GBRA

Contributing Zone Plan Application

Western Canyon Water Supply Project

Water Treatment Plant and Raw Water Control Tanks

February 2004

MALCOLM PIRNIE

3928-014

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
INDEPENDENT ENVIRONMENTAL ENGINEERS, SCIENTISTS & CONSULTANTS

February 10, 2004

Mr. John Mauser
Environmental Investigator
Texas Commission on Environmental Quality
Region 13 San Antonio
14250 Judson Rd.
San Antonio, TX 78233

Re: Contributing Zone Plan - Western Canyon Contract 4

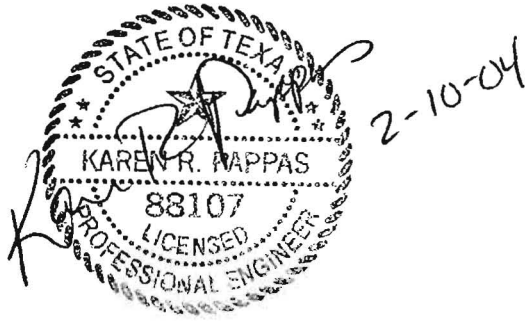
Dear Mr. Mauser:

On behalf of the Guadalupe–Blanco River Authority, we are pleased to submit the enclosed Contributing Zone Plan for the Contract 4 portion (Raw Water Control Tanks and Water Treatment Plant) of the Western Canyon Water Supply Project. As requested, there is 1 original and 3 copies of the plan for your use. Please call me at (210) 366-8747 if you have any questions during your review. Thank you.

Very truly yours,

MALCOLM PIRNIE, INC.

Karen R. Pappas
Project Engineer



2-10-04

krp
Enclosures
3928014

1100 N.W. LOOP 410 SUITE 700 SAN ANTONIO, TX 78213 210-366-8747 fax 210-366-8748 http://www.pirnie.com

Contributing Zone Plan Checklist

___ Contributing Zone Plan Application, *TNRCC-10257*

ATTACHMENT A - Road Map
ATTACHMENT B - USGS Quadrangle Map
ATTACHMENT C - Project Narrative
ATTACHMENT D - Factors Affecting Surface Water Quality
ATTACHMENT E - Volume and Character of Stormwater
ATTACHMENT F - Suitability Letter from Authorized Agent, if OSSF is proposed
ATTACHMENT G - Alternative Secondary Containment Methods, if AST is proposed and alternative method of secondary containment is proposed
ATTACHMENT H - AST Containment Structure Drawings, if AST is proposed
ATTACHMENT I - 20% or Less Impervious Cover Waiver, if project is multi-family residential, a school, or a small business and 20% or less impervious cover is proposed for the site
ATTACHMENT J - BMPs for Upgradient Stormwater
ATTACHMENT K - BMPs for On-site Stormwater
ATTACHMENT L - BMPs for Surface Streams
ATTACHMENT M - Construction Plans
ATTACHMENT N - Inspection, Maintenance, Repair and Retrofit Plan
ATTACHMENT O - Pilot-Scale Field Testing Plan, if guidance other than the Edwards Aquifer Protection Program Guidance Manual to design Permanent BMPs
ATTACHMENT P - Measures for Minimizing Surface Stream Contamination

___ Storm Water Pollution Prevention Plan (SWPPP)

___ Notice of Intent (NOI)

___ Agent Authorization Form, *TNRCC-0599*, if submitted by agent

___ Contributing Zone Fee Application Form, *TNRCC-10258*

___ Check Payable to the Texas Natural Resource Conservation Commission

___ Core Data Form, *TNRCC-10400*

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

Regulated Entity Name: Western Canyon Water Supply Project (Water Treatment Plant)

County: Comal Stream Basin: Dry Comal Creek

1. ✓ 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:	Gary Asbury, P.E.	
Entity:	Guadalupe-Blanco River Authority	
Mailing Address:	933 East Court Street	
City, State:	Sequin, Texas	Zip: 78155
Telephone:	(830) 379-5822	FAX: (830) 379-9718

Agent/Representative (If any):

Contact Person:	Karen Pappas, P.E.	
Title:	Project Engineer	
Entity:	Malcolm Pirnie, Inc.	
Mailing Address (after Dec 3, 2003):	1100 N.W. Loop 410, Suite 700	
City, State:	San Antonio, TX	Zip: 78213
Telephone:	(210) 366-0366	FAX: (210) 366-0198

3. ___ This project is inside the city limits of _____.
___ This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
✓ 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.

The WTP site is located in Comal County, south of the FM3159 / Cranes Mill Road intersection. Approaching from the north, the site entrance is located on the right hand side of Cranes Mill Road. Waggener Ranch is across the street from the site. The Raw Water Control Tanks (RWCT) site is 0.5 miles north of the WTP site on FM3159.

5. ✓ **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.

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

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

8. Existing project site conditions are noted below:
   - __ Existing commercial site
   - __ Existing industrial site
   - __ Existing residential site
   - __ Existing paved and/or unpaved roads
   - ✓ Undeveloped (Cleared)
   - __ Undeveloped (Undisturbed/Uncleared)
   - __ Other:

PROJECT INFORMATION

9. The type of project is:
   - __ Residential: # of Lots:
   - __ Residential: # of Living Unit Equivalents:
   - __ Commercial
   - __ Industrial
   - ✓ Other: Water Treatment Plant

10. Total project area (size of site): 27 Acres
    Total disturbed area: 9.6 Acres
    * The total area of the RWCT site is 0.45 acres.

11. Projected population: Less than 5 staff onsite

12. The amount and type of impervious cover expected after construction is complete is shown below:

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	58,957	÷ 43,560 =	1.4
Parking	3,154	÷ 43,560 =	0.1
Other paved surfaces	71,136	÷ 43,560 =	1.6
Total Impervious Cover	133,247	÷ 43,560 =	3.1
Total Impervious Cover ÷ Total Acreage x 100 =			11 %

*The RWCT site will contain 0.23 acres of impervious cover after construction.

13. ✓ **ATTACHMENT D - Factors Affecting Surface Water Quality.** A description of factors that could affect surface water quality is found as at the end of this form. If applicable, this should included the location and description of any discharge associated with industrial activity other than construction.

14. ✓ Only inert materials as defined by 30 TAC 330.2 will be used as fill material.

FOR ROAD PROJECTS ONLY
Complete questions 15-20 if this application is exclusively for a road project.

15. Type of project:
   - __ TXDOT road project.
   - __ County road or roads built to county specifications.

__ 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. ✓ **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:

✓ 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.
__ proposed.

__ Wastewater is to be discharged in the contributing zone. Requirements under 30 TAC §213.6(c) relating to Wastewater Treatment and Disposal Systems have been satisfied.

FOR PERMANENT ABOVEGROUND STORAGE TANKS (ASTs) > 500 GALLONS
Complete questions 23-29 if this project includes the installation of AST(s) with volume(s) greater than 500 gallons.

23. Tanks and substance stored:

AST Number	Size (Gallons)	Substance to be Stored	Tank Material
1	5,000	Caustic (for pH adjustment)	FRP
2*	6,200	For neutralization of membrane cleaning chemical	FRP
3*	2,500	Caustic (for membrane clean)	FRP
4*	2,500	Acid (for membrane clean)	FRP
5*	1,250	Ferric Sulfate (Day)	FRP
6*	20,000	Ferric Sulfate (Bulk)	FRP
Total (AST 1,6)		x 1.5 =	37,500 gallons
Total (AST 2,3,4,5)		x 1.1 =	12,450 gallons

* Located inside building.

24. ✓ The AST will be placed within a containment structure that is sized to capture one and one-half (1 1/2) times the storage capacity of the system. For facilities with more than one tank system, the containment structure is sized to capture one and one-half (1 1/2) times the cumulative storage capacity of all systems. *AST numbers 2 through 5 will be stored in a covered building. Per discussion with Lynn Bumguardner at TCEQ, the containment for these tanks must be at least 110% of the storage capacity of the system.

__ **ATTACHMENT G - Alternative Secondary Containment Methods.** Alternative methods for providing secondary containment are proposed. Specifications showing equivalent protection for the Edwards Aquifer are found at the end of this form.

25. Inside dimensions and capacity of containment structure(s):

AST Number	Length (L) (Ft.)	Width (W) (Ft.)	Height (H) (Ft.)	L x W x H = Gallons (Ft^3)
1	44	26	3	1,130 ft^3 = 8,450 gallons(1)
2, 3, 4	56	33	1.5	2,772 ft^3 = 20,736 gallons
5	28	13	1	364 ft^3 = 2,723 gallons
6	44	26	3.5	4,244 ft^3 = 31,749 gallons (1)
			Total	8,510 ft^3 = 63,655 gallons

(1) Total containment does not include tank pads, but does include the volume in trenches. See drawings.

26. __ All piping, hoses, and dispensers will be located inside the containment structure.
✓ Some of the piping to dispensers or equipment will extend outside the containment structure.

✓ The piping will be aboveground
✓ The piping will be underground

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 concrete.

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 in Attachment H.

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" = 100'. See figure 1C02.

31. 100-year floodplain boundaries

— 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): Firm Flood Insurance Rate map, Comal County, Texas: Community – Panel Numbers: 485463 0060 C, 485 463 0065 C. September 29, 1986.

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.
— 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.

34. ✓ The drainage patterns and approximate slopes anticipated after major grading activities.

35. ✓ Areas of soil disturbance and areas which will not be disturbed shown on Figure 1 CO1.

36. ✓ Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.

37. N/A Locations where soil stabilization practices are expected to occur.

38. N/A Surface waters (including wetlands).

39. ___ Locations where stormwater discharges to surface water.
✓ There will be no discharges to surface water.

40. ___ Temporary aboveground storage tank facilities.
✓ Temporary aboveground storage tank facilities will not be located on this site.

41. ✓ Permanent aboveground storage tank facilities.
___ Permanent aboveground storage tank facilities will not be located on this site.

Permanent best management practices (BMPs) and measures that will be used during and after construction is completed.

42. ✓ Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.

43. ✓ These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.

✓ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.
___ A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is provided below

44. ✓ Owners must insure that permanent 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 appropriate regional office within 30 days of site completion.

45. N/A Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. 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.

___ 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.
___ 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.

— This site will not be used for multi-family residential developments, schools, or small business sites.

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

— 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.**

✓ 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.

50. ✓ **ATTACHMENT M - Construction Plans.** Construction plans and design calculations for the proposed permanent BMPs and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information have been signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed permanent BMPs and measures are provided at the end of this form. Design Calculations, TCEQ Construction Notes, all proposed structural measures, and appropriate details must be shown on the construction plans.

51. ✓ **ATTACHMENT N - Inspection, Maintenance, Repair and Retrofit Plan.** A plan for the inspection, maintenance, repair, and, if necessary, retrofit of the permanent BMPs and measures is provided at the end of this form. The plan has been prepared and certified by the

engineer designing the permanent BMPs and measures. The plan has been signed by the owner or responsible party. The plan includes procedures for documenting inspections, maintenance, repairs, and, if necessary, retrofits as well as a discussion of record keeping procedures.

52. ✓ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

__ Pilot-scale field testing (including water quality monitoring) may be required for BMPs that are not contained in technical guidance recognized by or prepared by the executive director. __ **ATTACHMENT O - Pilot-Scale Field Testing Plan.** A plan for pilot-scale field testing is provided at the end of this form.

53. ✓ **ATTACHMENT P - Measures for Minimizing Surface Stream Contamination.** A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is provided at the end of this form. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity which increase erosion that results in water quality degradation.

Responsibility for maintenance of permanent BMPs and measures after construction is complete.

54. ✓ The applicant is 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.

55. ✓ A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.

ADMINISTRATIVE INFORMATION

56. ✓ One (1) original and one (1) copy of the complete application has been provided.

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. ✓ 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:

Karen R. Pappas, P.E.
Print Name of Customer/Agent

_____
Signature of Customer/Agent Date

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.

FM 3159
(ROW VARIES – 120 FT. MIN.)

EXIST. FENCE

12' CONC. DRWY (TYP)

ENLARGED PLAN I
SEE SHEET 1C03

ENLARGED PLAN II
SEE SHEET 1C04

ENLARGED PLAN III
SEE SHEET 1C05

ENLARGED PLAN IV
SEE SHEET 1C06

ENLARGED PLAN V
SEE SHEET 1C07

MEMBRANE BUILDING
FF= 1372.50

FERRIC SULFATE
STORAGE TANK

CHLORINE
BUILDING
FF= 1365.00

FLOW METER
VAULT No. 2

FUTURE
GAC

CHLORINE
FEED VAULT

OPERATIONS
BUILDING
FF= 1371.50

BUS
PARKING

2 MG TREATED
WATER TANK
TWST-701
BASE EL 1354.50

TANK INLET
VALVE VAULT

TANK OUTLET
VALVE VAULT

HYDROPNEUMATIC
TANK SLAB

SITE DRAIN
PUMP STATION

FLOW METER
VAULT No. 3

TANK INLET
VALVE VAULT MH

CONCRETE
PAVEMENT
HIGH SERVICE
PUMP STATION
FF= 1357.5

TANK OUTLET
VALVE VAULT

FUTURE
2 MG TREATED
WATER TANK
TWST-702

FUTURE
RESIDUALS
LAGOON

SEPTIC
TANK

CONC.
RAMP

RAPID MIX BASIN
FF= 1371.00

FLOCCULATION
BASIN FF= 1371.00

CHLORINE
FEED VAULT

CONTROL
VALVE
VAULT

FLOW METER
VAULT No. 1

CIP LAGOON 2
FF= 1357.50

CIP LAGOON 1
FF= 1357.50

LAGOON
DRAIN
PUMP

BENCH MARK
(A-418)
ELEV= 1360.76

RECYCLE
PUMPS

RESIDUALS
LAGOON 1
FF VARIES

RESIDUALS
LAGOON 2
FF VARIES

24" CATCH
BASIN

HEADWALL

CHAIN LINK
FENCE

EXIST. FENCE

CRANES MILL ROAD

WAGNER RANCH

BENCH MARK
(A-415)
ELEV= 1335.73

ASPHALT PAVEMENT
ROAD SEE NOTE 4
AND DETAIL

24' WIDE GATE
SEE DETAIL

20' X 20'
TURN AROUND

24" CATCH
BASIN

HEADWALL

3.7%
4%
4.1%
6.7%
7.3%
10.8%
6.8%
6.3%
8.0%

NOTES:

1. ALL ROADS ARE 20 FT WIDE UNLESS OTHERWISE INDICATED.
2. TURNING RADII OF ROADS ARE 35 FT UNLESS OTHERWISE INDICATED.
3. FOR LANDSCAPING SEE SHEETS 1L01–1L06.
4. ALL ROADS ARE ASPHALT UNLESS OTHERWISE INDICATED.
5. SEE SHEETS 1C03 THROUGH 1C08 FOR ENLARGED PLANS.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED RCE
DETAILED
CHECKED
DRAWN

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

SITE WORK
CIVIL
SITE PLAN
GRADING AND PAVING

DATE	NOVEMBER 2003
SCALE	1" =100'
FILE NAME	GBRA-4-1C-02.DWG
SHEET NO.	1C02
ISSUE	0

FM 3159
(ROW VARIES – 120 FT. MIN.)

EXIST. FENCE

MEMBRANE BUILDING AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

CIP LAGOON AREA

RESIDUALS LAGOON AREA

TREATED WATER TANKS AND PUMP STATION AREA

CLEARING AREA
377027 S.F.
8.655 AC.

CONTRACTOR STAGING AREA, SEE NOTE 4

SEE NOTE 9

STABILIZED CONSTRUCTION ENTRANCE

WTR PL

EXIST. FENCE

CRANES MILL ROAD

WAGNER RANCH

8.6%
2.8%
1.3%
3.6%
12.9%
7.4%
4.0%
5.9%
4.5%
6.3%
3.0%
12.5%
5.0%
4.9%
10.7%
7.7%
6.6%
9.0%

NOTES:

1. TEMPORARY BENCHMARK
   #_____ IS LOCATED AT
   ELEVATION = _____
   N = _____
   E = _____
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL _____ ON SHEET _____
3. CLEAR PRIME AREAS AS OUTLINED. CLEAR ALONG ROADS AT 25 FOOT WIDTHS, PROTECT ALL TREES ON THE PROPERTY OUTSIDE OF AREAS TO BE CLEARED. TREE REPRESENTATIONS ARE APPROXIMATE. DETAIL SURVEY NOT DONE, CONTRACTOR TO VERIFY TREES TO REMAIN AND CLEAR ONLY THAT NECESSARY TO CONSTRUCT.
4. CONTRACTOR SHALL USE DESIGNATED LOCATIONS FOR LAYDOWN, SPOIL AREAS, AND TRAILER STORAGE WITHIN AREA SHOWN.
5. CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL OFF-SITE. STORE ONLY THAT MATERIAL REQUIRED TO ESTABLISH FINAL GRADES.
6. FOR SITE PLAN, SEE SHEET 1C02. FOR SITE PIPING PLAN, SEE SHEET 1C04.
7. REFER TO SPECIFICATIONS FOR GENERAL SITE CLEARING REQUIREMENTS.
8. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
9. REMOVE EXISTING DRAINAGE CONTAINMENT. SEE GRADING PLANS FOR DETAILS.
10. THE SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.
11. GENERAL BORING LOCATION AND REPORT AVAILABLE UPON REQUEST.

