI, or is required to submit an NOI and the secondary operator has provided notification to the operator(s) of the need to obtain coverage (with records of notification available upon request). Any secondary operator notified under this provision may alternatively submit an NOI under this general permit, may seek coverage under an alternative TPDES individual permit, or may seek coverage under an alternative TPDES general permit if available.

4. Waivers for Small Construction Activities:

Part II.G. describes how operators of certain small construction activities may obtain a waiver from coverage.

5. Effective Date of Coverage

(a) Operators of small construction activities as described in either Part II.E.1. or II.E.2. above are authorized immediately following compliance with the applicable conditions of Part II.E.1. or II.E.2. Secondary operators of large construction activities as described in Part II.E.3. above are authorized immediately following compliance with the applicable conditions in Part II.E.3. For activities located in areas regulated by 30 TAC Chapter 213, related to the Edwards Aquifer, this authorization to discharge is separate from the requirements of the operator's responsibilities under that rule. Construction may not commence for sites regulated under 30 TAC Chapter 213 until all applicable requirements of that rule are met.

(b) Primary operators of large construction activities as described in Part II.E.3 above are provisionally authorized seven (7) days from the date that a completed NOI is

postmarked for delivery to the TCEQ, unless otherwise notified by the executive director. If electronic submission of the NOI is provided, and unless otherwise notified by the executive director, primary operators are authorized immediately following confirmation of receipt of the NOI by the TCEQ. Authorization is non-provisional when the executive director finds the NOI is administratively complete and an authorization number is issued for the activity. For activities located in areas regulated by 30 TAC Chapter 213, related to the Edwards Aquifer, this authorization to discharge is separate from the requirements of the operator's responsibilities under that rule. Construction may not commence for sites regulated under 30 TAC Chapter 213 until all applicable requirements of that rule are met.

(c) Operators are not prohibited from submitting late NOIs or posting late notices to obtain authorization under this general permit. The TCEQ reserves the right to take appropriate enforcement actions for any unpermitted activities that may have occurred between the time construction commenced and authorization was obtained.

6. Notice of Change (NOC)

If relevant information provided in the NOI changes, an NOC must be submitted at least 14 days before the change occurs, if possible. Where 14-day advance notice is not possible, the operator must submit an NOC within 14 days of discovery of the change. If the operator becomes aware that it failed to submit any relevant facts or submitted incorrect information in an NOI, the correct information must be provided to the executive director in an NOC within 14 days after discovery. The NOC shall be submitted on a form provided by the executive director, or by letter if an NOC form is not available. A copy of the NOC must also be provided to the operator of any MS4 receiving the discharge, and a list must be included in the SWP3 that includes the names and addresses of all MS4 operators receiving a copy.

Information that may be included on an NOC includes, but is not limited to, the following: the description of the construction project, an increase in the number of acres disturbed (for increases of one or more acres), or the operator name. A transfer of operational control from one operator to another, including a transfer of the ownership of a company, may not be included in an NOC. A transfer of ownership of a company includes changes to the structure of a company, such as changing from a partnership to a corporation or changing corporation types, so that the filing number (or charter number) that is on record with the Texas Secretary of State must be changed.

An NOC is not required for notifying TCEQ of a decrease in the number of acres disturbed. This information must be included in the storm water pollution prevention plan (SWP3) and retained on site.

7. Signatory Requirement for NOI Forms, Notice of Termination (NOT) Forms, NOC Letters, and Construction Site Notices

NOI forms, NOT forms, NOC letters, and Construction Site Notices that require a signature must be signed according to 30 TAC § 305.44 (relating to Signatories for Applications).

8. Contents of the NOI

The NOI form shall require, at a minimum, the following information:

(a) the TPDES CGP authorization number for existing authorizations under this general permit, where the operator submits an NOI to renew coverage within 90 days of the effective date of this general permit;

(b) the name, address, and telephone number of the operator filing the NOI for permit coverage;

(c) the name (or other identifier), address, county, and latitude/longitude of the construction project or site;

(d) the number of acres that will be disturbed by the applicant;

(e) confirmation that the project or site will not be located on Indian Country lands;

(f) confirmation that a SWP3 has been developed, that it will be implemented prior to construction, and that it is compliant with any applicable local sediment and erosion control plans;

(g) name of the receiving water(s);

(h) the classified segment number for each classified segment that receives discharges from the regulated construction activity (if the discharge is not directly to a classified segment, then the classified segment number of the first classified segment that those discharges reach), and

(i) the name of all surface waters receiving discharges from the regulated construction activity that are on the latest EPA-approved CWA § 303(d) list of impaired waters.

Section F. Terminating Coverage

1. Notice of Termination (NOT) Required

Each operator that has submitted an NOI for authorization under this general permit must apply to terminate that authorization following the conditions described in this section of the general permit. Authorization must be terminated by submitting a Notice of Termination (NOT) on a form supplied by the executive director. Authorization to discharge under this general permit terminates at midnight on the day the NOT is postmarked for delivery to the TCEQ. If electronic submission of the NOT is provided, authorization to discharge under this permit terminates immediately following confirmation of receipt of the NOT by the TCEQ. Compliance with the conditions and requirements of this permit is required until an NOT is submitted.

The NOT must be submitted to TCEQ, and a copy of the NOT provided to the operator of any MS4 receiving the discharge (with a list in the SWP3 of the names and addresses of all MS4 operators receiving a copy), within 30 days after any of the following conditions are met:

(a) final stabilization has been achieved on all portions of the site that are the responsibility of the permittee;

(b) a transfer of operational control has occurred (See Section II.F.4. below); or

(c) the operator has obtained alternative authorization under an individual TPDES permit or alternative TPDES general permit.

2. Minimum Contents of the NOT

The NOT form shall require, at a minimum, the following information:

(a) if authorization was granted following submission of an NOI, the permittee's site-specific TPDES authorization number for the construction site;

(b) an indication of whether the construction activity is completed or if the permittee is simply no longer an operator at the site;

(c) the name, address, and telephone number of the permittee submitting the NOT;

(d) the name (or other identifier), address, county, and latitude/longitude of the construction project or site; and

(e) a signed certification that either all storm water discharges requiring authorization under this general permit will no longer occur, or that the applicant to terminate coverage is no longer the operator of the facility or construction site, and that all temporary structural erosion controls have either been removed, will be removed on a schedule defined in the SWP3, or have been transferred to a new operator if the new operator has applied for permit coverage. Erosion controls that are designed to remain in place for an indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal.

3. Termination of Coverage for Small Construction Sites and for Secondary Operators at Large Construction Sites

Each operator that has obtained automatic authorization and has not been required to submit an NOI must remove the site notice upon meeting any of the conditions listed below, complete the applicable portion of the site notice related to removal of the site notice, and submit a copy of the completed site notice to the operator of any MS4 receiving the discharge (or provide alternative notification as allowed by the MS4 operator, with documentation of such notification included in the SWP3), within 30 days of meeting any of the following conditions:

(a) final stabilization has been achieved on all portions of the site that are the responsibility of the permittee;

(b) a transfer of operational control has occurred (See Section II.F.4. below), or

(c) the operator has obtained alternative authorization under an individual or general TPDES permit.

Authorization to discharge under this general permit terminates immediately upon removal of the applicable site notice. Compliance with the conditions and requirements of this permit is required until the site notice is removed.

4. Transfer of Operational Control

Coverage under this general permit is not transferable. A transfer of operational control includes changes to the structure of a company, such as changing from a partnership to a corporation, or changing to a different corporation type such that a different filing (or charter) number is established with the Texas Secretary of State.

When the primary operator of a large construction activity changes or operational control is transferred, the original operator must submit a Notice of Termination (NOT) within ten (10) days prior to the date that responsibility for operations terminates, and the new operator must submit an NOI at least ten (10) days prior to the transfer of operational control, in accordance with condition (a) or (b) below. A copy of the NOT must be provided to the operator of any MS4 receiving the discharge in accordance with Section II.F.1. above.

Operators of regulated construction activities who are not required to submit an NOI must remove the original site notice, and the new operator must post the required site notice prior to the transfer of operational control, in accordance with condition (a) or (b) below. A copy of the completed site notice must be provided to the operator of any MS4 receiving the discharge, in accordance with Section II.F.3. above.