BAR LENGTH ON ORIGINAL DRAWING EQUALS ONE INCH. ADJUST SCALE ACCORDINGLY.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED RCE
DESIGNED
CHECKED
DRAWN JRM

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL
WATER TREATEMENT PLANT
EXISTING SITE PLAN

DATE OCTOBER 2003
SCALE 1" = 100'
FILE NAME GBRA-4-1C01.DWG
SHEET NO. 1C01
ISSUE B

PRELIMINARY - NOT FOR CONSTRUCTION

= PRE CONSTRUCTION

= POST CONSTRUCTION

ORA MAE PFEUFFER
39830 FN 3159
CANYON LAKE, TX 78133

83.60 ACRES
VOL. 130, PG. 529–531

ORA MAE PFEUFFER
VOL. 184, PG. 734
5.716 AC.

EXISTING STRUCTURE

EXISTING DIRT/GRAVEL ROAD

BENCH MARK (A–413)
ELEV= 1381.41

EXISTING GRAVEL DRIVEWAY

164.0'

40'–0"

CHAIN LINK FENCE SEE DETAIL 1 / 11C02

PROTECT EXISTING TREES

PROPERTY LINE

CHAINLINK FENCE SET 2FT. INSIDE PROPERTY LINE (TYP AROUND PERIMETER) 1 / 11C02

20.0'x80.0' CONSTRUC ON STAGING AREA

NORTH ENTRANCE DOUBLE SWING GATE SEE DETAIL – / –

2.0%

2.0%

1383.25

30" RW

SITE BOLLARD (TYP) 5 / 11C03

1383.50

1383.75

162,000 GAL 34'–0" RWCT–201

162,000 GAL 34'–0" RWCT–202

B–2

B–1

BASE EL. 1384.00

8" DR INV. EL. 1379.00

30.0'

25'–0"

11.0'

19.0'

R 42'

R 10'

R 20'

16.3'

24.0'

120.0'

50' TEMPORARY CONSTRUCTION EASEMENT

50' WATER LINE EASEMENT

REMOVE EXISTING GRAVEL DRIVEWAY WITHIN FENCE AND REPLACE WITH COMPACTED GRAVEL ROAD

JUNCTION BOX SEE SHEET 9E19 & 9E20

EXISTING STRUCTURE

JUNCTION BOX SEE SHEET 9E19 & 9E20

SOUTH ENTRANCE DOUBLE SWING GATE SEE DETAIL – / –

3.0%

4.0%

1.5%

38" RW

BY OTHERS THIS CONTRACT

COMPACTED GRAVEL ROAD 7 / 11C01

(FUTURE RADIO ANTENNA BY OTHERS)

8" DR INV. EL. 1375.50

8" DR 40'–0"

24" DRAIN BOX SEE DETAIL 4 / 2C02

TANKS PLAN SEE SHEET 2C02

PROTECT EXISTING TREES

1384.25

THIS CONTRACT

BY OTHERS

ELECTRICAL TRANSFORMER SEE SHEET 9E19 & 9E20

SITE BOLLARD (TYP) 5 / 11C03

EXISTING FENCE

SITE BENCH MARK (A–414)
ELEV= 1378.40

EXISTING DIRT/GRAVEL ROAD

EXIST. PL

1378 1379 1380 1381 1382 1383 1384

NOTES:

1. ⊕ DENOTES POINT NO.
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL ON SHEET 11C01.
3. ALL CONSTRUCTION WORK SHALL BE LIMITED WITHIN PROPERTY LINE.
4. REFER TO SPECIFICATIONS FOR GENERAL SITE REQUIREMENTS.
5. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
6. GENERAL BORING LOCATIONS ARE SHOWN. THE GEOTECH REPORT IS AVAILABLE UPON REQUEST.
7. WHERE PIPE ELEVATIONS ARE NOT SHOWN, MINIMUM 4FT EARTH COVER SHALL BE PROVIDED. FOR 8" DRAIN SEE PLAN FOR ELEVATIONS. CONTRACTOR SHALL SUBMITT PIPE LAY SCHEDULES FOR APPROVAL.
8. ALL PIPELINES SHALL BE DESIGNED TO RESIST THRUST FORCES DEVELOPED DURING PRESSURE TESTING AND OPERATION. PROVIDE RESTRAINED PIPE JOINTS FOR ALL PIPING.
9. PROVIDE TAPS IN THE PIPELINES FOR PRESSURE TESTING. ALL PIPELINES SHALL BE PRESSURE TESTED. PROVIDE TEMPORARY BULKHEADS AND BLIND FLANGES AS NEEDED. SEE THE SPECIFICATIONS FOR PRESSURE TEST REQUIREMENTS.
10. UNLESS NOTED OTHERWISE, ALL FLANGE COUPLING ADAPTERS (FCA) SHALL BE RESTRAINED.
11. CONCRETE ENCASE 8" DR 2FT EITHER SIDE OVE 30" RW PIPE AT CROSSING.
12. WORK DESIGNATED "BY OTHERS" WILL BE PROVIDED UNDER A SEPARATE CONSTRUCTION CONTRACT. CONTRACTOR SHALL COORDINATE WITH OTHER CONTRACTOR TO VERIFY THE COORDINATES AND DEPTH OF CONNECTIONS TO 30" AND 36" RW PIPELINES PRIOR TO FABRICATION OF PIPE. FAILURE TO VERIFY CONNECTIONS SHALL NOT CONSTITUTE ADDITIONAL COST TO OWNER IF MODIFICATIONS ARE REQUIRED.
13. CONTRACTOR SHALL PROTECT TREES IN AREAS WHERE CONSTRUCTION DOES NOT DISTURB THE EXISTING TREES AND VEGETATION. CLEARING SHALL BE LIMITED WITHIN 10 FT. OF NEW WORK. PROVIDE RE–SEEDING OF DISTRUBED AREAS PER THE SPECIFICATIONS.
14. MAXIMUM SLOPE OF GRADING AT SOUTH GATE SHALL BE NO MORE THAN 7%. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM TANKS.
15. SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.

SITE COORDINATES

Point No.	Northing	Easting	Full Desc
200	849185.4879	194080.3808	FENCE CORNER
201	849249.2749	193994.4554	FENCE CORNER
202	849368.6789	194106.9843	FENCE CORNER
203	849282.8819	194184.8807	FENCE CORNER
204	849240.3824	194075.1228	CENTER RW–TANK
205	849286.1986	194119.9893	CENTER RW–TANK
206	849298.8584	194180.5521	POINT OF CONN. 30" RW
207	849283.6222	194118.3285	BORE B–1 RW–TANK
208	849241.9029	194076.8072	BORE B–2 RW–TANK
209	849179.4524	194086.0432	POINT OF CONN. 36" RW
210	849200.3991	194044.5689	END OF ROAD CURVE
211	849212.6382	194043.6104	END OF ROAD CURVE
212	849269.6842	194045.0962	END OF ROAD CURVE
213	849315.5004	194089.7826	END OF ROAD CURVE
214	849328.8718	194105.5857	END OF ROAD CURVE
215	849341.4139	194118.5290	END OF ROAD CURVE
216	849321.5823	194143.7199	END OF ROAD CURVE
217	849316.2418	194148.1750	END OF ROAD CURVE
218	849256.8485	194146.9164	END OF ROAD CURVE
219	849211.0333	194106.2300	END OF ROAD CURVE
220	849198.4420	194077.8066	END OF ROAD CURVE
221	849182.4462	194084.7477	END OF ROAD CURVE
222	849187.8664	194080.2808	END OF ROAD CURVE
223	849198.7811	194084.8953	℄ 30" PIPE JOINT
224	849243.4875	194039.0791	℄ 30" PIPE JOINT
225	849259.9327	194056.1383	℄ 30" PIPE JOINT
226	849305.7185	194099.7950	℄ 30" PIPE JOINT
227	849261.0825	194145.6409	℄ 30" PIPE JOINT
228	849215.2483	194100.9545	℄ 30" PIPE JOINT
229	849257.3784	194074.9678	⊙ POINT OF RWCT–201
230	849303.1938	194118.6580	⊙ POINT OF RWCT–202
231	849246.00	194122.00	FUTURE RADIO ANTENNA
232	849144.6369	194080.3309	BENCH MARK A–413
233	849383.0745	194105.0855	BENCH MARK A–414

PRELIMINARY - NOT FOR CONSTRUCTION

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER CW
DESIGNED
DESIGNED YW
CHECKED RH
DRAWN JRM

GBRA GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL

RAW WATER CONTROL TANKS
SITE PLAN

DATE NOVEMBER 2003
SCALE SCALE 1" = 20'
FILE NAME GBRA–4–2C01.DWG
SHEET NO. 2C01
ISSUE 0

ATTACHMENT A
ROAD MAP

Enter your name: Your Father Your Mother Find!

MAPS
Draw New Map
Current Map

ROUTES
Plan New Route
Current Route
Mail Route

YELLOW PAGES
Name Search
Category Search

ADDRESS BOOK
My Addresses

TOOLS
Register
General Options

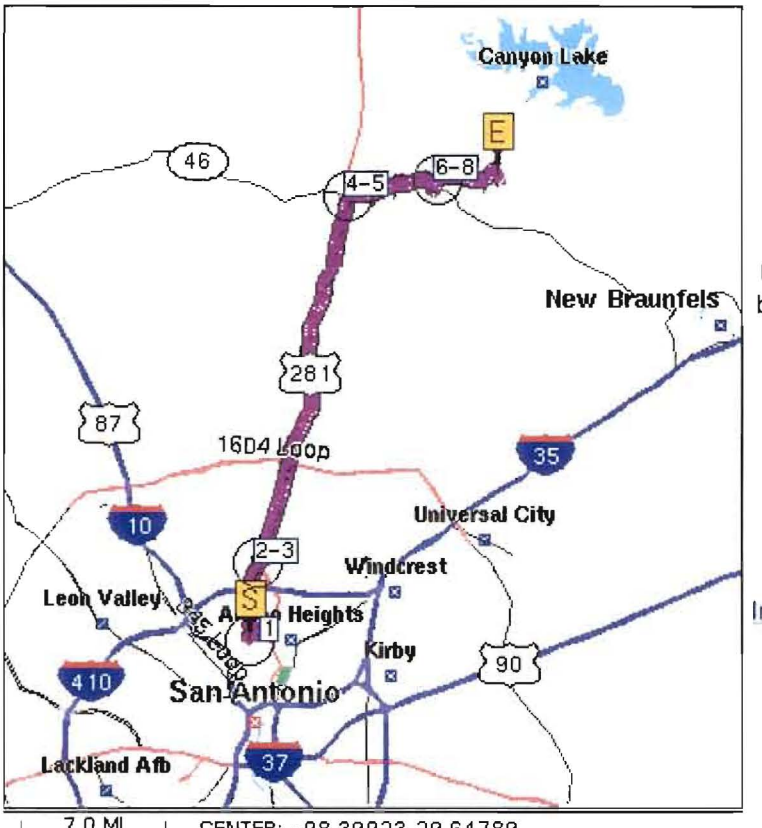
SWITCHBOARD SERVICES
Find a Person
Find Email

HELP FAQ
CONTACT US

Route Summary

Start: **Start Point (San Antonio, TX)**
End: **Map Address (cranes mill road, canyon lake, TX)**
Totals: **30.4 miles, 48 minutes, 8 turns** (Fastest Route)

Plan Return Route | Plan Another Route | Delete Route
Jump to Turn-by-Turn Directions | Show Full Route on Map | Hide Large Map



7.0 MI CENTER: -98.39923 29.64789

Use your browser's Print button to print.

When done, click on map to return to Interactive Map.

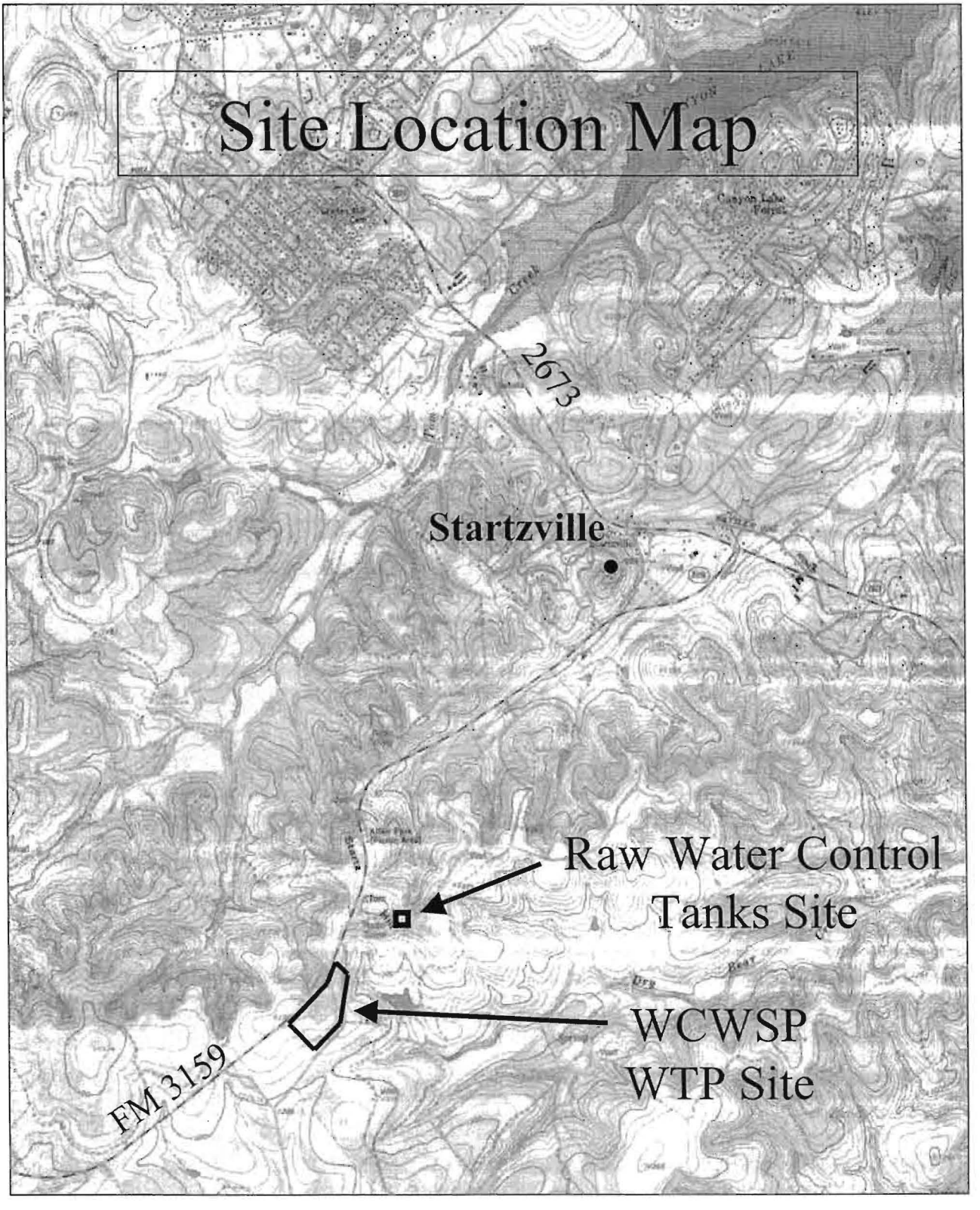
Turn-by-Turn Directions

For a detailed map of a turn, click on the turn number.
To see the route in a non-tabular format, click here.

	Directions	Total Miles	
Start	Head EAST on W HERMINE BLVD, From **Start Point (San Antonio, TX)**	0.0	Replace this column with detailed maps for all turns
1	Go less than .1 miles and then TURN LEFT onto SAN PEDRO AV	0.1	
2	Go 3.6 miles and then CONTINUE onto 537 SPUR	3.6	
3	Go 0.5 miles and then FOLLOW as road goes into US 281 (NORTH)	4.2	
4	Go 18.3 miles and then BEAR RIGHT onto UNNAMED ROAD to HWY 46 (EAST)	22.4	
5	Go 0.3 miles and then TURN RIGHT onto HWY 46 (EAST)	22.7	

6	Go 4.3 miles and then TURN LEFT onto FM 3159	27.0	
7	Go 0.5 miles and then FOLLOW FM 3159 as it TURNS LEFT	27.5	
8	Go 2.7 miles and then BEAR RIGHT onto KEY RD	30.1	
End	Go 0.3 miles to **Map Address (cranes mill road, canyon lake, TX)**	30.4	
WARNING: Use these directions at your own risk. Switchboard Incorporated does **not** guarantee their accuracy or drivability. Switchboard Incorporated will **not** be responsible for any damages or losses resulting from using these directions. **Obey all traffic regulations**.			
User Manual Sections: [Routes In General] [Turn-by-Turn Directions] [Caveats]			

ATTACHMENT B
USGS QUADDRANGLE MAP


Site Location Map
2673
Startzville
Raw Water Control
Tanks Site
WCWSP
WTP Site
FM 3159

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SMITHSON VALLEY QUADRANGLE
TEXAS–COMAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

(SPRING BRANCH) (DEVILS BACKBONE)

98°22'30" 29°52'30" 98°15' 29°45'

561000m E. 20' 17'30" 2 230 000 FEET 740 000 FEET 2 200 000 FEET 700 000 FEET

3304000m N. 3303 3302 3301 3300 3299 3298 3297 3296 3295 3294 3293 3292000m N.

50' 47'30"

(FISCHER) (BAT CAVE) (BULVERDE) (NEW BRAUNFELS WEST)

(ANHALT) (SATTLER)

2.6 MI. TO U.S. 281 · ANHALT 7 MI. 2.7 MI. TO U.S. 281 · 4.6 MI. TO U.S. 281 · 2.4 MI. TO TEX. 1863 · NEW BRAUNFELS 10 MI.

Guadalupe River · Miller Creek · Rebecca Creek · Jentsch Creek · Tom Creek · Canyon Lake · Dry Comal Creek · Dripping Springs · West Fork · Bear Creek · Little Bear Ck

Rust Cem · Simon Cem · Jonas Cem · Granes Mill Cem · Weidner Cem · Smithson Valley Cem · Heimer Cem · Kraft Cem · Valley View · Picnic Area · Canyon Lake Forest · Coastal Park · Boat Ramp · Boat Ramp · Westhaven · Startzville · Allen Park (Picnic Area) · Smithson Valley Middle Sch · Smithson Valley High Sch · Athletic Fields · Athletic Field · Radio Tower · Tom Hill · Mill · Sattler Well · Saltler Road · Smithson Valley Road · Beck Road · Granes Mill Road · Pipeline · Gravel Pit · Gravel Pits · Spring · Springs · Well · Wells · Substa · WT · ELEV 909

WESTERN CANYON REGIONAL WATER SUPPLY PROJECT

Produced by the United States Geological Survey
in cooperation with the Texas Water Development Board

Control by USGS and NOS/NOAA

Compiled from aerial photographs taken 1963. Revisions shown in purple compiled from aerial photographs taken 1986 and other sources and has been field checked. Map edited 1994
Conflicts may exist between some updated features and previously mapped contours

North American Datum of 1927 (NAD 27). Projection and 10 000-foot ticks : Texas Coordinate System, south central zone (Lambert Conformal Conic)
Blue 1000-meter Universal Transverse Mercator ticks, zone 14

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

Fine red dashed lines indicate selected fence lines

MN · GN · 0°21' 6 MILS · 6½° 116 MILS
UTM GRID AND 1994 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 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

TEXAS
QUADRANGLE LOCATION

2998-431

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

SMITHSON VALLEY, TEX.
29098-G3-TF-024

1964
REVISED 1994
DMA 6343 IV SE–SERIES V882

INTERIOR–GEOLOGICAL SURVEY, RESTON, VIRGINIA–1994

ATTACHMENT C
PROJECT NARRATIVE

The Western Canyon Water Supply Project (WCWSP) will divert water from Canyon Lake and send it through treatment and delivery facilities to provide treated water to customers in Comal, Kendall, and Bexar counties, Texas. The 18-foot diameter on-shore shaft intake structure and raw water pump station is designed to operate over a large range of lake surface level fluctuation. A 5-mile raw water transmission pipeline will deliver 10 million gallons per day (MGD) and ultimately 15 MGD to the raw water control tanks, located at Startz Hill. Water will flow by gravity from the raw water control tanks to the water treatment plant. When operational in 2005, the plant will combine coagulation and membrane microfiltration to produce high quality filtered water. Treated water will be delivered to wholesale customers through a 40-mile pipeline and will be blended with existing ground and surface water supplies. The overall system map dated October 2003 follows this narrative.

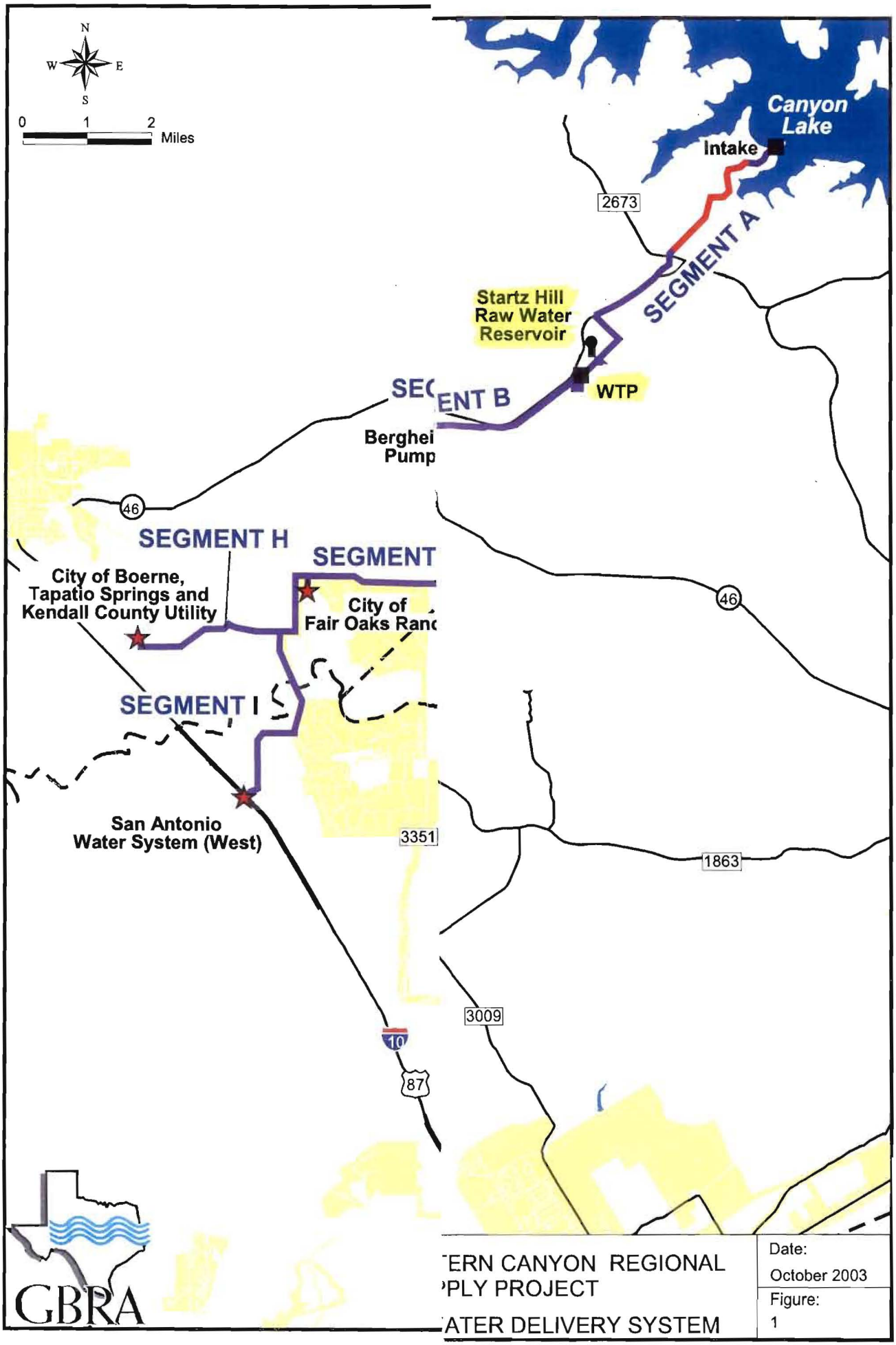
Malcolm Pirnie, Inc. and HDR, Inc. were retained in December 1999 as the prime consultants to perform professional engineering services for planning, design, bidding, and construction phase services for the WCWSP. Engineering and design services as completed for the project are divided into 6 construction contracts, which are defined as follows:

Construction Contract No.	Construction Contract Name and Scope
1	**Raw Water Intake and Pump Station (HDR)** Includes all work on USACE property at Comal Park, including vertical shaft, lake taps, wet well liner, concrete work, installation of pumps, building, site work, electrical supply and switchgear, and the raw water pipeline to the USACE property line. Also included raw water chemical feed building.
2	**Raw Water Transmission Pipeline (HDR)** Includes pipe material and installation for all of the raw water pipeline from USACE property line at Comal Park to the water treatment plant; includes customer connections (control valves, electrical supply, meters) at customers located adjacent to route of Contract A pipeline.
3	**Water Transmission Pipeline - Contracts 3 (HDR)** Includes pipe material and installation for all treated water transmission pipe; includes customer connections (control valves, electrical supply, meters at customers located adjacent to route of pipeline). The project will be designed with one set of construction drawings but may be awarded as multiple construction contracts.
4	**Raw Water Control Tanks and Water Treatment Plant (MP)** Includes site piping, foundations, buildings, electrical supply, switchgear, installation of process equipment, transfer pumps, finished water pump station, administration building, chemical feed, and finished water clearwells. Also includes raw water control tanks on adjacent site.
5	**Treated Water Booster Pump Stations (HDR)** Includes pump building and foundation, site piping, control valves, electrical supply and switchgear, pump procurement, and installation. Two booster pump stations are anticipated: Boerne/Fair Oaks/SAWS; and Bergheim/Cordillera ranch. Also includes the storage reservoir at the Boerne/Fair Oaks/SAWS pump station.

6	**SCADA and Telemetry (MP)** Includes procurement and installation of SCADA control system for all project elements, telemetry radios, antennas, towers, and interface to each project element.

Contributing Zone Plans will be submitted separately for each of the following project areas:

- Intake Pump Station and Raw Water Chemical Feed Facility sites
- Raw Water Control Tanks and Water Treatment Plant sites
- Treated Water Booster Pump Station sites


N
W
E
S
0
1
2
Miles
Canyon Lake
Intake
2673
SEGMENT A
Startz Hill Raw Water Reservoir
WTP
SEGMENT B
Berghei Pump
46
SEGMENT H
SEGMENT
City of Boerne, Tapatio Springs and Kendall County Utility
City of Fair Oaks Ranc
46
SEGMENT I
San Antonio Water System (West)
3351
1863
3009
10
87
GBRA
ERN CANYON REGIONAL
PLY PROJECT
ATER DELIVERY SYSTEM
Date:
October 2003
Figure:
1

ATTACHMENT D
FACTORS AFFECTING SURFACE WATER QUALITY

Although no surface water is present on either the Raw Water Control Tanks or Water Treatment Plant site, stormwater run-off that leaves the site may reach surface waters in other nearby areas. The chemicals stored on site may impact the quality of this run-off. All chemicals will be stored in tanks with proper containment. A list of the chemicals to be stored on site is included on page 4 of the application. Additional factors that may affect surface water quality include gas and oils on the paved roads or from the maintenance bay attached to the operations building.

ATTACHMENT E
VOLUME AND CHARACTER OF STORMWATER

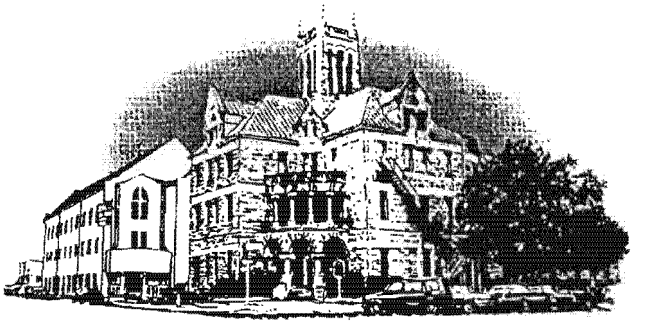
The Water Treatment Plant sites comprises an area of 27 acres. Following construction, 3.1 acres will be impervious cover that includes driveways, parking lots, buildings, and structures. The area of the Raw Water Control Tanks site is 0.45 acres, 0.27 acres of which will be gravel roads or structures after construction. A runoff coefficient of 0.75 was determined for the site based the amount of impervious cover and the original site characteristics, which consist of impervious limestone rock with varying depths of soil cover. This runoff coefficient was used with the average annual rainfall value for Comal County (33 inches per TNRCC RG-348), to calculate the volume of stormwater expected to be produced on the site. Average annual, monthly, and daily values were calculated as follows:

Annual Ave.	18.5 million gallons
Monthly Ave.	1.5 million gallons
Daily Ave.	50,000 gallons

During construction stormwater will contain sediments from the disturbed areas onsite. After completion of the project, stormwater quality may be impacted by factors as described in Appendix D.

ATTACHMENT F
SUITABILITY LETTER FROM AUTHORIZED AGENT

Wastewater produced on the site will be treated and disposed of using an on-site sewage facility. The facility was designed and will be installed according to Comal County requirements.



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: 85051

Issued this date: January 27, 2004

This Permit is hereby given to: Guadalupe Blanco River Authority

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

Cranes Mill & FM 3159, 27.107 acres, Canyon Lake, TX 78133
Leona Irrigation & Agriculture Subdivision

APPROVED MIMNIMUM SIZES AS PER ATTACHED DESIGN

Type of System: Aerobic Treatment with Surface Irrigation 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.

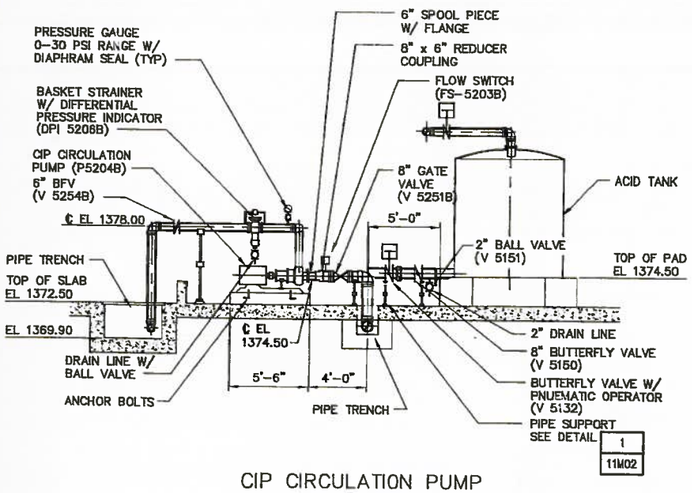
This "License-Operate" report was printed on 1/27/2004 by: Comal County Environmental Health, , operator, using CASST Ver 2.1

ATTACHMENT G
ALTERNATIVE SECONDARY CONTAINMENT METHODS

Not Used

ATTACHMENT H
AST CONTAINMENT STRUCTURE DRAWINGS

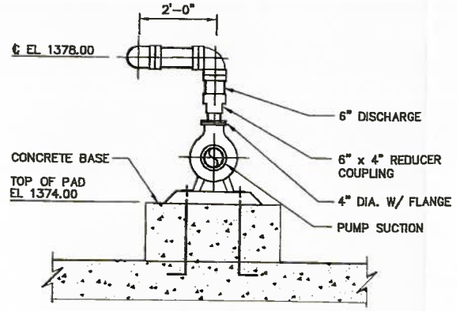
Attached are the drawings of the containment structures for the chemical storage tanks on site. Both caustic and ferric bulk storage containment areas will have a valve manhole with valve and drain to lagoons just outside of the inside sump. The valves will be controlled by a float in the sumps. If there is a minor spill or rainwater accumulation, the contained liquid will be released to lagoons. If there is a major spill, the operators will call in a truck to pump it out for disposal.