A transfer of operational control occurs when either of the following criteria is met:

(a) Another operator has assumed control over all areas of the site that have not been finally stabilized; and all silt fences and other temporary erosion controls have either been removed, scheduled for removal as defined in the SWP3, or transferred to a new operator, provided that the permitted operator has attempted to notify the new operator in writing of the requirement to obtain permit coverage. Record of this notification (or attempt at notification) shall be retained by the operator in accordance with Part VI of this permit. Erosion controls that are designed to remain in place for an indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal.

(b) A homebuilder has purchased one or more lots from an operator who obtained coverage under this general permit for a common plan of development or sale. The homebuilder is considered a new operator and shall comply with the requirements listed above, including the development of a SWP3 if necessary. Under these circumstances, the homebuilder is only responsible for compliance with the general permit requirements as they apply to lot(s) it has operational control over, and the original operator remains responsible for common controls or discharges, and must amend its SWP3 to remove the lot(s) transferred to the homebuilder.

Section G. Waivers from Coverage

The executive director may waive the otherwise applicable requirements of this general permit fo storm water discharges from small construction activities under the terms and conditions describe in this section.

1. Waiver Applicability and Coverage

Operators of small construction activities may apply for and receive a waive requirements to obtain authorization under this general permit, where all of the c conditions are met. This waiver from coverage does not apply to non-storm water discharges. The operator must insure that any non-storm water discharges are either authorized under a separate permit or authorization, or are not considered to be a wastewater

(a) the calculated rainfall erosivity (R) factor for the entire period of the construction project is less than five (5);

(b) the operator submits to the TCEQ a signed waiver certification form, supplied by the executive director, certifying that the construction activity will commence and be completed within a period when the value of the calculated rainfall erosivity R factor is less than five (5); and

(c) the waiver certification form is postmarked for delivery to the TCEQ at least two (2) days before construction activity begins.

2. Steps to Obtaining a Waiver

The construction site operator may calculate the R factor to request a waiver using the following steps:

(a) Estimate the construction start date and the construction end date. The construction end date is the date that final stabilization will be achieved.

(b) Find the appropriate Erosivity Index (EI) zone in Appendix B of this permit.

(c) Find the EI percentage for the project period by adding the results for each period of the project using the table provided in Appendix D of this permit, in EPA Fact Sheet 2.1, or in USDA Handbook 703, by subtracting the start value from the end value to find the percent EI for the site.

(d) Refer to the Isoerodent Map (Appendix C of this permit) and interpolate the annual isoerodent value for the proposed construction location.

(e) Multiply the percent value obtained in Step (c) above by the annual isoerodent value obtained in Step (d). This is the R factor for the proposed project. If the value is less than 5, then a waiver may be obtained. If the value is five (5) or more, then a waiver may not be obtained, and the operator must obtain coverage under Part II.E.2. of this permit.

Alternatively, the operator may calculate a site-specific R factor utilizing the following online calculator: http://el.tamu.edu/index.html, or using another available resource.

The waiver certification form is not required to be posted at the small construction site.

3. Effective Date of Waiver

Operators of small construction activities are provisionally waived from the otherwise applicable requirements of this general permit two (2) days from the date that a completed waiver certification form is postmarked for delivery to TCEQ.

4. Activities Extending Beyond the Waiver Period

If a construction activity extends beyond the approved waiver period due to circumstances beyond the control of the operator, the operator must either:

(a) recalculate the rainfall erosivity (R) factor using the original start date and a new projected ending date, and if the R factor is still under five (5), submit a new waiver certification form at least two (2) days before the end of the original waiver period; or

(b) obtain authorization under this general permit according to the requirements delineated in either Part II.E.2. or Part II.E.3. at least two (2) days before the end of the approved waiver period.

Section H. Alternative TPDES Permit Coverage

1. Individual Permit Alternative

Any discharge eligible for coverage under this general permit may alternatively be authorized under an individual TPDES permit according to 30 TAC Chapter 305 (relating to Consolidated Permits). Applications for individual permit coverage should be submitted at least three hundred and thirty (330) days prior to commencement of construction activities to ensure timely issuance.

2. Individual Permit Required

The executive director may suspend an authorization or deny an NOI in accordance with the procedures set forth in 30 TAC Chapter 205 (relating to General Permits for Waste Discharges), including the requirement that the executive director provide written notice to the permittee. The executive director may require an operator of a construction site, otherwise eligible for authorization under this general permit, to apply for an individual TPDES permit in the following circumstances:

(a) the conditions of an approved total maximum daily load (TMDL) limitation or TMDL implementation plan on the receiving stream;

(b) the activity being determined to cause a violation of water quality standards or being found to cause, or contribute to, the loss of a designated use of surface water in the state; and

(c) any other consideration defined in 30 TAC Chapter 205 (relating to General Permits for Waste Discharges) including 30 TAC §205.4(c)(3)(D), which allows the commission to deny authorization under the general permit and require an individual permit if a discharger "has been determined by the executive director to have been out of compliance with any rule, order, or permit of the commission, including non-payment of fees assessed by the executive director."

Additionally, the executive director may cancel, revoke, or suspend authorization to discharge under this general permit based on a finding of historical and significant noncompliance with the provisions of this general permit, relating to 30 TAC §60.3 (Use of Compliance History). Denial of authorization to discharge under this general permit or suspension of a permittee's authorization under this general permit shall be done according to commission rules in 30 TAC, Chapter 205 (relating to General Permits for Waste Discharges).

3. Any discharge eligible for authorization under this general permit may alternatively be authorized under a separate general permit according to 30 TAC Chapter 205 (relating to General Permits for Waste Discharges), if applicable.

Section I. Permit Expiration

1. This general permit is issued for a term not to exceed five (5) years. All active discharge authorizations expire on the date provided on page one (1) of this permit. Following public notice and comment, as provided by 30 TAC §205.3 (relating to Public Notice, Public Meetings, and Public Comment), the commission may amend, revoke, cancel, or renew this general permit.

2. If the executive director publishes a notice of the intent to renew or amend this general permit before the expiration date, the permit will remain in effect for existing, authorized discharges until the commission takes final action on the permit. Upon issuance of a renewed or amended permit, permittees may be required to submit an NOI within 90 days following the effective date of the renewed or amended permit, unless that permit provides for an alternative method for obtaining authorization.

3. If the commission does not propose to reissue this general permit within 90 days before the expiration date, permittees shall apply for authorization under an individual permit or an alternative general permit. If the application for an individual permit is submitted before the expiration date, authorization under this expiring general permit remains in effect un issuance or denial of an individual permit. No new NOIs will be accepted nor authorizations honored under the general permit after the expiration date.

Part III. Storm Water Pollution Prevention Plans (SWP3)

Storm water pollution prevention plans must be prepared to address discharges authorized under Parts II.E.2. and II.E.3. that will reach Waters of the United States, including discharges to MS4s and privately owned

separate storm sewer systems that drain to Waters of the United States, to identify and address potential sources of pollution that are reasonably expected to affect the quality of discharges from the construction site, including off-site material storage areas, overburden and stockpiles of dirt, borrow areas, equipment staging areas, vehicle repair areas, fueling areas, etc., used solely by the permitted project. The SWP3 must describe the implementation of practices that will be used to minimize to the extent practicable the discharge of pollutants in storm water associated with construction activity and non-storm water discharges described in Part II.A.3., in compliance with the terms and conditions of this permit.

Individual operators at a site may develop separate SWP3s that cover only their portion of the project, provided reference is made to the other operators at the site. Where there is more than one SWP3 for a site, permittees must coordinate to ensure that BMPs and controls are consistent and do not negate or impair the effectiveness of each other. Regardless of whether a single comprehensive SWP3 is developed or separate SWP3s are developed for each operator, it is the responsibility of each operator to ensure compliance with the terms and conditions of this general permit in the areas of the construction site where that operator has control over construction plans and specifications or day-to-day operations.

Section A. Shared SWP3 Development

For more effective coordination of BMPs and opportunities for cost sharing, a cooperative effort by the different operators at a site is encouraged. Operators must independently obtain authorization, but may work together to prepare and implement a single, comprehensive SWP3 for the entire construction site.