CIP CIRCULATION PUMP

SECTION 1 5M09

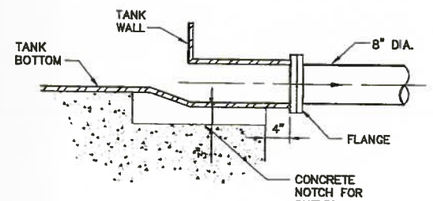
SCALE: 3/16" = 1'-0"



CIP CIRCULATION PUMP

SECTION 2 5M09

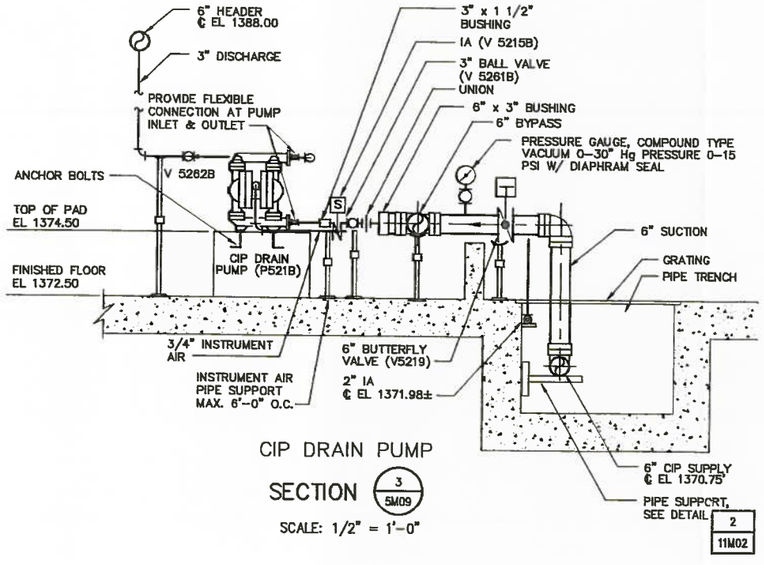
SCALE: 1/2" = 1'-0"



TANK OUTLET

DETAIL 1 5M09

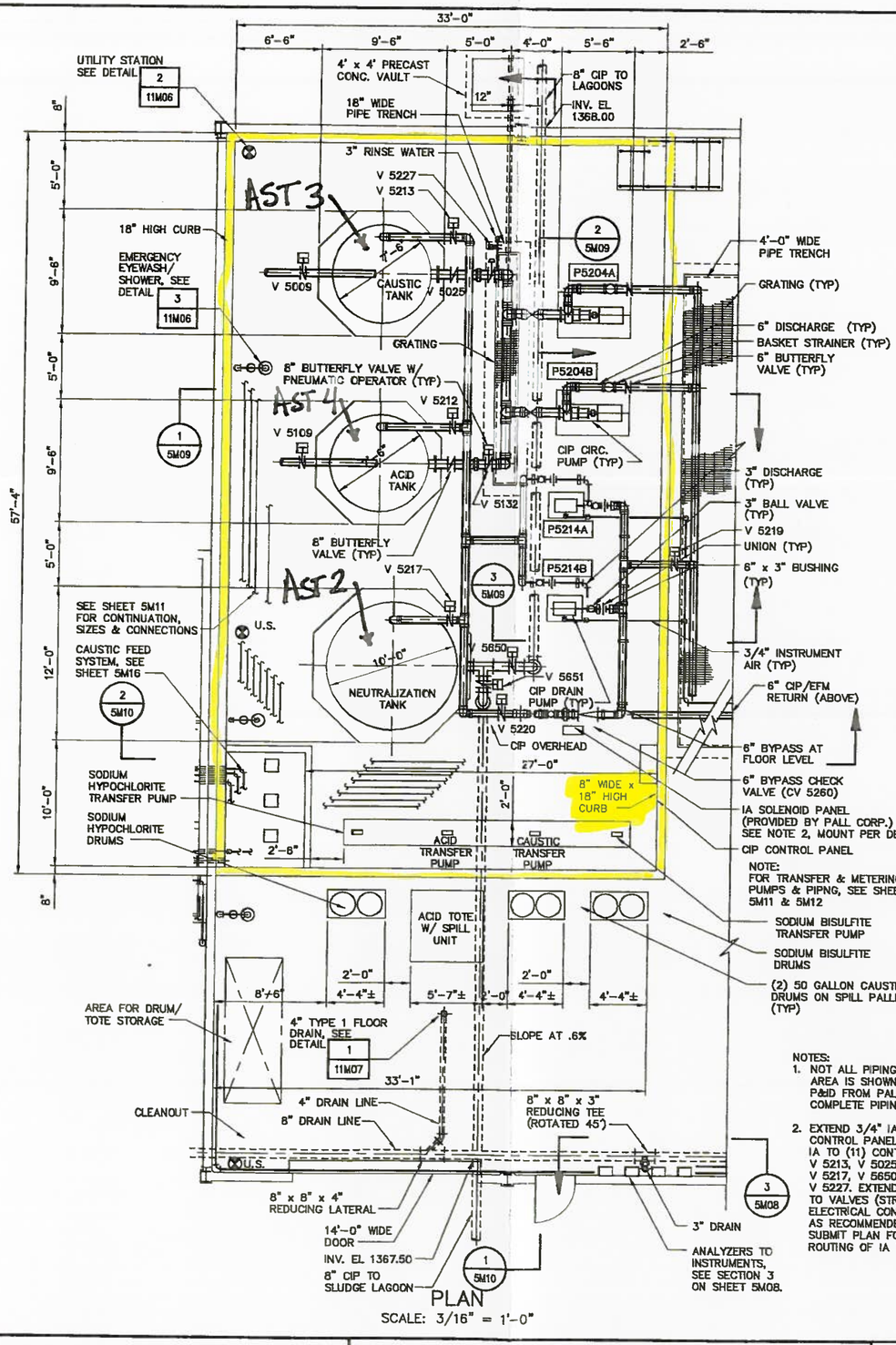
NOT TO SCALE



CIP DRAIN PUMP

SECTION 3 5M09

SCALE: 1/2" = 1'-0"



PLAN

SCALE: 3/16" = 1'-0"

NOTES:

1. NOT ALL PIPING AND EQUIPMENT AT CIP AREA IS SHOWN. SEE SHEET 5M11 AND P&ID FROM PALL CORPORATION FOR COMPLETE PIPING/EQUIPMENT SYSTEM.
2. EXTEND 3/4" IA TO SOLENOID VALVE CONTROL PANEL. THE PANEL WILL PROVIDE IA TO (11) CONTROL VALVES V 5009, V 5213, V 5025, V5109, V 5212, V 5132, V 5217, V 5650, V 5651, V 5220, & V 5227. EXTEND AIR TUBING FROM PANEL TO VALVES (STRAP TO OTHER PIPES, ELECTRICAL CONDUITS, ETC.) AS RECOMMENDED BY PALL CORPORATION. SUBMIT PLAN FOR REVIEW APPROVAL FOR ROUTING OF IA TUBING TO VALVES.

PRELIMINARY - NOT FOR CONSTRUCTION

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

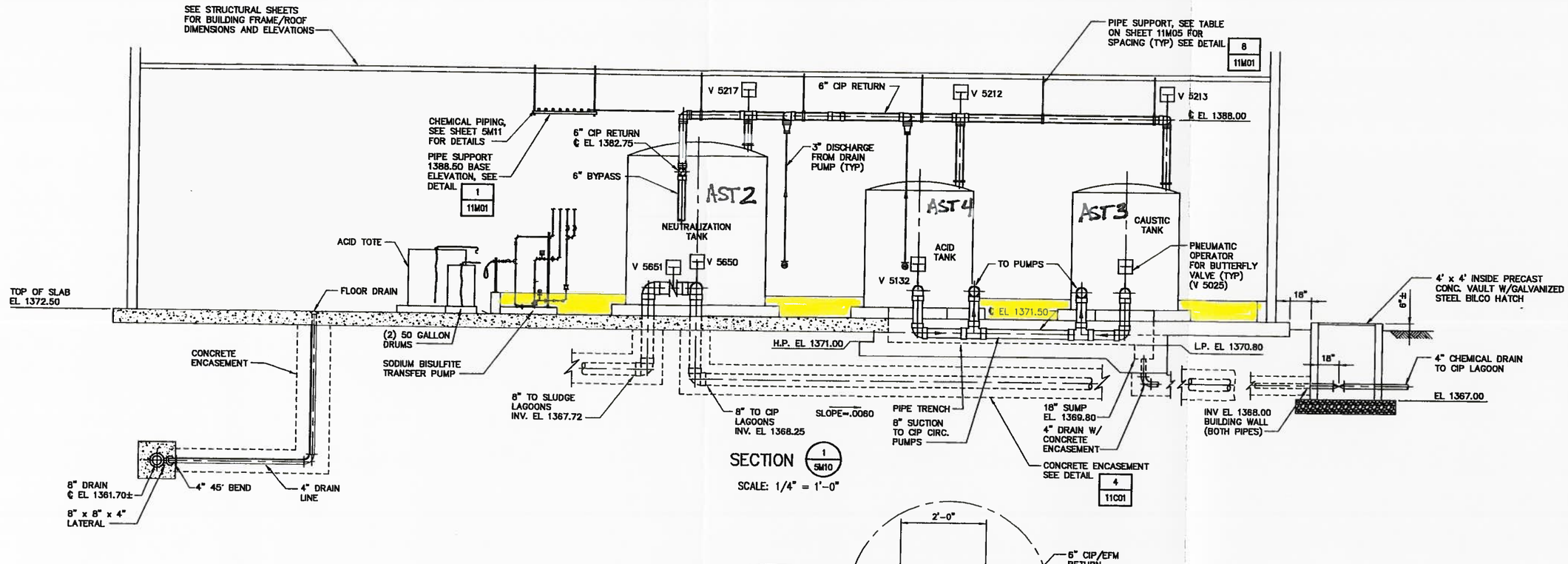
PROJECT MANAGER CW
DESIGNED SH
DESIGNED
CHECKED
DRAWN MD

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS AND WATER TREATMENT PLANT

MEMBRANE BUILDING
MECHANICAL
CIP SYSTEM
PARTIAL PLAN, SECTIONS AND DETAILS

DATE	NOVEMBER 2003
SCALE	AS SHOWN
FILE NAME	GBRA-4-5M09
SHEET NO.	5M09
ISSUE	B



MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER: CW
DESIGNED: SH
DESIGNED:
CHECKED:
DRAWN: MD

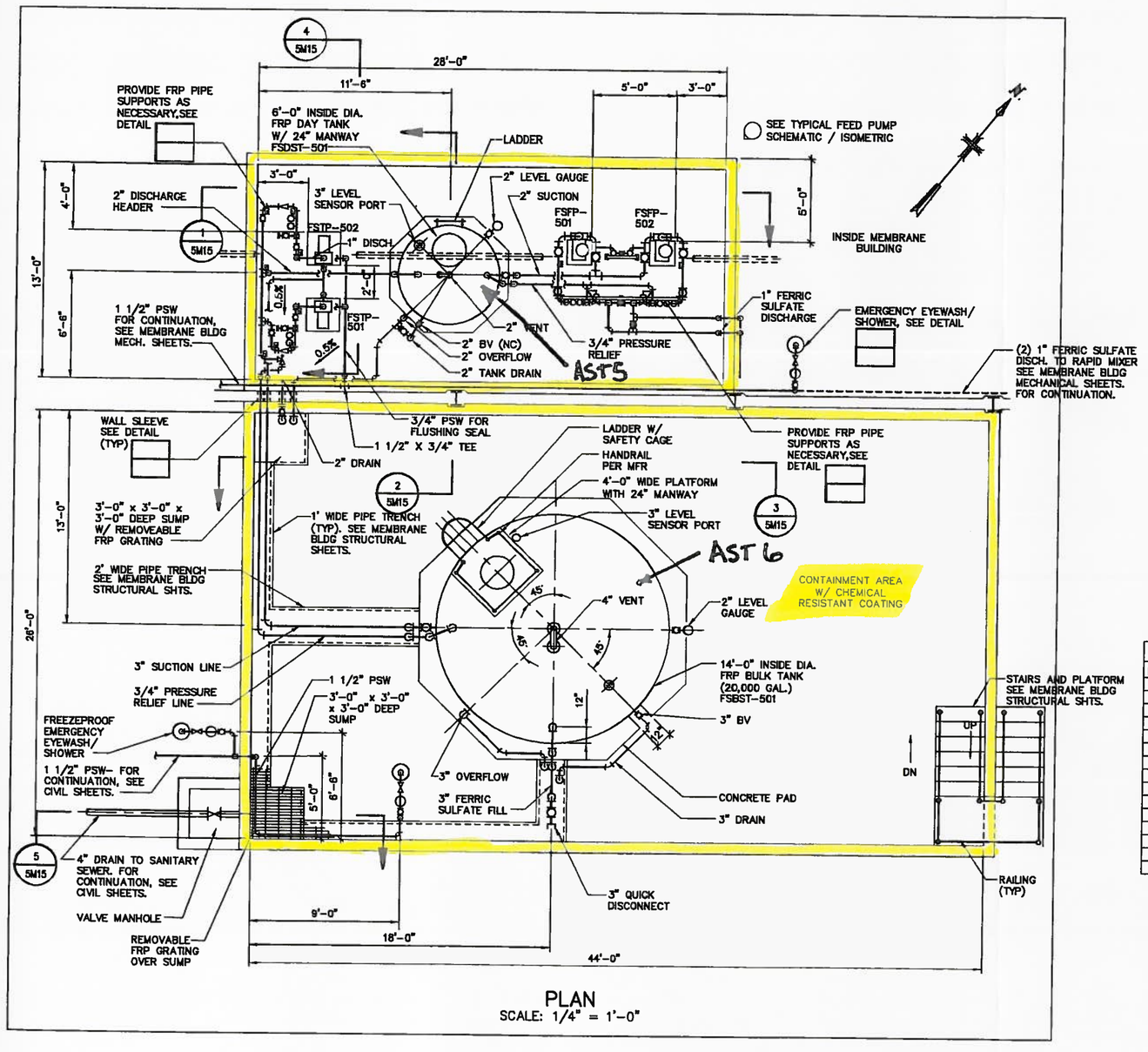
GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

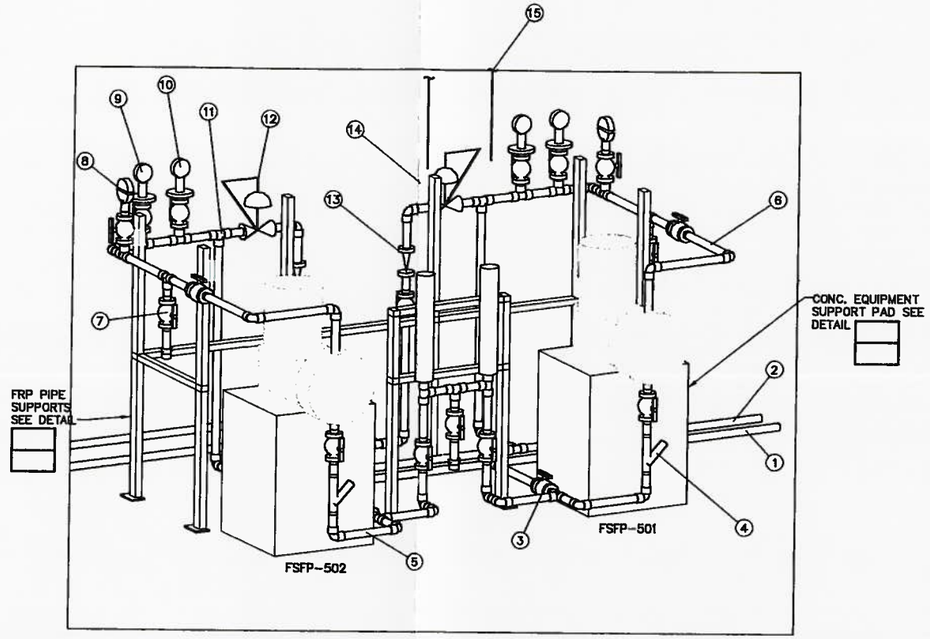
MEMBRANE BUILDING
MECHANICAL
CIP SYSTEM
SECTIONS

DATE: NOVEMBER 2003
SCALE: 1/4" = 1'-0"
FILE NAME: GBRA-4-5M10
SHEET NO.: 5M10
ISSUE: B

PRELIMINARY - NOT FOR CONSTRUCTION



PLAN
SCALE: 1/4" = 1'-0"



TYPICAL FEED PUMP SCHEMATIC / ISOMETRIC
NOT TO SCALE

PARTIAL ASSEMBLY SCHEDULE		
ITEM #	SIZE	DESCRIPTION
1	2"	SUCTION TO PUMPS
2	3/4"	PRESSURE RELIEF TO FSDST
3	2"	ISOLATION BV (TYP)
4	2"	STRAINER
5	2"	INDIVIDUAL PUMP SUCTION
6	1"	PUMP DISCHARGE
7	1"	BV W/ HOSE CONNECTION
8	1"	PULSATION DAMPENER
9	1"	HIGH PRESSURE SWITCH
10	1"	PRESSURE INDICATOR
11	3/4"	PRESSURE RELIEF LINE
12	1"	BACK PRESSURE VALVE
13	1"	CHECK VALVE
14	1.0L	CALIBRATION COLUMN
15	3/4"	CAL COLUMN VENT

NOTES:

1. THE FEED PUMP SCHEMATIC/ISOMETRIC IS INTENDED TO PROVIDE THE GENERAL ARRANGEMENT OF THE FERRIC SULFATE FEED PUMPS AND PIPING. PIPING IS NOT TO SCALE. REFER TO THE PLAN AND SECTIONS ON SHEETS 5M14 AND 5M15 FOR ADDITIONAL INFORMATION, SIZES, DIMENSIONS, AND ELEVATIONS. REFER TO INSTRUMENTATION SHEET 10I07 FOR ALL REQUIRED VALVES, INSTRUMENTS, AND CONTROLS.
2. GENERAL ARRANGEMENT FOR FEED PUMP IS TYPICAL OF 2 W/ ONE PUMP ARRANGEMENT AS MIRROR IMAGE OF THE OTHER.
3. SEE PLAN AND SECTIONS FOR PIPING AND VALVES AT TANKS AND TRANSFER PUMPS (FSTP-501 AND 502).
4. PUMP PADS, PIPING ARRANGEMENTS SHOWN ARE BASED ON ONE PUMP MANUFACTURER'S REQUIREMENTS. MODIFICATIONS REQUIRED TO ACCOMMODATE SELECTED EQUIPMENT SHALL BE MADE AT NO ADDITIONAL COST TO OWNER AS APPROVED BY ENGINEER.
5. REFER TO THE SPECIFICATIONS FOR PIPING, VALVE MATERIALS, WATER PIPE INSULATION REQUIREMENTS, COATING INSIDE CONTAINMENT AREA FLOORS, ETC.
6. PROVIDE A MINIMUM NUMBER OF PIPING UNIONS TO ENSURE VALVES, INSTRUMENTS, AND EQUIPMENT CAN BE READILY REMOVED W/O SHUTDOWN OF THE SYSTEM.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

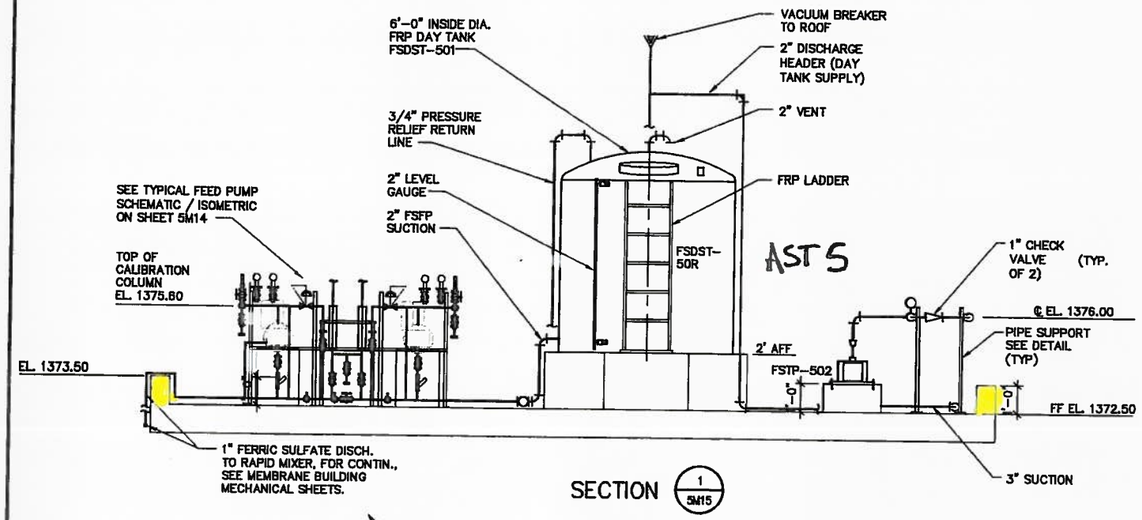
PROJECT MANAGER
DESIGNED PDK
DETAILED
CHECKED
DRAWN MWD

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

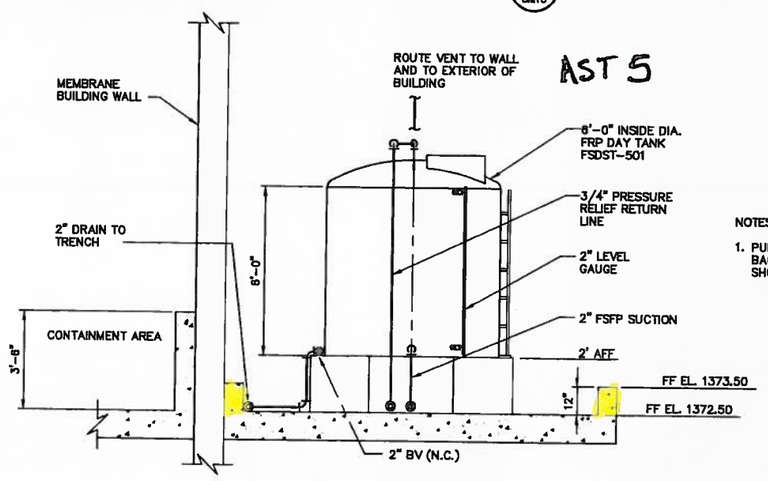
GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

MEMBRANE BUILDING
FERRIC SULFATE FEED SYSTEM
MECHANICAL
PLAN AND SCHEMATIC

DATE NOVEMBER 2003
SCALE AS SHOWN
FILE NAME GBRA-4-5M14
SHEET NO. 5M14
ISSUE 0



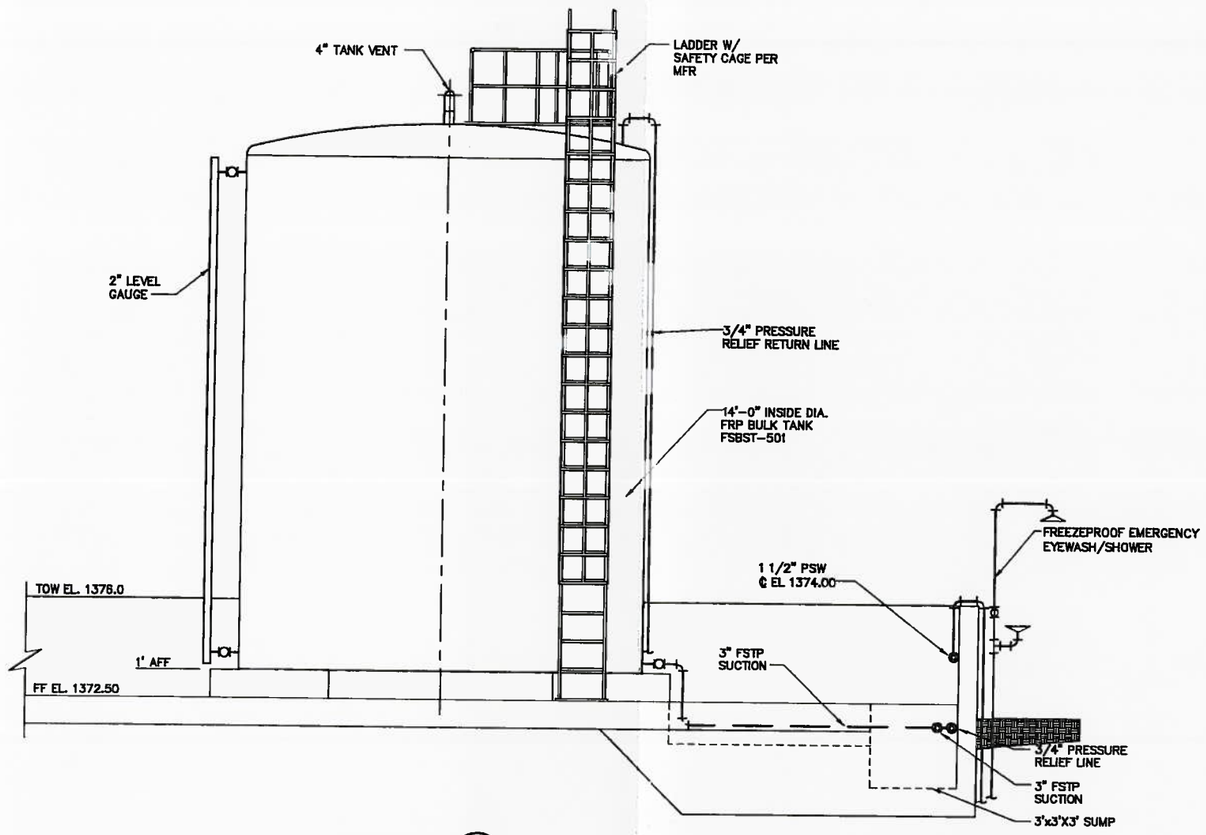
SECTION 1/5M15



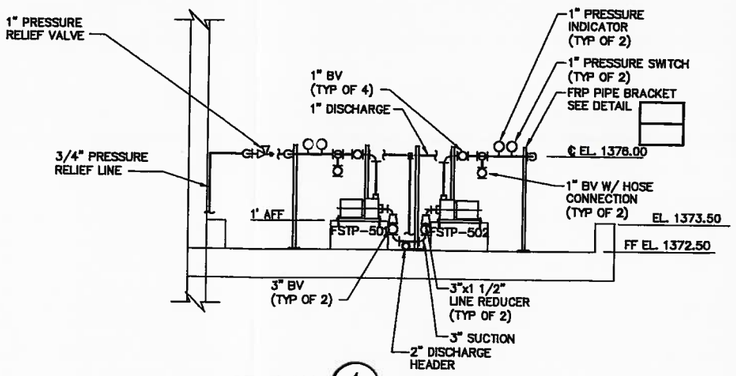
SECTION 2/5M15

NOTES:

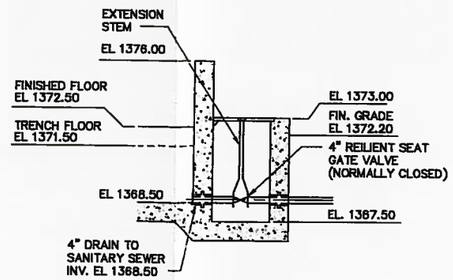
1. PUMPS/ PIPING IN BACKGROUND NOT SHOWN FOR CLARITY.



SECTION 3/5M15



SECTION 4/5M15



SECTION 5/5M15

NOT TO SCALE

NOTES:

1. REFER TO NOTES ON SHEET 5M14.
2. VALVING AND INSTRUMENTS ARE TYPICAL FOR FSTP-501 AND 502.
3. FOR CONTAINMENT WALL PIPE SUPPORT. SPACING SHALL BE PER SPECIFICATION REQUIREMENTS. SEE DETAIL
4. LOCATIONS AND ROUTINGS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO INSTALLATION. CONTRACTOR SHALL VERIFY CLEARANCES AND INSTALL PIPING TO MINIMIZE NUMBER OF ELBOWS AND PIPE LENGTH.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED PDK
DESIGNED
CHECKED
DRAWN MWD

GBRA GUADALUPE-BLANCO RIVER AUTHORITY

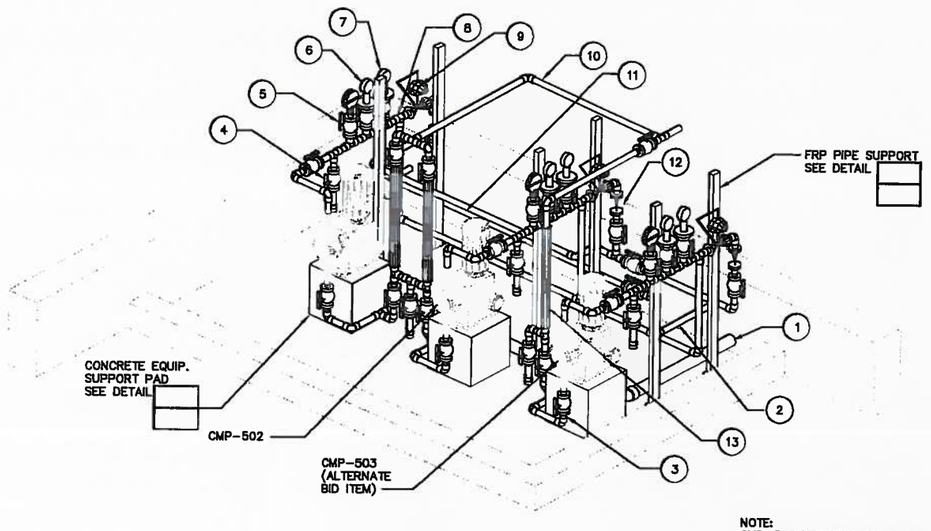
GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS AND WATER TREATMENT PLANT

MEMBRANE BUILDING
FERRIC SULFATE FEED SYSTEM
MECHANICAL
SECTIONS

DATE	NOVEMBER 2003
SCALE	3/8" = 1'-0"
FILE NAME	GBRA-4-5M15
SHEET NO.	5M15
ISSUE	0

PRELIMINARY - NOT FOR CONSTRUCTION

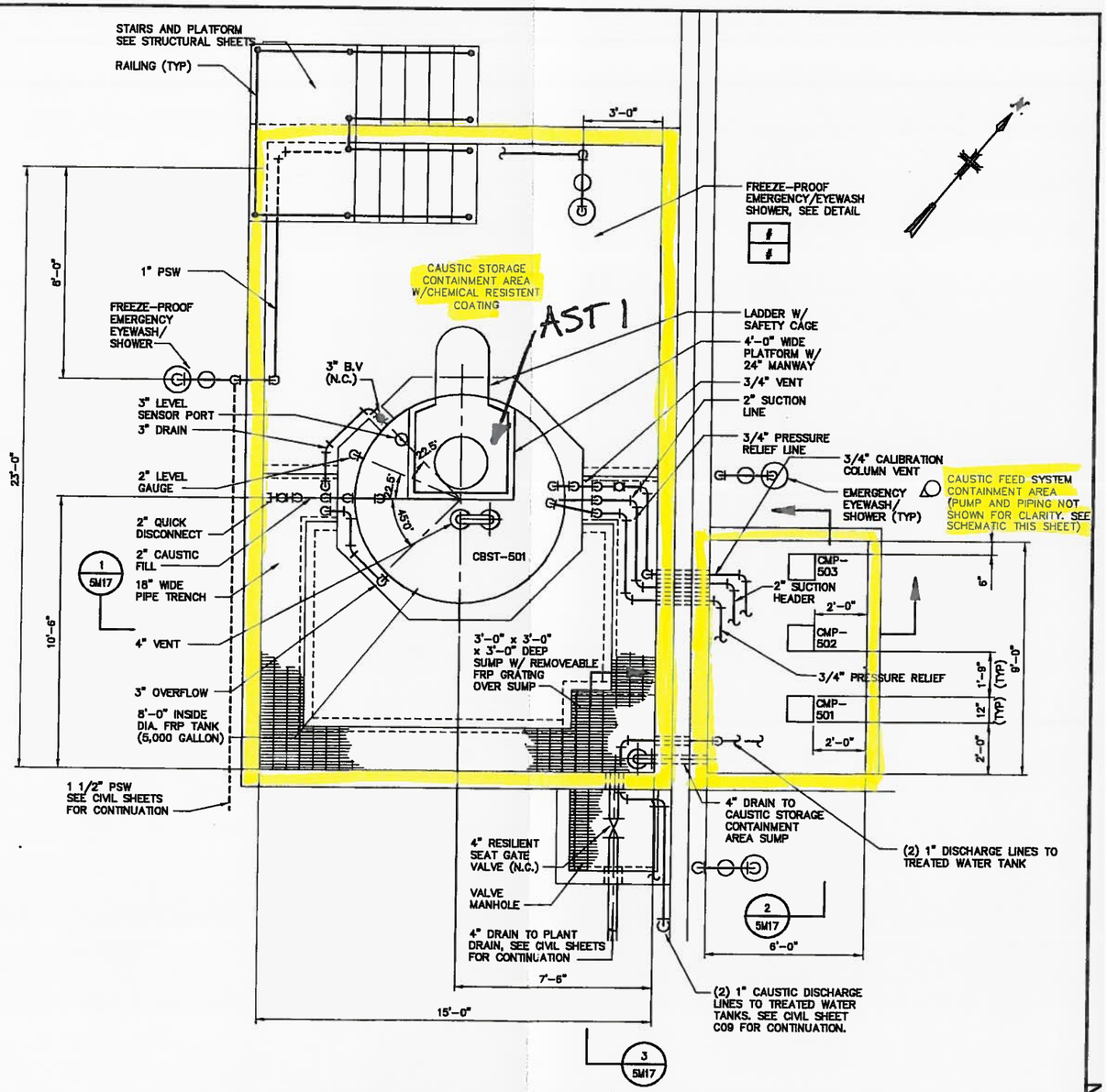
BAR LENGTH ON ORIGINAL DRAWING EQUALS ONE INCH. ADJUST SCALE ACCORDINGLY



ISOMETRIC/SCHEMATIC
SCALE: NTS

NOTE:
CMP-503 METERING PUMP AND ASSOCIATED VALVES, INSTRUMENTS, & FITTINGS SHOWN AS SHADED SHALL BE ALTERNATIVE BID ITEM.