1. The SWP3 must clearly list the name and, for large construction activities, the general permit authorization numbers, for each operator that participates in the shared SWP3. Until the TCEQ responds to receipt of the NOI with a general permit authorization number, the SWP3 must specify the date that the NOI was submitted to TCEQ by each operator. Each operator participating in the shared plan must also sign the SWP3.

2. The SWP3 must clearly indicate which operator is responsible for satisfying each shared requirement of the SWP3. If the responsibility for satisfying a requirement is not described in the plan, then each permittee is entirely responsible for meeting the requirement within the boundaries of the construction site where they perform construction activities. The SWP3 must clearly describe responsibilities for meeting each requirement in shared or common areas.

Section B. Responsibilities of Operators

1. Secondary Operators and Primary Operators with Control Over Construction Plans and Specifications

   All secondary operators and primary operators with control over construction plans and specifications must:

   (a) ensure the project specifications allow or provide that adequate BMPs are developed to meet the requirements of Part III of this general permit;

   (b) ensure that the SWP3 indicates the areas of the project where they have control over project specifications, including the ability to make modifications in specifications;

   (c) ensure all other operators affected by modifications in project specifications are notified in a timely manner so that those operators may modify their best management practices as necessary to remain compliant with the conditions of this general permit, and

   (d) ensure that the SWP3 for portions of the project where they are operators indicates the name and site-specific TPDES authorization numbers for permittees with the day-to-day operational control over those activities necessary to ensure compliance with the SWP3 and other permit conditions. If the party with day-to-day operational control has not been authorized or has abandoned the site, the person with control over project specifications is considered to be the responsible party until the authority is transferred to another party and the SWP3 is updated.

2. Primary Operators with Day-to-Day Operational Control

   Primary Operators with day-to-day operational control of those activities at a project that are necessary to ensure compliance with an SWP3 and other permit conditions must ensure that the SWP3 accomplishes the following requirements:

   (a) meets the requirements of this general permit for those portions of the project where they are operators;

   (b) identifies the parties responsible for implementation of best management practices (BMPs) described in the SWP3;

   (c) indicates areas of the project where they have operational control over day-to-day activities; and

   (d) includes, for areas where they have operational control over day-to-day activities, the name and site-specific TPDES authorization number of the parties with control over project specifications, including the ability to make modifications in specifications.

Section C. Deadlines for SWP3 Preparation, Implementation, and Compliance

The SWP3 must be prepared prior to obtaining authorization under this general permit, and implemented prior to commencing construction activities that result in soil disturbance. The SWP3 must be prepared so that it provides for compliance with the terms and conditions of this general permit.

Section D. Plan Review and Making Plans Available

1. The SWP3 must be retained on-site at the construction site or, if the site is inactive or does not have an on-site location to store the plan, a notice must be posted describing the location of the SWP3. The SWP3 must be made readily available at the time of an on-site inspection to: the executive director; a federal, state, or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site.

2. In addition to the requirement to post the NOI, a primary operator of a large construction activity must post the site notice provided in Attachment 4 of this permit near the main entrance of the construction site. An operator of a small construction activity seeking authorization under this general permit and a secondary operator of a large construction activity must post the site notice required in Part II.E.1., 2., or 3. of this permit in order to obtain authorization (see Attachments 1, 2, and 3). If the construction project is a linear construction project (e.g. pipeline or highway), the notices must be placed in a publicly accessible location near where construction is actively underway. Notices for these linear sites may be relocated, as necessary, along the length of the project. The notices must be readily available for viewing by the general public; local, state, and federal authorities; and contain the following information:

   (a) the site-specific TPDES authorization number for the project if assigned;

   (b) the operator name, contact name, and contact phone number;

   (c) a brief description of the project; and

   (d) the location of the SWP3.

3. This permit does not provide the general public with any right to trespass on a construction site for any reason, including inspection of a site; nor does this permit require that permittees allow members of the general public access to a construction site.

Section E. Revisions and Updates to SWP3s

The permittee must revise or update the SWP3 whenever the following occurs:

1. a change in design, construction, operation, or maintenance that has a significant effect on the discharge of pollutants and that has not been previously addressed in the SWP3;

2. changing site conditions based on updated plans and specifications, new operators, new areas of responsibility, and changes in BMPs; or

3. results of inspections or investigations by site operators, operators of a municipal separate storm sewer system receiving the discharge, authorized TCEQ personnel, or a federal, state or local agency approving sediment and erosion plans indicate the SWP3 is proving ineffective in eliminating or significantly minimizing pollutants in discharges authorized under this general permit.

Section F. Contents of SWP3

The SWP3 must include, at a minimum, the information described in this section.

1. A site or project description, which includes the following information:

   (a) a description of the nature of the construction activity;

   (b) a list of potential pollutants and their sources;

   (c) a description of the intended schedule or sequence of activities that will disturb soils for major portions of the site;

   (d) the total number of acres of the entire property and the total number of acres where construction activities will occur, including off-site material storage areas, overburden and stockpiles of dirt, and borrow areas that are authorized under the permittee's NOI;

   (e) data describing the soil or the quality of any discharge from the site;

   (f) a map showing the general location of the site (e.g. a portion of a city or county map);

   (g) a detailed site map (or maps) indicating the following:

      (i) drainage patterns and approximate slopes anticipated after major grading activities;

      (ii) areas where soil disturbance will occur;

      (iii) locations of all major structural controls either planned or in place;

      (iv) locations where temporary or permanent stabilization practices are expected to be used;

      (v) locations of construction support activities, including off-site activities, that are authorized under the permittee's NOI, including material, waste, borrow, fill, or equipment storage areas;

      (vi) surface waters (including wetlands) either at, adjacent, or in close proximity to the site;

      (vii) locations where storm water discharges from the site directly to a surface water body or a municipal separate storm sewer system; and

      (viii) vehicle wash areas.

      Where the amount of information required to be included on the map would result in a single map being difficult to read and interpret, the operator shall develop a series of maps that collectively include the required information.

   (h) the location and description of support activities authorized under the permittee's NOI, including asphalt plants, concrete plants, and other activities providing support to the construction site that is authorized under this general permit;

   (i) the name of receiving waters at or near the site that may be disturbed or that may receive discharges from disturbed areas of the project;

(j) a copy of this TPDES general permit, and

(k) the notice of intent (NOI) and acknowledgement certificate for primary operators of large construction sites, and the site notice for small construction sites and for secondary operators of large construction sites.

2. A description of the best management practices (BMPs) that will be used to minimize pollution in runoff.

The description must identify the general timing or sequence for implementation. At a minimum, the description must include the following components.

(a) General Requirements

(i) Erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall.

(ii) Control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications.

(iii) Controls must be developed to minimize the offsite transport of liner, construction debris, and construction materials.

(b) Erosion Control and Stabilization Practices

The SWP3 must include a description of temporary and permanent erosion control and stabilization practices for the site, including a schedule of when the practices will be implemented. Site plans should ensure that existing vegetation is preserved where it is possible.

(i) Erosion control and stabilization practices may include but are not limited to: establishment of temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, slope texturing, temporary velocity dissipation devices, flow diversion mechanisms, and other similar measures.

(ii) The following records must be maintained and either attached to or referenced in the SWP3, and made readily available upon request to the parties listed in Part III.D.1 of this general permit:

(A) the dates when major grading activities occur;

(B) the dates when construction activities temporarily or permanently cease on a portion of the site; and

(C) the dates when stabilization measures are initiated.

(iii) Erosion control and stabilization measures must be initiated as soon as practicable in portions of the site where construction activities have temporarily ceased. Stabilization measures that provide a protective cover must be initiated as soon as practicable in portions of the site where construction activities have permanently ceased. Except as provided in (A) through (D) below, these measures must be initiated no more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased:

(A) Where the initiation of stabilization measures by the 14th construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable

(B) Where construction activity on a portion of the site has temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary erosion control and stabilization measures are not required on that portion of site.

(C) In arid areas, semiarid areas, and areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased or is precluded by arid conditions, erosion control and stabilization measures must be initiated as soon as practicable. Where vegetative controls are not feasible due to arid conditions, the operator shall install non-vegetative erosion controls. If non-vegetative controls are not feasible, the operator shall install temporary sediment controls as required in Paragraph (D) below.

(D) In areas where temporary stabilization measures are infeasible, the operator may alternatively utilize temporary perimeter controls. The operator must document in the SWP3 the reason why stabilization measures are not feasible, and must demonstrate that the perimeter controls will retain sediment on site to the extent practicable. The operator must continue to inspect the BMPs at the frequency established in Section III.F.7.(a) for unstabilized sites.

(iv) Final stabilization must be achieved prior to termination of permit coverage.

(c) Sediment Control Practices

The SWP3 must include a description of any sediment control practices used to remove eroded soils from storm water runoff, including the general timing or sequence for implementation of controls.

(i) Sites With Drainage Areas of Ten or More Acres

(A) Sedimentation Basin(s)

(1) A sedimentation basin is required, where feasible, for a common drainage location that serves an area with ten (10) or more acres disturbed at one time. A sedimentation basin may be temporary or permanent, and must provide sufficient storage to contain a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained. When calculating the volume of runoff from a 2-year, 24-hour storm event, it is not required to include the flows from offsite areas and flow from onsite areas that are either undisturbed or have already undergone permanent stabilization, if these flows are diverted around both the disturbed areas of the site and the sediment basin. Capacity calculations shall be included in the SWP3.

(2) Where rainfall data is not available or a calculation cannot be performed, the sedimentation basin must provide at least 3,600 cubic feet of storage per acre drained until final stabilization of the site.

(3) If a sedimentation basin is not feasible, then the permittee shall provide equivalent control measures until final stabilization of the site. In determining whether installing a sediment basin is feasible, the permittee may consider factors such as site soils, slope, available area, public safety, precipitation patterns, site geometry, site vegetation, infiltration capacity, geotechnical factors, depth to groundwater, and other similar considerations. The permittee shall document the reason that the sediment basins are not feasible, and shall utilize equivalent control measures, which may include a series of smaller sediment basins.

(B) Perimeter Controls: At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area, and for those side slope boundaries deemed appropriate as dictated by individual site conditions.

(ii) Controls for Sites With Drainage Areas Less than Ten Acres:

(A) Sediment traps and sediment basins may be used to control solids in storm water runoff for drainage locations serving less than ten (10) acres. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area, and for those side slope boundaries deemed appropriate as dictated by individual site conditions.

(B) Alternatively, a sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed

acre drained may be utilized. Where rainfall data is not available or a calculation cannot be performed, a temporary or permanent sediment basin providing 3,600 cubic feet of storage per acre drained may be provided. If a calculation is performed, then the calculation shall be included in the SWP3.

3. A Description of Permanent Storm Water Controls

A description of any measures that will be installed during the construction process to control pollutants in storm water discharges that may occur after construction operations have been completed must be included in the SWP3. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site or prior to submission of an NOT.

4. Other Required Controls and BMPs

(a) Permittees shall minimize, to the extent practicable, the off-site vehicle tracking of sediments and the generation of dust. The SWP3 shall include a description of controls utilized to accomplish this requirement.

(b) The SWP3 must include a description of construction and waste materials expected to be stored on-site and a description of controls to minimize pollutants from these materials.

(c) The SWP3 must include a description of potential pollutant sources from areas other than construction (such as storm water discharges from dedicated asphalt plants and dedicated concrete batch plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.

(d) Permittees shall place velocity dissipation devices at discharge locations and along the length of any outfall channel (i.e., runoff conveyance) to provide a non-erosive flow velocity from the structure to a water course, so that the natural physical and biological characteristics and functions are maintained and protected.

(e) Permittees shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water from the site.

5. Documentation of Compliance with Approved State and Local Plans

(a) Permittees must ensure that the SWP3 is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or site permits approved by federal, state, or local offi

(b) SWP3s must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment erosion site plans or site permits, or storm water management site plans or site permits approved by state or local official for which the permittee receives written notice.

(c) If the permittee is required to prepare a separate management plan, including but not limited to a Water Pollution Abatement Plan or Contributing Zone Plan in accordance with 30 TAC Chapter 213 (related to the Edwards Aquifer), then a copy of that plan must be either included in the SWP3 or made readily available upon request to authorized personnel of the TCEQ. The permittee shall maintain a copy of the approval letter for the plan in its SWP3.

6. Maintenance Requirements

(a) All protective measures identified in the SWP3 must be maintained in effective operating condition. If, through inspections or other means, the permittee determines that BMPs are not operating effectively, then the permittee shall perform maintenance as necessary to maintain the continued effectiveness of storm water controls, and prior to the next rain event if feasible. If maintenance prior to the next anticipated storm event is impracticable, the reason shall be documented in the SWP3 and maintenance must be scheduled and accomplished as soon as practicable. Erosion and sediment controls that have been intentionally disabled, run-over, removed, or otherwise rendered ineffective must be replaced or corrected immediately upon discovery.

(b) If periodic inspections or other information indicates a control has been used incorrectly, is performing inadequately, or is damaged, then the operator must replace or modify the control as soon as practicable after making the discovery.

(c) Sediment must be removed from sediment traps and sedimentation ponds no later than the time that design capacity has been reduced by 50%. For perimeter controls such as silt fences, berms, etc., the trapped sediment must be removed before it reaches 50% of the above-ground height.

(d) If sediment escapes the site, accumulations must be removed at a frequency that minimizes off-site impacts, and prior to the next rain event, if feasible. If the permittee does not own or operate the off-site conveyance, then the permittee must to work with the owner or operator of the property to remove the sediment.

7. Inspections of Controls

(a) Personnel provided by the permittee must inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, discharge locations, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Personnel conducting these inspections must be knowledgeable of this general permit, familiar with the construction site, and knowledgeable of the SWP3 for the site. Sediment and erosion control measures identified in the SWP3 must be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking. Inspections must be conducted at least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

Where sites have been finally or temporarily stabilized or where runoff is unlikely due to winter conditions (e.g. site is covered with snow, ice, or frozen ground exists), inspections must be conducted at least once every month. In arid or semi-arid areas, inspections must be conducted at least once every month and within 24 hours after the end of a storm event of 0.5 inches or greater.

As an alternative to the above-described inspection schedule of once every 14 calendar days and within 24 hours of a storm event of 0.5 inches or greater, the SWP3 may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, then the inspection must occur on a specifically defined day, regardless of whether or not there has been a rainfall event since the previous inspection. The inspections may occur on either schedule provided that the SWP3 reflects the current schedule and that any changes to the schedule are conducted in accordance with the following provisions: the schedule may be changed a maximum of one time each month, the schedule change must be implemented at the beginning of a calendar month, and the reason for the schedule change must be documented in the SWP3 (e.g., end of "dry" season and beginning of "wet" season).

(b) Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may provide inspection personnel with limited access to the areas described in Part III.F.8.(a) above. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls must be inspected at least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches, but representative inspections may be performed. For representative inspections, personnel must inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described in Part III.F.8.(a) above. The conditions of the controls along each inspected 0.25 mile portion may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile portion to either the end of the next 0.25 mile inspected portion, or to the end of the project, whichever occurs first.

As an alternative to the above-described inspection schedule of once every 14 calendar days and within 24 hours of a storm event of 0.5 inches or greater, the SWP3 may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, the inspection must occur on a specifically defined day, regardless of whether or not there has been a rainfall event since the previous inspection. The inspections may occur on either schedule provided that the SWP3 reflects the current schedule and that any changes to the schedule are conducted in accordance with the following provisions: the schedule may be changed a maximum of one time each month, the schedule change must be implemented at the beginning of a calendar month, and the reason for the schedule change must be documented in the SWP3 (e.g., end of "dry" season and beginning of "wet" season).

(c) In the event of flooding or other uncontrollable situations which prohibit access to the inspection sites, inspections must be conducted as soon as access is practicable.