PARTIAL ASSEMBLEY SCHEDULE		
ITEM	SIZE	SIZE
1	2"	SUCTION TO PUMPS
2	3/4"	PRESSURE RELIEF TO CBST-501
3	2"	ISOLATION BALL VALVE
4	1"	BALL VALVE W/ HOSE CONNECTION
5	1"	PULSATION DAMPER
6	1"	HIGH PRESSURE SWITCH
7	1"	PRESSURE INDICATOR
8	3/4"	PRESSURE RELIEF
9	1"	BACK PRESSURE VALVE
10	3/4"	CALIBRATION COLUMN VENT
11	1"	PUMP DISCHARGE
12	1"	CHECK VALVE
13	3/4"	CALIBRATION COLUMN



NOTES:
1. THE FEED PUMP SCHEMATIC/ISOMETRIC IS INTENDED TO PROVIDE THE GENERAL ARRANGEMENT OF THE CAUSTIC FEED PUMPS AND PIPING. PIPING IS NOT TO SCALE. REFER TO THE PLAN AND SECTIONS ON SHEETS 5M16 AND 5M17 FOR ADDITIONAL INFORMATION, SIZES, DIMENSIONS, VALVES, INSTRUMENTS AND CONTROLS.
2. PUMP PADS AND PIPING ARRANGEMENTS SHOWN ARE BASED ON ONE PUMP MANUFACTURER'S REQUIREMENTS. MODIFICATIONS REQUIRED TO ACCOMODATE SELECTED EQUIPMENT SHALL BE MADE AT NO ADDITIONAL COST TO OWNER AS APPROVED BY ENGINEER.
3. REFER TO THE SPECIFICATIONS FOR PIPING, VALVE MATERIALS, INSULATION REQUIREMENTS, ETC.
4. PROVIDE A MINIMUM NUMBER OF PIPING UNIONS TO ENSURE VALVES, INSTRUMENTS AND EQUIPMENT CAN BE READILY REMOVED WITHOUT SHUTDOWN OF THE SYSTEM.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED
DESIGNED
CHECKED
DRAWN CD

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

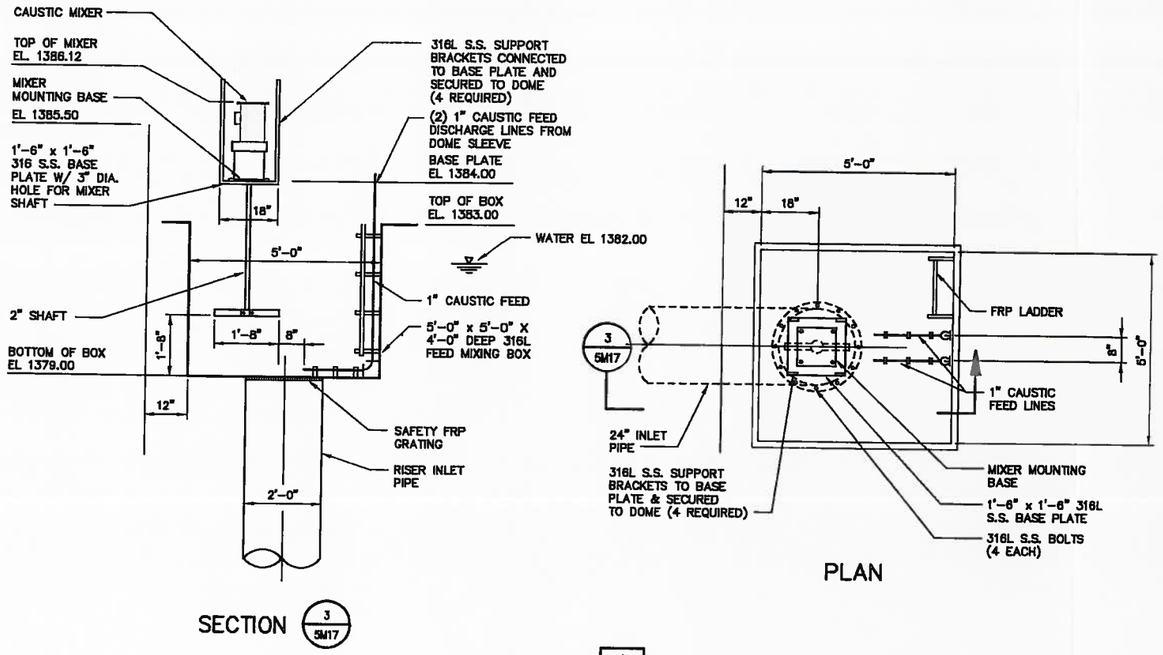
GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS AND WATER TREATMENT PLANT

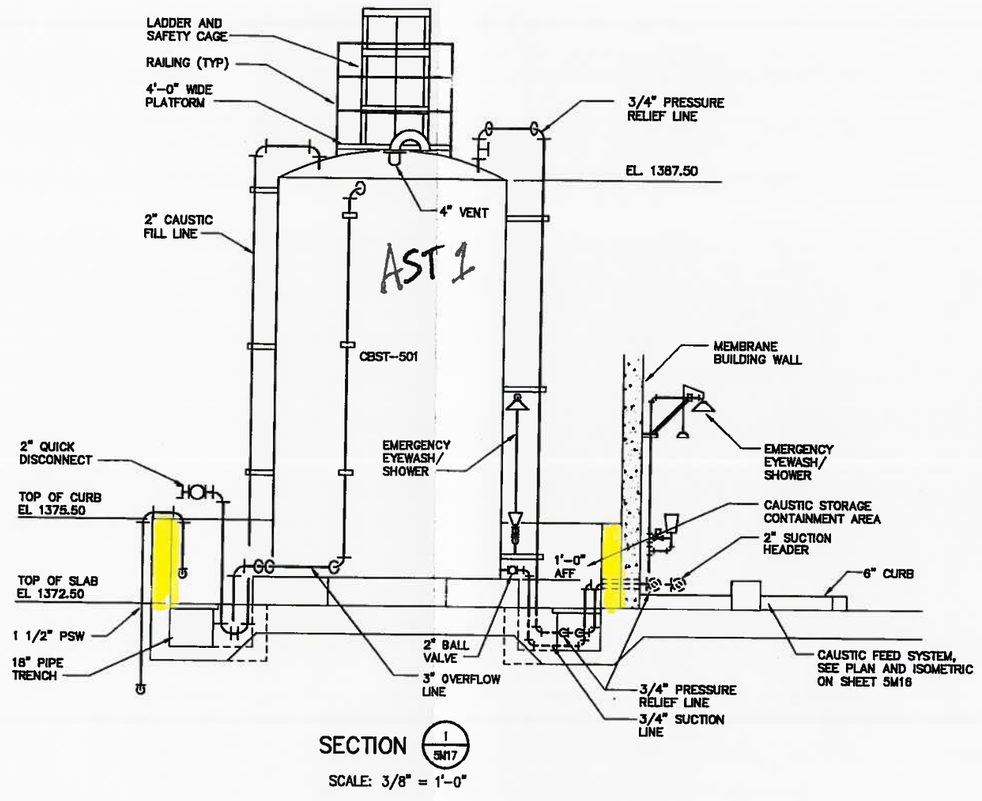
CAUSTIC FEED SYSTEM

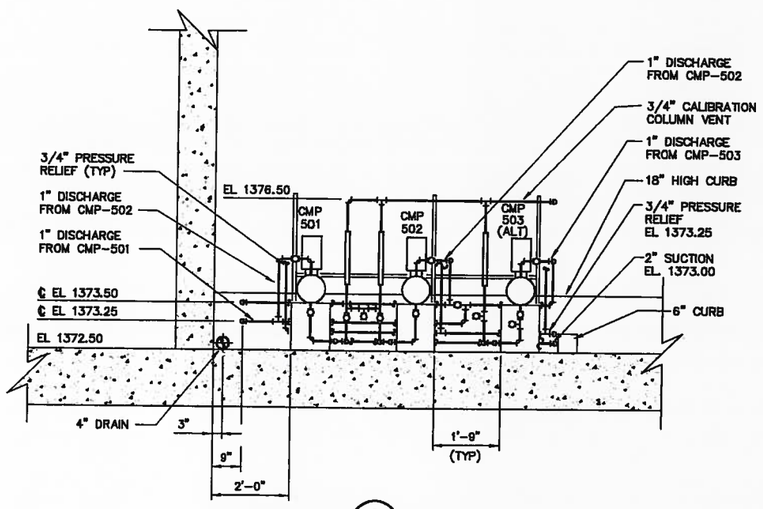
MECHANICAL PLAN AND SECTIONS

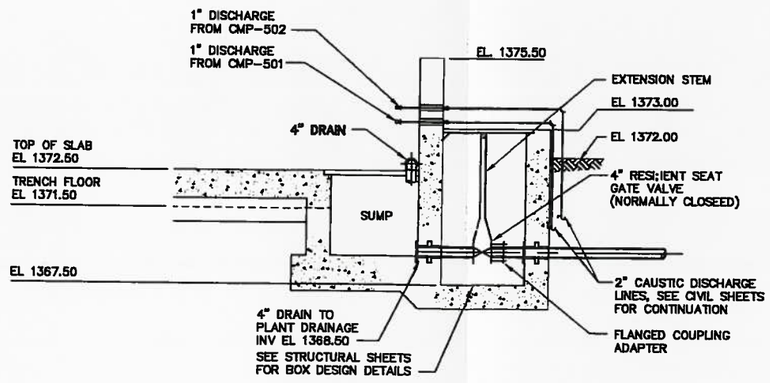
DATE NOVEMBER 2003
SCALE AS SHOWN
FILE NAME GBRA-4-5M16
SHEET NO. 5M16
ISSUE 0

PRELIMINARY - NOT FOR CONSTRUCTION









MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED PK
DESIGNED
CHECKED
DRAWN MD

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS AND WATER TREATMENT PLANT

CAUSTIC FEED SYSTEM

MECHANICAL
SECTIONS AND DETAIL

DATE NOVEMBER 2003
SCALE AS SHOWN
FILE NAME GBRA-4-5M17
SHEET NO. 5M17
ISSUE 0

PRELIMINARY - NOT FOR CONSTRUCTION

ATTACHMENT I
20% OR LESS IMPERVIOUS COVER WAIVER

Not Used

ATTACHMENT J
BMPS FOR UPGRADIENT STORMWATER

No surface water, groundwater, or stormwater originating upgradient of the site flows across the site. All upgradient water flows bypass the site. This is due to the grading of the WTP site and of FM 3159, which is shown on the site plan. Grassy swales run adjacent to FM3159 and catch the runoff from the road.

ATTACHMENT K
BMPS FOR ON-SITE STORMWATER

Best Management Practices used to prevent surface water and groundwater pollution are listed and described below.

Temporary BMPs

Before construction begins at the water treatment plant, a silt fence will be installed around the downstream perimeter of the WTP site to prevent construction-generated sediments from flowing off-site with stormwater runoff. The silt fence will be supported by the existing fence posts along the site property line. Hay bales will also be installed along the grassy swale at the site entrance to provide sediment control for the stormwater that flows between the silt fences at the property entrance. Temporary BMPs are shown in the attached Figure 1. Erosion at the site is not expected to be problematic as the site consists of limestone rock covered by varying depths of soil. Sediment and erosion control practices during construction are specified in the attached specification Section 02315. Earthwork and excavation on the site will be minimized due to the high expense of rock excavation. As shown in the existing WTP site plan (Sheet 1C01), vegetation was protected from clearing wherever possible. A silt fence will also be installed around the downstream perimeters of the RWCT site, as shown in Figure 2C01.

Permanent BMPs

Vegetative filter strips will be used on the WTP site to manage stormwater following the completion of construction. Existing vegetation consisting of grassland and forested will be used for the filter strips. Where disturbance is required during construction, filter strip areas will be regraded and seeded. Vegetative filter strip locations areas are shown in Attachment M (Figure 1C02-A). The areas delineated in Attachment M are the minimum filter strip areas required to conform to the design requirements of the TCEQ guidance manual. The areas outside the filter strip boundaries are also vegetated. Filter strips for each drainage area are located to receive even flow distribution in order to prevent flow channeling. Runoff from drainage area 3 is routed to an earthen distribution channel, from where it will overflow onto the filter strip for that area. The undisturbed land surrounding these designated areas will further reduce the TSS load exiting the site. The filter strips will be prepared and revegetated as described in specification Section 02935, Landscape Maintenance, Section 02921, Seeding, and Section 02442, Landscape Irrigation System, which are included in Attachment M. The areas of seeding at the WTP site will include but not be limited to the designated filter strip areas.

In addition to the Best Management Practices discussed above, additional landscaping and vegetative practices such as the preservation and protection of existing trees and sodding will be implemented at the site, as described in specification Sections 02935, and 02940 which are included in Attachment M.

FM 3159
(ROW VARIES - 120' ET. MIN.)

EXIST. FENCE

DRAINAGE AREA 1
0.47 AC.

12' CONC. DRWY (TYP)

FILTER STRIP AREA 1
0.28 AC.

FUTUR
NR3

MH

CMH

MEMBRANE BUILDING
FF= 1372.00

FERRIC SULFATE
STORAGE TANK

CHLORINE
FEED VAULT

CONTROL
VALVE
VAULT

FLOW METER
VAULT No. 1

RAPID MIX BASIN
FF= 1371.00

FLOCCULATION
BASIN FF= 1371.00

DRAINAGE AREA 4
2.33 AC.

FILTER STRIP AREA 4
0.79 AC.

CIP LAGOON 2
FF= 1357.50

CIP LAGOON 1
FF= 1357.50

DRAINAGE AREA 5B
0.42 AC.

FILTER STRIP AREA 5B
0.06 AC.

CHLORINE
BUILDING
FF= 1365.00

FLOW METER
VAULT No. 2

FUTURE
GAC

OPERATIONS
BUILDING
FF= 1371.50

BUS
PARKING

LAGOON
DRAIN
PUMP

DRAINAGE AREA 5A
0.28 AC.

RECYCLE
PUMPS

DRAINAGE AREA 2
2.14 AC.

2 MG TREATED
WATER TANK
TWST-701
BASE EL 1364.50

TANK INLET
VALVE VAULT

TANK OUTLET
VALVE VAULT

FILTER STRIP AREA 2
1.18 AC.

FILTER STRIP AREA 5A
0.13 AC.

RESIDUALS
LAGOON 1
FF VARIES

RESIDUALS
LAGOON 2
FF VARIES

HYDROPNEUMATIC
TANK SLAB

SITE DRAIN
PUMP STATION

FLOW METER
VAULT No. 3

TANK INLET
VALVE VAULT MH

CONCRETE
PAVEMENT

HIGH SERVICE
PUMP STATION
FF= 1357.5

TANK OUTLET
VALVE VAULT

FUTURE
2 MG TREATED
WATER TANK
TWST-702

CONC.
RAMP

SEPTIC
TANK

FILTER STRIP AREA 3
1.14 AC.

24" CATCH
BASIN

HEADWALL

CHAIN LINK
FENCE

EXIST. FENCE

DRAINAGE AREA 3
2.36 AC.

24' WIDE GATE
SEE DETAIL

20' X 20'
TURN AROUND

24" CATCH
BASIN

HEADWALL

STANES MILL ROAD

WAGNER RANCH

NOTES:

1. ALL ROADS ARE 20 FT WIDE UNLESS OTHERWISE INDICATED.
2. TURNING RADII OF ROADS ARE 35 FT UNLESS OTHERWISE INDICATED.
3. FOR LANDSCAPING SEE SHEETS 1L01-1L06.
4. ALL ROADS ARE ASPHALT UNLESS OTHERWISE INDICATED.
5. SEE SHEETS 1C03 THROUGH 1C06 FOR ENLARGED PLANS.