(d) The SWP3 must be modified based on the results of inspections, as necessary, to better control pollutants in runoff. Revisions to the SWP3 must be completed within seven (7) calendar days following the inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SWP3 and wherever possible those changes implemented before the next storm event. If implementation before the next anticipated storm event is impracticable, these changes must be implemented as soon as practicable.

(e) A report summarizing the scope of the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWP3 must be made and retained as part of the SWP3. Major observations should include: The locations of discharges of sediment or other pollutants from the site; locations of BMPs that need to be maintained; locations of BMPs that failed to operate as designed or proved inadequate for a particular location; and locations where additional BMPs are needed.

Actions taken as a result of inspections must be described within, and retained as a part of, the SWP3. Reports must identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report must contain a certification that the facility or site is in compliance with the SWP3 and this permit. The report must be signed by the person and in the manner required by 30 TAC § 305.128 (relating to Signatories to Reports).

The names and qualifications of personnel making the inspections for the permittee may be documented once in the SWP3 rather than being included in each report.

8. The SWP3 must identify and ensure the implementation of appropriate pollution prevention measures for all eligible non-storm water components of the discharge, as listed in Part II.A.3 of this permit.

9. The SWP3 must include the information required in Part III.B. of this general permit.

Part IV. Storm Water Runoff from Concrete Batch Plants

Discharges of storm water runoff from concrete batch plants at regulated construction sites may be authorized under the provisions of this general permit provided that the following requirements are met for concrete batch plant(s) authorized under this permit. If discharges of storm water runoff from concrete batch plants are not covered under this general permit, then discharges must be authorized under an alternative general permit or individual permit. This permit does not authorize the discharge or land disposal of any wastewater from concrete batch plants at regulated construction sites. Authorization for such wastes must be obtained under an individual permit or an alternative general permit.

A. Benchmark Sampling Requirements

1. Operators of concrete batch plants authorized under this general permit must sample the storm water runoff from the concrete batch plants according to the requirements of this

section of this general permit, and must conduct evaluations on the effectiveness of the SWP3 based on the following benchmark monitoring values:

Benchmark Parameter	Benchmark Value	Sampling Frequency	Sample Type
Oil and Grease	15 mg/L	1/quarter (*1)(*2)	Grab (*3)
Total Suspended Solids	100 mg/L	1/quarter (*1)(*2)	Grab (*3)
pH	6.0 - 9.0 Standard Units	1/quarter (*1)(*2)	Grab (*3)
Total Iron	1.3 mg/L	1/quarter(*1)(*2)	Grab (*3)

(*1) When discharge occurs. Sampling is required within the first 30 minutes of discharge. If it is not practicable to take the sample, or to complete the sampling, within the first 30 minutes, sampling must be completed within the first hour of discharge. If sampling is not completed within the first 30 minutes of discharge, the reason must be documented and attached to all required reports and records of the sampling activity.

(*2) Sampling must be conducted at least once during each of the following periods. The first sample must be collected during the first full quarter that a storm water discharge occurs from a concrete batch plant authorized under this general permit.

January through March
April through June
July through September
October through December

For projects lasting less than one full quarter, a minimum of one sample shall be collected, provided that a storm water discharge occurred at least once following submission of the NOI or following the date that automatic authorization was obtained under Section II.E.2., and prior to terminating coverage.

(*3) A grab sample shall be collected from the storm water discharge resulting from a storm event that is at least 0.1 inches of measured precipitation that occurs at least 72 hours from the previously measurable storm event. The sample shall be collected downstream of the concrete batch plant, and where the discharge exits any BMPs utilized to handle the runoff from the batch plant, prior to commingling with any other water authorized under this general permit.

2. The permittee must compare the results of sample analyses to the benchmark values above, and must include this comparison in the overall assessment of the SWP3's effectiveness. Analytical results that exceed a benchmark value are not a violation of this permit, as these values are not numeric effluent limitations. Results of analyses are indicators that modifications of the SWP3 should be assessed and may be necessary to protect water quality. The operator must investigate the cause for each exceedance and must document the results of this investigation in the SWP3 by the end of the quarter following the sampling event.

The operator's investigation must identify the following:

(a) any additional potential sources of pollution, such as spills that might have occurred,

(b) necessary revisions to good housekeeping measures that are part of the SWP3,

(c) additional BMPs, including a schedule to install or implement the BMPs, and

(d) other parts of the SWP3 that may require revisions in order to meet the goal of the benchmark values.

Background concentrations of specific pollutants may also be considered during the investigation. If the operator is able to relate the cause of the exceedance to background concentrations, then subsequent exceedances of benchmark values for that pollutant may be resolved by referencing earlier findings in the SWP3. Background concentrations may be identified by laboratory analyses of samples of storm water runon to the permitted facility, by laboratory analyses of samples of storm water run-off from adjacent non-industrial areas, or by identifying the pollutant is a naturally occurring material in soils at the site.

Section B. Best Management Practices (BMPs) and SWP3 Requirements

Minimum Storm Water Pollution Prevention Plan (SWP3) Requirements – The following are required in addition to other SWP3 requirements listed in this general permit (including, but not limited to Part III.F.7. of this permit):

1. Description of Potential Pollutant Sources - The SWP3 must provide a description of potential sources (activities and materials) that may reasonably be expected to affect the quality of storm water discharges associated with concrete batch plants authorized under this permit. The SWP3 must describe practices that that will be used to reduce the pollutants in these discharges to assure compliance with this general permit, including the protection of water quality, and must ensure the implementation of these practices.

   The following must be developed, at a minimum, in support of developing this description:

   (a) Drainage – The site map must include the following information:

   (1) the location of all outfalls for storm water discharges associated with concrete batch plants that are authorized under this permit;

   (2) a depiction of the drainage area and the direction of flow to the outfall(s);

   (3) structural controls used within the drainage area(s);

   (4) the locations of the following areas associated with concrete batch plants that are exposed to precipitation: vehicle and equipment maintenance activities (including fueling, repair, and storage areas for vehicles and equipment scheduled for maintenance), areas used for the treatment, storage, or disposal

of wastes; liquid storage tanks; material processing and storage areas; loading and unloading areas; and

(5) the locations of the following: any bag house or other dust control device(s); recycle/sedimentation pond, clarifier or other device used for the treatment of facility wastewater (including the areas that drain to the treatment device); areas with significant materials; and areas where major spills or leaks have occurred.

(b) Inventory of Exposed Materials - A list of materials handled at the concrete plant that may be exposed to storm water and that have a potential to affect the quality of storm water discharges associated with concrete batch plants that are authorized under this general permit.

(c) Spills and Leaks - A list of significant spills and leaks of toxic or hazardous pollutants that occurred in areas exposed to storm water and that drain to storm water outfalls associated with concrete batch plants authorized under this general permit must be developed, maintained, and updated.

(d) Sampling Data - A summary of existing storm water discharge sampling data must be maintained, if available.

2. Measures and Controls - The SWP3 must include a description of management controls to regulate pollutants identified in the SWP3's "Description of Potential Pollutant Sources" from Part IV.B.1.(a) of this permit, and a schedule for implementation of the measures and controls. This must include, at a minimum:

   (a) Good Housekeeping - Good housekeeping measures must be developed and implemented in the area(s) associated with concrete batch plants.

   (1) Operators must prevent or minimize the discharge of spilled cement, aggregate (including sand or gravel), settled dust, or other significant materials from paved portions of the site that are exposed to storm water. Measures used to minimize the presence of these materials may include regular sweeping or other equivalent practices. These practices must be conducted at a frequency that is determined based on consideration of the amount of industrial activity occurring in the area and frequency of precipitation, and shall occur at least once per week when cement or aggregate is being handled or otherwise processed in the area.

   (2) Operators must prevent the exposure of fine granular solids, such as cement, to storm water. Where practicable, these materials must be stored in enclosed silos, hoppers or buildings, in covered areas, or under covering.

   (b) Spill Prevention and Response Procedures - Areas where potential spills that can contribute pollutants to storm water runoff, and the drainage areas from these locations, must be identified in the SWP3. Where appropriate, the SWP3 must specify material handling procedures, storage requirements, and use of equipment,

Procedures for cleaning up spills must be identified in the SWP3 and made available to the appropriate personnel.

(c) Inspections - Qualified facility personnel (i.e., a person or persons with knowledge of this general permit, the concrete batch plant, and the SWP3 related to the concrete batch plant(s) for the site) must be identified to inspect designated equipment and areas of the facility specified in the SWP3. The inspection frequency must be specified in the SWP3 based upon a consideration of the level of concrete production at the facility, but must be a minimum of once per month while the facility is in operation. The inspection must take place while the facility is in operation and must, at a minimum, include all areas that are exposed to storm water at the site, including material handling areas, above ground storage tanks, hoppers or silos, dust collection/containment systems, truck wash down and equipment cleaning areas. Follow-up procedures must be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections must be maintained and be made readily available for inspection upon request.

(d) Employee Training - An employee training program must be developed to educate personnel responsible for implementing any component of the SWP3, or personnel otherwise responsible for storm water pollution prevention, with the provisions of the SWP3. The frequency of training must be documented in the SWP3, and at a minimum, must consist of one training prior to the initiation of operation of the concrete batch plant.

(e) Record Keeping and Internal Reporting Procedures - A description of spills and similar incidents, plus additional information that is obtained regarding the quality and quantity of storm water discharges, must be included in the SWP3. Inspection and maintenance activities must be documented and records of those inspection and maintenance activities must be incorporated to the SWP3.

(f) Management of Runoff - The SWP3 shall contain a narrative consideration for reducing the volume of runoff from concrete batch plants by diverting runoff or otherwise managing runoff, including use of infiltration, detention ponds, retention ponds, or reusing of runoff.

3. Comprehensive Compliance Evaluation – At least once per year, one or more qualified personnel (i.e., a person or persons with knowledge of this general permit, the concrete batch plant, and the SWP3 related to the concrete batch plant(s) for the site) shall conduct a compliance evaluation of the plant. The evaluation must include the following.

   (a) Visual examination of all areas draining storm water associated with regulated concrete batch plants for evidence of, or the potential for, pollutants entering the drainage system. These include but are not limited to: cleaning areas, material handling areas, above ground storage tanks, hoppers or silos, dust collection/containment systems, and truck wash down and equipment cleaning areas. Measures implemented to reduce pollutants in runoff (including structural controls and implementation of management practices) must be evaluated to determine if they are effective and if they are implemented in accordance with the terms of this permit

and with the permittee's SWP3. The operator shall conduct a visual inspection of equipment needed to implement the SWP3, such as spill response equipment.

(b) Based on the results of the evaluation, the following must be revised as appropriate within two weeks of the evaluation: the description of potential pollutant sources identified in the SWP3 (as required in Part IV.B.1., "Description of Potential Pollutant Sources"); and pollution prevention measures and controls identified in the SWP3 (as required in Part IV.B.2., "Measures and Controls"). The revisions may include a schedule for implementing the necessary changes.

(c) The permittee shall prepare and include in the SWP3 a report summarizing the scope of the evaluation, the personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the SWP3, and actions taken in response to the findings of the evaluation. The report must identify any incidents of noncompliance. Where the report does not identify incidences of noncompliance, the report must contain a statement that the evaluation did not identify any incidence(s), and the report must be signed according to 30 TAC Section 305.128, relating to Signatories to Reports.

(d) The Comprehensive Compliance Evaluation may substitute for one of the required inspections delineated in Part IV.B.2.(c) of this general permit.

Section C. Prohibition of Wastewater Discharges

Wastewater discharges associated with concrete production including wastewater disposal by land application are not authorized under this general permit. These wastewater discharges must be authorized under an alternative TCEQ water quality permit or otherwise disposed of in an authorized manner. Discharges of concrete truck washout at construction sites may be authorized if conducted in accordance with the requirements of Part V of this general permit.

Part V. Concrete Truck Wash Out Requirements

This general permit authorizes the wash out of concrete trucks at construction sites regulated under Sections II.E.1., 2., and 3. of this general permit, provided the following requirements are met. Authorization is limited to the land disposal of wash out water from concrete trucks that are associated with off-site production facilities. Wash out water associated with on-site concrete production facilities must be authorized under a separate TCEQ general permit or individual permit.

1. Direct discharge of concrete truck wash out water to surface water in the state, including discharge to storm sewers, is prohibited by this general permit.

2. Concrete truck wash out water shall be discharged to areas at the construction site where structural controls have been established to prevent direct discharge to surface waters, areas that have a minimal slope that allow infiltration and filtering of wash out water to prevent direct discharge to surface waters. Structural controls may consist of temporary berms, temporary shallow pits, temporary storage tanks with slow rate release, or other reasonable measures to prevent runoff from the construction site.

3. Wash out of concrete trucks during rainfall events shall be minimized. The direct discharge

of concrete truck wash out water is prohibited at all times, and the operator shall insure that its BMPs are sufficient to prevent the discharge of concrete truck washout as the result of rain.

4. The discharge of wash out water shall not cause or contribute to groundwater contamination.

5. If a SWPJ is required to be implemented, the SWPJ shall include concrete wash out areas on the associated map.

Part VI. Retention of Records

The permittee must retain the following records for a minimum period of three (3) years from the date that a NOT is submitted as required by Part II E.3. For activities in which an NOT is not required, records shall be retained for a minimum period of three (3) years from the date that the operator terminates coverage under Section II.F.3. of this permit. Records include:

1. A copy of the SWPJ;

2. All reports and actions required by this permit, including a copy of the construction site notice;

3. All data used to complete the NOI, if an NOI is required for coverage under this general permit; and

4. All records of submittal of forms submitted to the operator of any MS4 receiving the discharge and to the secondary operator of a large construction site, if applicable.

Part VII. Standard Permit Conditions

1. The permittee has a duty to comply with all permit conditions. Failure to comply with any permit condition is a violation of the permit and statutes under which it was issued, and is grounds for enforcement action, for terminating coverage under this general permit, or for requiring a discharger to apply for and obtain an individual TPDES permit.

2. Authorization under this general permit may be suspended or revoked for cause. Filing a notice of planned changes or anticipated non-compliance by the permittee does not stay any permit condition. The permittee must furnish to the executive director, upon request and within a reasonable time, any information necessary for the executive director to determine whether cause exists for revoking, suspending, or terminating authorization under this permit. Additionally, the permittee must provide to the executive director, upon request, copies of all records that the permittee is required to maintain as a condition of this general permit.

3. It is not a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the permit conditions.

4. Inspection and entry shall be allowed under Texas Water Code Chapters 26-28, Texas Health and Safety Code §§361.032-361.033 and 361.037, and 40 Code of Federal Regulations (CFR) §122.41(i). The statement in Texas Water Code §26.014 that commission entry of a facility shall occur according to an establishment's rules and regulations concerning safety, internal security, and

fire protection is not grounds for denial or restriction of entry to any part of the facility or site, but merely describes the commission's duty to observe appropriate rules and regulations during an inspection.

5. The discharger is subject to administrative, civil, and criminal penalties, as applicable, under Texas Water Code §§26.136, 26.212, and 26.213 for violations including but not limited to the following:

   a. negligently or knowingly violating the federal Clean Water Act (CWA), §§301, 302, 306, 307, 308, 318, or 405, or any condition or limitation implementing any sections in a permit issued under CWA, §402, or any requirement imposed in a pretreatment program approved under CWA, §§402(a)(3) or 402(b)(8);

   b. knowingly making any false statement, representation, or certification in any record or other document submitted or required to be maintained under a permit, including monitoring reports or reports of compliance or noncompliance.

6. All reports and other information requested by the executive director must be signed by the person and in the manner required by 30 TAC §305.128 (relating to Signatories to Reports).

7. Authorization under this general permit does not convey property or water rights of any sort and does not grant any exclusive privilege.

Part VIII. Fees

1. A fee of must be submitted along with the NOI:

   a. $325 if submitting a paper NOI, or
   b. $225 if submitting a NOI electronically.