STATE OF TEXAS
KAREN R. PAPPAS
88107
LICENSED
PROFESSIONAL ENGINEER

PRELIMINARY - NOT FOR CONSTRUCTION

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED KRP
DESIGNED
CHECKED
DRAWN JRM

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL
SITE WORK
DRAINAGE AREAS
AND VEGETATIVE STRIPS

DATE NOVEMBER 2003
SCALE 1" = 100'
FILE NAME GBRA-4-1C11-PERMIT
SHEET NO. 1C02-A
ISSUE 0

DAN LEWTON, ON ORIGINAL DRAWING ONLY. DO NOT ADJUST SCALE ACCORDINGLY

User: JRHEZ, Time: 11:27 Layout: SITE PLAN

FM 3159
(ROW VARIES - 120 FT. MIN.)

EXIST. FENCE

BOUNDARY OF PROJECT SITE CLEARING AREA

MEMBRANE BUILDING AREA

OPERATIONS BUILDING

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

OUTLINE TEMPORARY ACCESS ROAD FOR CONSTRUCTION OF PRESTRESSED CONCRETE TANK, APPROX 15' WIDER THAT OUTSIDE TANK ELEVATION TO BE DETERMINED BY TANK MFR (TYP.)

TREATED WATER TANKS AND PUMP STATION AREA

RESIDUALS LAGOON AREA

CIP LAGOON AREA

BOUNDARY OF PROJECT SITE CLEARING AREA

BENCH MARK (A-416) ELEV= 1360.74

WTP PL

CONTRACTOR STAGING AREA, SEE NOTE 4

SEE NOTE 9

BENCH MARK (A-415) ELEV= 1335.73

STABILIZED CONSTRUCTION ENTRANCE

EXISTING FENCE TO BE REMOVED (APPROX. 60 LF. TO NEAREST FENCE POST)

BOUNDARY OF PROJECT SITE CLEARING AREA

EXIST. FENCE

CRANE'S MILL ROAD

WAGNER RANCH

1370 1365 1360 1355 1350 1345 1340 1335

NOTES:

1. CLEAR PRIME AREAS AS OUTLINED. CLEAR ALONG ROADS AT 25 FOOT WIDTHS. PROTECT ALL TREES ON THE PROPERTY OUTSIDE OF AREAS TO BE CLEARED. TREE REPRESENTATIONS ARE APPROXIMATE. DETAIL SURVEY NOT DONE, CONTRACTOR TO VERIFY TREES TO REMAIN AND CLEAR ONLY THAT NECESSARY TO CONSTRUCT.
2. CONTRACTOR SHALL USE DESIGNATED LOCATIONS FOR LAYDOWN, SPOIL AREAS, AND TRAILER STORAGE WITHIN AREA SHOWN.
3. CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL OFF-SITE. STORE ONLY THAT MATERIAL REQUIRED TO ESTABLISH FINAL GRADES.
4. FOR SITE PLAN, SEE SHEET 1C02. FOR SITE PIPING PLAN, SEE SHEET 1C04.
5. REFER TO SPECIFICATIONS FOR GENERAL SITE CLEARING REQUIREMENTS.
6. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
7. BASIS OF COORDINATES:
   NAD '83 (1993) DATUM
   THE COORDINATES AND ELEVATIONS SHOWN FOR ALL WORK WITHIN THE GBRA WATER TREATMENT PLANT ARE BASED ON (ELEVATIONS ARE BASED ON NAVD '88 DATUM)

BENCHMARK No.	ELEVATION	DESCRIPTION
A-413	1381.41	Set bent 60d in 9"x9" twin live oak by 12' gravel road on Tank Site
A-414	1378.46	Set bent 60d in fence post on Pfeuffer 83.60 ac by Tank Site
A-415	1335.73	Set bent 60d in base of 28" Oak at entrance to Water Treatment Plant location Pt. #6628*
A-416	1360.74	Set bent 60d in base of 13" Oak close to Pt. #130 on Water Treatment Plant location
A-417	977.50	Set bent 60d in base of 9" Oak at SE corner of Chemical side
A-418	982.92	Set bent 60d in base of 14" Cedar at NE corner of Chemical side

* NOT SHOWN IN THIS DRAWING

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED RCE
DESIGNED
CHECKED
DRAWN JRM

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL
WATER TREATEMENT PLANT
EXISTING SITE PLAN

DATE NOVEMBER 2003
SCALE 1" = 80'
FILE NAME GBRA-4-1C01.DWG
SHEET NO. 1C01
ISSUE 0

= SILT FENCE

ORA MAE PFEUFFER
39830 FM 3159
CANYON LAKE, TX 78133

83.60 ACRES
VOL. 130, PG. 529–531

ORA MAE PFEUFFER
VOL. 184, PG. 734
5.716 AC.

BENCH MARK
(A–413)
ELEV= 1381.41

EXISTING STRUCTURE

EXISTING DIRT/GRAVEL ROAD

EXISTING GRAVEL DRIVEWAY

EXISTING STRUCTURE

164.0'

40'–0"

CHAIN LINK FENCE SEE DETAIL 1 / 11C02

PROTECT EXISTING TREES

PROPERTY LINE

CHAINLINK FENCE SET 2FT. INSIDE PROPERTY LINE (TYP AROUND PERIMETER) 1 / 11C02

20.0'x80.0' CONSTRUCTION STAGING AREA

NORTH ENTRANCE DOUBLE SWING GATE SEE DETAIL – / –

PROTECT EXISTING TREES

16.3'

24.0'

REMOVE EXISTING GRAVEL DRIVEWAY WITHIN FENCE AND REPLACE WITH COMPACTED GRAVEL ROAD

JUNCTION BOX SEE SHEET 9E19 & 9E20

50' TEMPORARY CONSTRUCTION EASEMENT

120.0'

SITE BOLLARD (TYP) 5 / 11C03

30" RW

25'–0"

11.0'

162,000 GAL
34'–0"
RWCT–201

162,000 GAL
34'–0"
RWCT–202

8" DR INV.
EL. 1379.00

30.0'

BASE
EL. 1384.00

BASE
EL. 1384.00

(FUTURE RADIO ANTENNA BY OTHERS)

COMPACTED GRAVEL ROAD 7 / 11C01

25'–0"

18.0'

30" RW

JUNCTION BOX SEE SHEET 9E19 & 9E20

SOUTH ENTRANCE DOUBLE SWING GATE SEE DETAIL – / –

36" RW

BY OTHERS THIS CONTRACT

8" DR INV.
EL. 1375.50

24" DRAIN BOX SEE DETAIL 4 / 2002

8" DR
40'–0"

8" DR INV.
EL. 1375.50

10.0'

TANKS PLAN SEE SHEET 2C02

PROTECT EXISTING TREES

THIS CONTRACT

BY OTHERS

50' WATER LINE EASEMENT

EXISTING FENCE

ELECTRICAL TRANSFORMER SEE SHEET 9E19 & 9E20

SITE BOLLARD (TYP) 5 / 11C03

EXISTING DIRT/GRAVEL ROAD

EXIST. PL

SITE BENCH MARK
(A–414)
ELEV= 1378.46

NOTES:

1. ⊕ DENOTES POINT NO.
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL ON SHEET 11C01.
3. ALL CONSTRUCTION WORK SHALL BE LIMITED WITHIN PROPERTY LINE.
4. REFER TO SPECIFICATIONS FOR GENERAL SITE REQUIREMENTS.
5. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
6. GENERAL BORING LOCATIONS ARE SHOWN. THE GEOTECH REPORT IS AVAILABLE UPON REQUEST.
7. WHERE PIPE ELEVATIONS ARE NOT SHOWN, MINIMUM 4FT EARTH COVER SHALL BE PROVIDED. FOR 8" DRAIN SEE PLAN FOR ELEVATIONS. CONTRACTOR SHALL SUBMITT PIPE LAY SCHEDULES FOR APPROVAL.
8. ALL PIPELINES SHALL BE DESIGNED TO RESIST THRUST FORCES DEVELOPED DURING PRESSURE TESTING AND OPERATION. PROVIDE RESTRAINED PIPE JOINTS FOR ALL PIPING.
9. PROVIDE TAPS IN THE PIPELINES FOR PRESSURE TESTING. ALL PIPELINES SHALL BE PRESSURE TESTED. PROVIDE TEMPORARY BULKHEADS AND BLIND FLANGES AS NEEDED. SEE THE SPECIFICATIONS FOR PRESSURE TEST REQUIREMENTS.
10. UNLESS NOTED OTHERWISE, ALL FLANGE COUPLING ADAPTERS (FCA) SHALL BE RESTRAINED.
11. CONCRETE ENCASE 8" DR 2FT EITHER SIDE OVE 30" RW PIPE AT CROSSING.
12. WORK DESIGNATED "BY OTHERS" WILL BE PROVIDED UNDER A SEPARATE CONSTRUCTION CONTRACT. CONTRACTOR SHALL COORDINATE WITH OTHER CONTRACTOR TO VERIFY THE COORDINATES AND DEPTH OF CONNECTIONS TO 30" AND 36" RW PIPELINES PRIOR TO FABRICATION OF PIPE. FAILURE TO VERIFY CONNECTIONS SHALL NOT CONSTITUTE ADDITIONAL COST TO OWNER IF MODIFICATIONS ARE REQUIRED.
13. CONTRACTOR SHALL PROTECT TREES IN AREAS WHERE CONSTRUCTION DOES NOT DISTURB THE EXISTING TREES AND VEGETATION. CLEARING SHALL BE LIMITED WITHIN 10 FT. OF NEW WORK. PROVIDE RE–SEEDING OF DISTRUBED AREAS PER THE SPECIFICATIONS.
14. MAXIMUM SLOPE OF GRADING AT SOUTH GATE SHALL BE NO MORE THAN 7%. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM TANKS.
15. SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.

SITE COORDINATES

Point No.	Northing	Easting	Full Desc
200	849185.4879	194080.3608	FENCE CORNER
201	849249.2749	193994.4554	FENCE CORNER
202	849368.6789	194108.9843	FENCE CORNER
203	849282.8919	194194.8897	FENCE CORNER
204	849240.3824	194075.1828	CENTER RW–TANK
205	849286.1988	194119.8893	CENTER RW–TANK
206	849296.8564	194180.5521	POINT OF CONN. 30" RW
207	849283.8222	194119.5285	BORE B–1 RW–TANK
208	849241.9029	194178.6072	BORE B–2 RW–TANK
209	849179.4524	194096.0432	POINT OF CONN. 36" RW
210	849200.1991	194044.5869	END OF ROAD CURVE
211	849212.8382	194043.8104	END OF ROAD CURVE
212	849289.8842	194045.0962	END OF ROAD CURVE
213	849316.6004	194089.7828	END OF ROAD CURVE
214	849325.6718	194105.5867	END OF ROAD CURVE
215	849341.4139	194118.5290	END OF ROAD CURVE
216	849321.5823	194143.7199	END OF ROAD CURVE
217	849316.2418	194149.1750	END OF ROAD CURVE
218	849258.8495	194149.9164	END OF ROAD CURVE
219	849211.0333	194105.2300	END OF ROAD CURVE
220	849198.4420	194077.8065	END OF ROAD CURVE
221	849192.4492	194064.7477	END OF ROAD CURVE
222	849187.8664	194060.2800	END OF ROAD CURVE
223	849198.7811	194084.8953	⊄ 30" PIPE JOINT
224	849243.4875	194039.0791	⊄ 30" PIPE JOINT
225	849259.9327	194055.1383	⊄ 30" PIPE JOINT
226	849305.7185	194099.7950	⊄ 30" PIPE JOINT
227	849261.0625	194145.8408	⊄ 30" PIPE JOINT
228	849215.2483	194100.9545	⊄ 30" PIPE JOINT
229	849257.3784	194074.9678	⊙ POINT OF RWCT–201
230	849303.1938	194119.6580	⊙ POINT OF RWCT–202
231	849246.00	194122.00	FUTURE RADIO ANTENNA
232	849144.6389	194080.3309	BENCH MARK A–413
233	849383.0745	194105.0855	BENCH MARK A–414

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER CW
DESIGNED
DESIGNED YW
CHECKED RH
DRAWN

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

TEMPORARY BMPS

RAW WATER CONTROL TANKS
SITE PLAN

DATE NOVEMBER 2003
SCALE SCALE 1" = 20'
FILE NAME GBRA–4–2C01.DWG
SHEET NO. 2C01
ISSUE 0

NOT FOR CONSTRUCTION

SECTION 02315

EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals required to perform all excavating, backfilling, testing, filling and grading, and disposing of earth materials as shown, specified, and required for construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work in every respect.
   2. All necessary preparation of subgrade for slabs and pavements is included.
   3. All temporary means needed to prevent discharge of sediment to water courses from dewatering systems or erosion are included.
   4. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.
   5. CONTRACTOR shall perform all earthwork as specified in this Section.

B. Related Sections:
   1. Section 01411, Testing Laboratory Services Furnished by CONTRACTOR.
   2. Section 02222, Rock Excavation.
   3. Section 02230, Clearing.
   4. Section 02318, Crushed Stone and Gravel.
   5. Section 02742, Bituminous Paving.
   6. Section 02751, Concrete Paving.
   7. Section 15051, Buried Pipe Installation.
   8. Division 16, Electrical.

1.2 QUALITY ASSURANCE

A. Testing Services:
   1. General: Contractor will pay for all tests. Testing of materials, testing for moisture content during placement and compaction of fill materials, and of compaction requirements for compliance with technical requirements of the Specifications shall be performed by a testing laboratory as designated in Section 01452, Testing Laboratory Services Furnished by CONTRACTOR.
   2. Testing Agency Scope:
      a. Test CONTRACTOR'S proposed materials in the laboratory and/or field for compliance with the Specifications.

b. Perform field moisture content and density tests to assure that the specified compaction of backfill materials has been obtained.
c. Report all test results to the ENGINEER and CONTRACTOR.

3. Authority and Duties of Testing Agency: Technicians representing the testing laboratory shall inspect the materials in the field and perform tests and shall report their findings to the ENGINEER and CONTRACTOR. When the materials furnished or Work performed fails to fulfill Specification requirements, the technician will direct the attention of the ENGINEER and CONTRACTOR to such failure.
   a. The technician shall not act as foreman or perform other duties for CONTRACTOR. Work will be checked as it progresses, but failure to detect any defective Work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the ENGINEER for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirements of the Contract Documents, nor to approve or accept any portion of the Work.
4. Responsibilities and Duties of CONTRACTOR:
   a. The use of testing services shall in no way relieve CONTRACTOR of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
   b. To facilitate testing services, CONTRACTOR shall:
      1) Secure and deliver to the ENGINEER or to the testing agency, without cost, preliminary representative samples of the materials he proposes to use and which are required to be tested.
      2) Furnish such casual labor as is necessary to obtain and handle samples at the Work site or at other sources of material.
      3) Advise the testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.
   c. CONTRACTOR'S Testing Service shall inspect and approve subgrades and fill layers before further construction Work is performed thereon.
   d. It shall be the responsibility of CONTRACTOR to accomplish the specified compaction for backfill, fill, and other earthwork. It shall be the responsibility of CONTRACTOR to control his operations by confirmation tests to verify and confirm that he has complied, and is complying at all times, with the requirements of these Specifications concerning compaction, control, and testing.
   e. The frequency of CONTRACTOR'S tests shall be not less than as follows; each test location for trenches shall include tests for each layer, type, or class of backfill from bedding to finish grade.
      1) For trenches:
         a) In open fields: 2 locations every 1,000 linear feet.
         b) Along dirt or gravel roads or off traveled right-of-way: 2 locations every 500 linear feet.

c) Crossing paved roads: 2 locations along each crossing.
d) Under pavement cuts or within 2 feet of pavement edges: 1 location every 400 linear feet.

2) For structural backfill: 1 every 20 cubic yards.
3) In embankment or fill: 1 every 200 cubic yards.
4) Base material: 1 every 50 cubic yards.

f. Copies of the test reports shall be submitted promptly to the ENGINEER.

g. CONTRACTOR shall demonstrate the adequacy of compaction equipment and procedures before exceeding any of the following amounts of earthwork quantities:
1) 200 linear feet of trench backfill.
2) 10 cubic yards of structural backfill.
3) 50 cubic yards of base material.

h. Until the specified degree of compaction on the previously specified amounts of earthwork is achieved, no additional earthwork of the same kind shall be performed.

i. If compaction fails to meet the specified requirements, CONTRACTOR shall remove and replace the backfill at proper density or shall bring the density up to specified level by other means acceptable to the ENGINEER. Subsequent tests required to confirm and verify that the reconstructed backfill has been brought up to specified density shall be paid by CONTRACTOR. CONTRACTOR'S confirmation tests shall be performed in a manner acceptable to the ENGINEER. Frequency of confirmation tests for remedial Work shall be double that amount specified for initial confirmation tests.