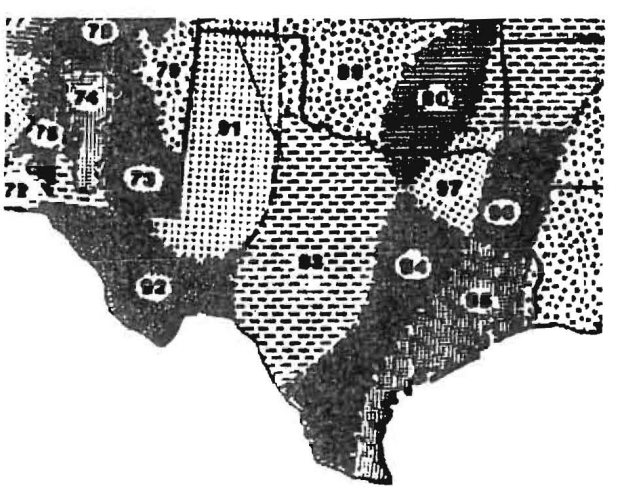
2. Fees are due upon submission of the NOI. An NOI will not be declared administratively complete unless the associated fee has been paid in full.

3. No separate annual fees will be assessed. The Water Quality Annual fee has been incorporated into the NOI fees as described above.

Appendix A: Automatic Authorization
Periods of Low Erosion Potential by County – Eligible Date Ranges

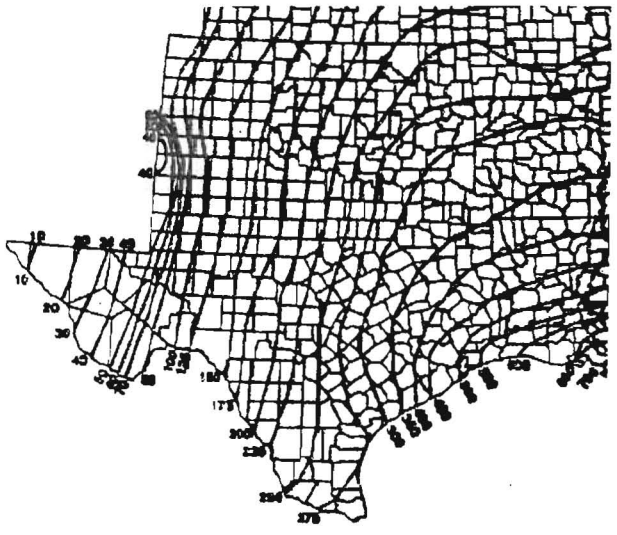
drews: Nov. 15 - Apr. 30
cher: Dec. 15 - Feb. 14
Armstrong: Nov. 15 - Apr. 30
Bailey: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Baylor: Dec. 15 - Feb. 14
Borden: Nov. 15 - Apr. 30
wster: Nov. 15 - Apr. 30
coe: Nov. 15 - Apr. 30
wn: Dec. 15 - Feb. 14
ahan: Dec. 15 - Feb. 14
Carson: Nov. 15 - Apr. 30
Castro: Nov. 15 - Apr. 30
Childress: Dec. 15 - Feb. 14
hran: Nov. 1 - Apr. 30, or Nov. 15 - May 14
e: Dec. 15 - Feb. 14
man: Dec. 15 - Feb. 14
lingsworth: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28
Concho: Dec. 15 - Feb. 14
Cottle: Dec. 15 - Feb. 14
Crane: Nov. 15 - Apr. 30
Crockett: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
by: Nov. 15 - Apr. 30
erson: Nov. 1 - May 14
m: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
on: Nov. 15 - Apr. 30
Deaf Smith: Nov. 15 - Apr. 30
Dickens: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
Dimmit: Dec. 15 - Feb. 14
y: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28
nd: Dec. 15 - Feb. 14
Nov. 15 - Apr. 30
ds: Dec. 15 - Feb. 14
El Paso: Jan. 1 - Jul. 14, or May 15 - Jul. 31, or Jun. 1 - Aug. 14, or Jun. 15 - Sept. 14, or Jul. 1 - Oct. 14, or Jul. 15 - Oct. 31, or Aug. 1 - Apr. 30, or Aug. 15 - May 14, or Sept. 1 - May 30, or Oct. 1 - Jun. 14, or Nov. 1 - Jun. 30, or Nov. 15 - Jul. 14
F Dec. 15 - Feb. 14
T Nov. 15 - Apr. 30
F Dec. 15 - Feb. 14
G Nov. 15 - Apr. 30
Garza: Nov. 15 - Apr. 30
Glasscock: Nov. 15 - Apr. 30
Hale: Nov. 15 - Apr. 30
H eb. 1 - Mar. 30
H d. Nov. 15 - Apr. 30
H an: Dec. 15 - Feb. 14
H Nov. 15 - Apr. 30
Haskell: Dec. 15 - Feb. 14
Hock Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Ho 15 - Apr. 30
Hu 1 - May 14
Iro 15 - Apr. 30
Ja b. 14
Ke - Apr. 30 or Nov. 15 - May 14
Kent: Dec. 15 - Feb. 14
Kent: Nov. 15 - Jan. 14 or Feb. 1 - Mar. 30
Kerr: Dec. 15 - Feb. 14
Kimble: Dec. 15 - Feb. 14
King: Dec. 15 - Feb. 14
Kinney: Dec. 15 - Feb. 14
Knox: Dec. 15 - Feb. 14
Lamb: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Loving: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Lubbock: Nov. 15 - Apr. 30
Lynn: Nov. 15 - Apr. 30
Martin: Nov. 15 - Apr. 30
Mason: Dec. 15 - Feb. 14
Maverick: Dec. 15 - Feb. 14
McCulloch: Dec. 15 - Feb. 14
Menard: Dec. 15 - Feb. 14
Midland: Nov. 15 - Apr. 30
Mitchell: Nov. 15 - Apr. 30
Moore: Nov. 15 - Apr. 30
Motley: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
Nolan: Dec. 15 - Feb. 14
Oldham: Nov. 15 - Apr. 30
Parmer: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Pecos: Nov. 15 - Apr. 30
Potter: Nov. 15 - Apr. 30
Presidio: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Randall: Nov. 15 - Apr. 30
Reagan: Nov. 15 - Apr. 30
Real: Dec. 15 - Feb. 14
Reeves: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Runnels: Dec. 15 - Feb. 14
Schleicher: Dec. 15 - Feb. 14
Scurry: Nov. 15 - Apr. 30
Shackelford: Dec. 15 - Feb. 14
Sherman: Nov. 15 - Apr. 30
Stephens: Dec. 15 - Feb. 14
Sterling: Nov. 15 - Apr. 30
Stonewall: Dec. 15 - Feb. 14
Sutton: Dec. 15 - Feb. 14
Swisher: Nov. 15 - Apr. 30
Taylor: Dec. 15 - Feb. 14
Terrell: Nov. 15 - Apr. 30
Terry: Nov. 15 - Apr. 30
Throckmorton: Dec. 15 - Feb. 14
Tom Green: Dec. 15 - Feb. 14
Upton: Nov. 15 - Apr. 30
Uvalde: Dec. 15 - Feb. 14
Val Verde: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
Ward: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Wichita: Dec. 15 - Feb. 14
Wilbarger: Dec. 15 - Feb. 14
Winkler: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Yoakum: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Young: Dec. 15 - Feb. 14
Wheeler: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28
Zavala: Dec. 15 - Feb. 14

Appendix B:
Erosivity Index (EI) Zones in Texas



Adapted from Chapter 2 of USDA Agriculture Handbook 703, "Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service

Appendix C: Isoerodent Map



Adapted from Chapter 2 of USDA Agriculture Handbook 703: "Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service

Appendix D: Erosivity Indices for El Zones in Texas

Periods:

EI#:	1/1	1/15	2/1	2/15	3/1	3/15	4/1	4/15	5/1	5/15	6/1	6/15	7/1	7/15	8/1	8/15	9/1	9/15	10/1	10/15	11/1	11/15	12/1
85	0	0	1	1	2	3	4	7	11	18	27	38	48	55	62	69	76	83	90	94	97	98	99
90	0	1	2	3	4	6	8	13	21	29	37	46	54	60	65	69	74	81	87	92	95	97	98
91	0	0	0	0	1	1	2	5	16	29	39	46	53	60	67	74	81	88	95	97			
92	0	0	0	0	1	1	1	2	6	18	29	39	46	53	60	67	74	81	88	95			
93	0	1	1	2	3	4	6	8	13	23	40	49	56	62	67	72	76	80	85	91	9		
94	0	1	2	4	6	8	10	15	21	29	38	47	53	57	61	65	70	76	83	88	91		
95	0	1	3	5	7	9	11	14	18	27	35	43	46	51	57	62	68	73	79	84	89	93	96
96	0	2	4	6	9	12	17	23	30	37	43	49	54	58	62	66	70	74	78	82	86	90	94
97	0	1	3	5	7	10	14	20	28	37	48	56	61	64	68	72	77	81	86	89	92	95	98
100	0	3	6	9	12	17	21	27	33	38	44	49	55	61	67	71	75	78	81	84	86	90	94

- Each period begins on the date listed in the table above and lasts until the day before the following period. The final period begins on December 15 and ends on December 31.

Table adapted from Chapter 2 of USDA Agriculture Handbook 703: Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service

Attachment 1

SMALL CONSTRUCTION SITE NOTICE: LOW POTENTIAL FOR EROSION

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program

TPDES GENERAL PERMIT TXR150000

The following information is posted in compliance with **Part II.E.1.** of the TCEQ General Permit Number TXR150000 for discharges of storm water runoff from small construction sites automatically authorized based on low rainfall erosivity. Additional information regarding the TCEQ storm water permit program may be found on the internet at:
http://www.tceq.state.tx.us/nav/permits/wq_construction.html

Operator Name:	
Contact Name and Phone Number:	
Project Description: (Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized)	

For Small Construction Sites Authorized Under Part II.E.1., the following certification must be completed:

I _____ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an automatic authorization based on low rainfall erosivity under Part II.E.1. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. Construction activities at this site shall occur within a time period listed in Appendix A of the TPDES general permit for this county, that period beginning on _____ and ending on _____. I understand that if construction activities continue past this period, all storm water runoff must be authorized under a separate provision of the general permit. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title _____ Date _____

_____ *Date Notice Removed*
_____ *MS4 operator notified per Part II.F.3.*

Attachment 2

SMALL CONSTRUCTION SITE NOTICE

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program

TPDES GENERAL PERMIT TXR150000

The following information is posted in compliance with **Part II.E.2.** of the TCEQ General Permit Number TXR150000 for discharges of storm water runoff from small construction sites. Additional information regarding the TCEQ storm water permit program may be found on the internet at:
http://www.tceq.state.tx.us/nav/permits/wq_construction.html

Operator Name:	
Contact Name and Phone Number:	
Project Description: *Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized*	
Location of Storm Water Pollution Prevention Plan:	

For Small Construction Activities Authorized Under Part II.E.2. (Obtaining Authorization to Discharge) the following certification must be completed:

I _____ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.D.1. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A storm water pollution prevent has been developed and will be implemented prior to construction, according to permit requirements. A copy of this sign is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for provid information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing vio

Signature and Title _____ Date _____

_____ *Date Notice Removed*
_____ *MS4 operator notified per Part II.F.3.*

Attachment 3

LARGE CONSTRUCTION SITE NOTICE

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program
TPDES GENERAL PERMIT TXR150000
"SECONDARY OPERATOR" NOTICE

This notice applies to secondary operators of construction sites operating under Part II.E.3. of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.E.2. of the general permit. Additional information regarding the TCEQ storm water permit program may be found on the internet at: http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	
Operator Name:	
Contact Name and Phone Number:	
Project Description: *Physical address or description of the site's location, and estimated start date and projected end date, or date that disturbed soils will be stabilized.*	
Location of Storm Water Pollution Prevention Plan (SWP2):	

For Large Construction Activities Authorized Under Part II.E.3. (Obtaining Authorization to Discharge) the following certification must be completed:

I _____ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.2. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A storm water pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title_____ Date _____

_____ *Date Notice Removed*
_____ *MS4 operator notified per Part II.F.3.*

Attachment 4

LARGE CONSTRUCTION SITE NOTICE

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program
TPDES GENERAL PERMIT TXR150000

"PRIMARY OPERATOR" NOTICE

This notice applies to construction sites operating under Part II.E.3. of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.E.2. of the general permit. This notice shall be posted along with a copy of the signed Notice of Intent (NOI), as applicable. Additional information regarding the TCEQ storm water permit program may be found on the internet at: http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	
Operator Name:	
Contact Name and Phone Number:	
Project Description: *Physical address or description of the site's location, and estimated start date and projected end date, or date that disturbed soils will be stabilized.*	
Location of Storm Water Pollution Prevention Plan:	

TRAINING

Employee and Subcontractor Training

As per contract specification 01 57 24.00 44 part 1.2(7), a briefing of the approved SWPPP will be performed by the CPESC who prepared the BMP layout. This training will include all onsite personnel of JSR, Inc. and their subcontractors. The objective of this training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMP's), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. The Sign- In sheet on the next page will serve as the certificate to verify training.

The following is a list of topics to be discussed at the training.

1. Permitting and Signage – brief discussion of the permitting process, regulations, and information required to be on the sign
2. SWPPP – discussion of the contents of the SWPPP including necessary contents, site information, documentation, points of contact, etc.
3. Housekeeping Practices – discussion of importance of keeping the site clean, potential sources of pollutants, etc.
4. Onsite Best Management Practices – discussion of BMP's and installed sediment/erosion controls, etc.
5. Spill Response – discussion of location of spill kit, what to do in case of a spill, contact information
6. Stormwater Inspections and Reports – discussion of importance of inspections, what to do with the reports, contact information, etc.
7. Correcting Report Action Items – discussion of process for identifying items needing corrective action, getting things fixed and cleaned, etc.
8. Questions

SWPPP Briefing Sign-in Log

Note: Briefing on the approved Construction Operation SWPPP to be provided by a Certified Professional in Erosion and Sediment Control (CPESC).

Date	Attendee Name	Attendee Signature	Trainer Name	Trainer Signature

Date	Non-Storm Water Discharge Assessment	Certification Name (printed)	Certification Signature

LARGE CONSTRUCTION SITE NOTICE

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program

TPDES GENERAL PERMIT TXR150000

"SECONDARY OPERATOR" NOTICE

This notice applies to secondary operators of construction sites operating under Part II.E.3. of the TPDES General Permit Number TXR150000 for discharges of storm water runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.D.2. of the general permit. Additional information regarding the TCEQ storm water permit program may be found on the internet at:

http://www.tceq.state.tx.us/nav/permits/sw_permits.html

Site-Specific TPDES Authorization Number:	TXR150000
Operator Name:	U.S. Army Corps of Engineers
Contact Name and Phone Number:	Robert G. Adams 254-939-1829
Project Description: *Physical address or description of the site's location, and estimated start date and projected end date, or date that disturbed soils will be stabilized.*	Crane's Mill Park Canyon Lake Comal County, Texas
Location of Storm Water Pollution Prevention Plan (SWP3):	Project Field Office at construction site

For Large Construction Activities Authorized Under Part II.E.3. (Obtaining Authorization to Discharge) the following certification must be completed:

I Robert G. Adams (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.3. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A storm water pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title ADAMS.ROBERT.G.1231001499 Digitally signed by ADAMS.ROBERT.G.1231001499 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499 Date: 2011.02.01 15:11:48 -06'00' Date 3 FEB 2011

_____ *Date Notice Removed*
_____ *MS4 operator notified per Part II.F.3.*

1 February 2011

Reference: Park Modernization Project – Crane's Mill Park, Canyon Lake.

The U.S. Army Corps of Engineers (USACE) is a secondary operator with the ability to approve and disapprove changes to plans and specifications. USACE will comply will all provisions of the Texas Pollution Discharge Elimination System (TPDES) General Permit TXR150000 and the Storm Water Pollution Prevention Plan (SWPPP) developed for the project. The SWPPP and its provisions shall be implemented by JSR, Inc. as Primary Operator.

ADAMS.ROBERT.G.1231001499

Digitally signed by ADAMS.ROBERT.G.1231001499
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.ROBERT.G.1231001499
Date: 2011.02.03 14:57:50 -06'00'

Robert G. Adams

Natural Resource Management

Business Line Manager

Capital Regional Office

U.S. Army Corps of Engineers