B. Permits and Regulations:
1. Obtain all necessary permits for Work in roads, rights-of-way, railroads, etc. Also obtain permits as required by local, state and federal agencies for discharging water from excavations.
2. Perform excavation Work in compliance with applicable requirements of governing authorities having jurisdiction.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. ASTM A36, Specification for Structural Steel.
2. ASTM A328, Specification for Steel Sheet Piling.
3. ASTM D422, Method for Particle-Size Analysis of Soils.
4. ASTM D423, Liquid Limit of Soils.
5. ASTM D427, Shrinkage Factors of Soils.
6. ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil.
7. ASTM D1556, Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

8. ASTM D2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.
10. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650 (Subpart P - Excavations).
11. ASTM D2166, Unconfined compressive strength of soils.
12. International Building Code.
13. Texas Health and Safety Code Amm. 756.021 (Vernon, 1991).

1.3 SUBMITTAL

A. Excavation Plan: Prior to start of excavation operations, submit written plan to demonstrate compliance with OSHA Standard 29 CFR Part 1926.650. As a minimum, excavation plan shall include:
   1. Name of competent person.
   2. Excavation method(s) or protective system(s) to be used.
   3. Copies of "manufacturer's data" or other tabulated data if protective system(s) are designed on the basis of such data.

B. CONTRACTOR shall prepare drawings for the following items:
   1. Sheeting and bracing, or other protective system(s).
   2. Dewatering system.
   3. Cofferdams.
   4. Underpinning.

   Drawings and calculations shall be prepared by a Registered Professional Engineer licensed in the State of Texas and recognized as expert in the specialty involved. Drawings shall be submitted to ENGINEER for record purposes only. Calculations shall be submitted. Drawing and calculation submittal will not be checked and will not imply approval by ENGINEER of the Work involved. CONTRACTOR shall be solely responsible for designing, installing, operating and maintaining whatever system is necessary to satisfactorily accomplish all necessary sheeting, bracing, protection, underpinning and dewatering.

C. Test Reports - Borrow, Backfill, and Grading:
   1. Testing laboratory shall submit copies of the following reports directly to ENGINEER, with one copy to CONTRACTOR:
      a. Tests on borrow material.
      b. Tests on footing subgrade.
      c. Field density tests.
      d. Optimum moisture - maximum density curve for each soil used for backfill.
      e. Reports of observations for conformance of borrow material to the Project Geotechnical Report.

D. Samples of all materials, including select backfill, general backfill, granular embedment, crushed stone, sand and topsoil shall be submitted to the ENGINEER and the testing service. Samples of the proposed material shall be submitted at least fourteen (14) days in advance of its anticipated use.

1.4 JOB CONDITIONS

A. Refer to General Conditions for information pertaining to subsurface conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Select Fill:
   1. Place select fill where shown or specified and around structures, pipelines, roads, tanks, walks, and other work.
   2. Use well graded granular non-expansive material, free from organic matter. Well-graded granular material shall have a uniformity coefficient greater than 4 for gravels and 6 for sands, and a coefficient of gradation between 1 and 3 for gravels and sands. The material shall have a plasticity index between 6 and 15 and a liquid limit not exceeding 35 percent.
   3. Select structural fill to consist of crushed limestone base material in accordance with TxDOT Item 247, Type A, Grades 1 or 2. Select structural fill to be placed in 8-inch maximum loose lifts, each lift compacted to at least 95% of the maximum dry density as determined by applicable moisture density determination.
   4. Advise ENGINEER in writing of source and, if required, submit a sample of the material for approval.

B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, or natural or crushed sand, approved by ENGINEER.

C. Drainage Fill: All drainage fill material shall be a crushed stone, sand/gravel, or sand/crushed stone mixture. The material should have less then 3 percent passing a No. 200 sieve, and less than a 30 percent passing a No. 40 sieve. The minus No. 40 sieve material should be non-plastic.

D. General Backfill and Fill Materials: Provide approved soil materials for backfill and fill, free of rock or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetable and other organic matter and other deleterious materials. Previously excavated materials meeting these requirements may be used for backfill.

E. Pipe Zone (Pipe Bedding): Granular embedment material shall be crushed rock or pea gravel coarse aggregate size No. 7 (1/2" to No. 4) ASTM C33. Pipe bedding materials shall be placed in layers not more than 6" deep and compacted with a mechanical probe vibrator during placement to ensure all voids beneath the pipe are filled.

F. Trench Zone Backfill (above pipe zone): At the option of the CONTRACTOR, backfill may be (1) Job Excavated Material, (2) granular material, (3) graded gravel, or (4) imported soil backfill materials as described below:

1. Job Excavated Material: Job excavated material meeting select fill requirements may be used for trench zone backfill.
2. Granular Material: Granular material for compacted backfill shall comply with ASTM C33 and shall be coarse aggregate size Number 467 (1-1/2 inch to No. 4), 5 (1 inch to ½ inch), 56 (1 inch to 3/8 inch), or 57 (1 inch to No. 4), or shall be granular embedment material as specified for pipe bedding. Granular material shall be deposited in uniform layers not exceeding 12 inches in compacted thickness and shall be compacted to 70 percent relative density as determined by ASTM D4253 and D4254. Two relative density tests shall be conducted
3. Graded Gravel: Gravel for backfill shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
1 inch	100
3/4 inch	85-100
3/8 inch	50-80
No. 4	35-60
No. 40	15-30
No. 200	5-10

The gravel mixture shall contain no clay lumps or organic matter. The fraction passing the No. 4 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 5. Gravel backfill shall be deposited in uniform layers not exceeding 12 inches in uncompacted thickness. The backfill shall be compacted by a suitable vibratory roller or platform vibrator to not less than 70 percent relative density as determined by ASTM D4253 and D4254. Two relative density tests shall be conducted.

4. Soil Backfill: Soil backfill material shall consist of clayey sands, silty fine sands and sandy clays with a liquid limit less than 35 and a plasticity index between 6 and 15. Backfill materials shall be deposited in layers not to exceed 8 inches in uncompacted thickness and shall be compacted to 95 percent of maximum dry density at optimum moisture content as determined by ASTM

D698. The moisture content shall be between +/-2 percentage points of optimum moisture content. One moisture-density test on a sample of delivered material shall be conducted. At least one in-place density test shall be conducted for every 50 cubic yards of material.

PART 3 - EXECUTION

3.1 INSPECTION

A. Provide ENGINEER with sufficient notice and with means to examine the areas and conditions under which excavating, filling, and grading are to be performed. ENGINEER will notify CONTRACTOR if conditions are found that may be detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 TEST PITS

A. General: CONTRACTOR shall excavate and backfill, in advance of the construction, test pits to determine conditions or location of the existing utilities and structures. CONTRACTOR shall perform all Work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

1. CONTRACTOR shall be responsible for the definite location of each existing facility involved within the area of his excavation for Work under this Contract. Care shall be exercised during such location work to avoid damaging and/or disrupting the affected facility. CONTRACTOR shall be responsible for repairing, at his expense, damage to any structure, piping, or utility caused by his Work.

3.3 EXCAVATION

A. Perform all excavation required to complete the Work as shown, specified and required. Excavations shall include earth, sand, clay, gravel, hardpan, boulders, rock, pavements, rubbish and all other materials within the excavation limits. Where the excavation is in rock, the rock shall be removed as specified under Section 02222, Rock Excavation.

B. Excavations for structures and pipelines shall be open excavations. Provide excavation protection system(s) required by ordinances, codes, law and regulations to prevent injury to workmen and to prevent damage to new and existing structures or pipelines. Unless shown or specified otherwise, protection system(s) shall be utilized under the following conditions.

1. Excavation Less Than 5 Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
2. Excavations More Than 5 Feet Deep: Excavations in stable rock where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded or shored and braced.
3. Excavation protection system(s) shall be installed and maintained in accordance with the excavation plan submitted under Paragraph 1.3 above.

C. Where the structure or pipeline is to be placed below the ground water table, well points, cofferdams, or other, acceptable methods shall be used to permit construction of said structure or pipeline under dry conditions. Dry conditions shall prevail until concrete has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested and backfilled. In addition, protect excavation from flooding until all walls and floor framing up to and including grade level floors are in place and backfilling has begun. Water level shall be maintained below top of backfill at all times.

D. Pumping of water from excavations shall be done in such a manner to prevent the carrying a way o f u nsolidified c oncrete materials and to prevent damage to the existing subgrade.

E. The elevation of the bottom of footings shown shall be considered as approximate only and ENGINEER may order such changes in dimensions and elevations as may be required to secure a satisfactory footing. All structure excavations shall be hand-trimmed to permit the placing of full widths and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

F. When excavations are made below the required grades, without the written order of ENGINEER, they shall be backfilled with compacted select fill or concrete, as directed by ENGINEER, at the expense of CONTRACTOR.

G. Excavations shall be extended sufficiently on each side of structures, footings, etc., to permit setting of forms, installation of shoring or bracing or the safe sloping of banks.

H. Excavation Requirements for Structures:
1. General. Do not commence excavation for foundations for structures until:
   a. Soils Engineer approves:
      1) The removal of topsoil and other unsuitable and undesirable material from existing subgrade.

2) Density and moisture content of site area compacted fill material meets requirements of specifications.
3) Site surcharge or mass fill material can be removed from entire construction site or portion thereof.
4) Surcharge or mass fill material has been removed from construction area or portions thereof.

b. Engineer grants approval to begin excavations.

2. Dimensions:
   a. Excavate as required to provide 6 inches of drainage fill under slab-on-grade.
   b. Shallow foundations shall be founded in natural limestone rock or in compacted, select structural fill placed on the natural limestone.
   c. Allow additional space as required for construction operations and inspection of foundations.
3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute work indicated on Contract Drawings. If undesirable material and obstructions are encountered during excavation, remove material and replace as directed by Soils Engineer.
4. Level off bottoms of excavations to receive foundations, floor slabs, equipment support pads, or compacted fill. Remove loose materials and bring excavations into approved condition to receive concrete or fill material. Where compacted fill material must be placed to bring subgrade elevation up to underside of construction, scarify existing subgrade upon which fill material is to be placed to a depth of 6 inches and then compact to density stated in this Section of Specifications before fill material can be placed thereon. Do not carry excavations lower than shown for foundations except as directed by Soils Engineer. If any part of excavations is carried below required depth without authorization, maintain excavation and start foundation from excavated level with concrete of same strength as required for superimposed foundation, and no extra compensation will be made to Contractor therefore.
5. Notify Soils Engineer and Engineer as soon as excavation is completed in order that subgrades may be inspected. Do not commence further construction until subgrade under compacted fill material, under foundations, under floor slabs-on-grade, and under equipment support pads has been inspected and approved by the Soils Engineer as being free of undesirable material, being of compaction density required by this specification, and being capable of supporting the allowable foundation design bearing pressures and superimposed foundation, fill, and building loads to be placed thereon. Soils Engineer shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.

a. Place fill material, foundations, floor slabs-on-grade, and equipment support pads as soon as weather conditions permit after excavation is completed, inspected, and approved and after forms and reinforcing are inspected and approved. Before concrete or fill material is placed, protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.

6. Do not place floor slabs-on-grade including equipment support pads until subgrade below has been approved, piping has been tested and approved, reinforcement placement has been approved, and Contractor receives approval to commence slab construction. Do not place building floor slabs-on-grade including equipment support pads when temperature of air surrounding the slab and pads is or is expected to be below 40 DegF before structure is completed and heated to a temperature of at least 50 DegF.

7. Protection of structures: Prevent new and existing structures from becoming damaged due to construction operations or other reasons. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.

I. Subgrades for roadways, structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud, muck, and other soft or unsuitable materials; and shall remain firm and intact under all construction operations. Subgrades which are otherwise solid, but which become soft or mucky on top due to construction operations, shall be reinforced with select fill. The finished elevation of stabilized subgrades shall not be above subgrade elevations shown.

J. Pipe Trench Preparation:

1. No more than 200 feet of trench may be opened in advance of pipe laying.
2. Trench width shall be minimized to greatest extent practical but shall conform to the following:
   a. Sufficient to provide room for installing, jointing and inspecting piping, but in no case wider at top of pipe than pipe barrel outside diameter plus 3 feet.
   b. Enlargements at pipe joints may be made, if required, and approved by ENGINEER.
   c. Sufficient for shoring and bracing, or shielding and dewatering.
   d. Sufficient to allow thorough compaction of backfill adjacent to bottom half of pipe.
   e. Do not use excavating equipment, which requires the trench to be excavated to excessive width.
3. Depth of trench shall be as shown. If required and approved by ENGINEER, depths may be revised.

K. Material Storage: Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
   1. Locate and retain soil materials away from edge of excavations.
   2. Dispose of excess soil material and waste materials as specified hereinafter.

L. Where ENGINEER considers the existing material beneath the bedding material unsuitable, CONTRACTOR shall remove same and replace it with select backfill.

3.4 UNAUTHORIZED EXCAVATION

A. All excavation outside the lines and grades shown, and which is not approved by ENGINEER, together with the removal and disposal of the associated material shall be at CONTRACTOR'S expense. Unauthorized excavations shall be filled and compacted with select backfill by CONTRACTOR at his expense.

3.5 EROSION CONTROL AND DEWATERING

A. Erosion Control:
   1. In general, the construction procedures outlined herein shall be implemented to assure minimum damage to the environment during construction. CONTRACTOR shall take any and all additional measures required to conform to the requirements of applicable codes and regulations.
   2. Whenever possible, access, and temporary roads shall be located and constructed to avoid environmental damage. Provisions shall be made to regulate drainage, avoid erosion, and minimize damage to vegetation.
   3. Where areas must be cleared for storage of materials or temporary structures, provisions shall be made for regulating drainage and controlling erosion, subject to the ENGINEER'S approval.
   4. Temporary measures shall be applied to control erosion and to minimize the siltation of the existing waterways, and natural ponding areas. Such measures shall include, but are not limited to, the use of berms, baled straw silt barriers, gravel or crushed stone, mulch, slope drains and other methods. These temporary measures shall be applied to erodible materials exposed by any activities associated with the construction of this Work.
      a. Special care shall be taken to eliminate depressions that could serve as mosquito pools.
      b. Temporary measures shall be coordinated with the construction of permanent drainage facilities and other Work to the extent practicable to assure economical, effective, and continuous erosion and siltation control.
      c. CONTRACTOR shall provide special care in areas with steep slopes. Disturbance of vegetation shall be kept to a minimum to maintain stability.

5. Remove only those shrubs and grasses that must be removed for construction. Protect the remainder to preserve their erosion-control value.
6. Install erosion and sediment control practices where shown and according to applicable standards, codes and specifications. The practices shall be maintained in effective working condition during construction and until the drainage, area has been permanently stabilized.
7. Mulching to be used for temporary stabilization.
   a. Suitable Materials for Mulching:
      1) Unrotted straw or salt hay - 1-1/2 to 2 tons/acre.
      2) Asphalt emulsion or cutback asphalt - 600 to 1200 gal. / acre.
      3) Wood-fiber or paper-fiber (hydroseeding) - 1500 lbs./ acre.
      4) Mulch netting (paper, jute, excelsior, cotton or plastic).
   b. Straw or salt hay mulches should be immediately anchored using peg and twine netting or a mulch anchoring tool or liquid mulch binders.
8. After stabilization, remove all straw bale dikes, debris, etc., from the site.
9. In the event of any temporary Work stoppage, CONTRACTOR shall take steps any temporary or environmental damage to the area undergoing construction.
10. In the event CONTRACTOR repeatedly fails to satisfactorily control erosion and siltation, the OWNER reserves the right to employ outside assistance or to use its own forces to provide the corrective measures indicated. The cost of such work, plus engineering costs, will be deducted from monies due CONTRACTOR.
11. CONTRACTOR shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce on and off-site damage and health hazards. Control may be achieved by irrigation in which the site shall be sprinkled with water until the surface is moist. The process shall be repeated as needed.

B. Dewatering:
   1. CONTRACTOR shall provide and maintain adequate dewatering equipment to remove and dispose of all surface water and ground water entering excavations, trenches, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein is inspected by the ENGINEER and backfill operations have been completed and approved.
      a. The different working areas on the site shall be kept free of surface water at all times. CONTRACTOR shall install drainage ditches and dikes and shall perform all pumping and other Work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations and fill areas. The diversion and removal of surface water shall be performed in a manner that will prevent the accumulation of water behind temporary structures or at any other locations within the construction area where it may be detrimental.

b. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the water downstream of the point of discharge, shall not be directly discharged. Such waters shall be diverted through a settling basin or filter before being discharged.

c. CONTRACTOR will be held responsible for the condition of any pipe, conduit or channel used for drainage purposes and all such pipes, conduits or channels shall be left clean and free of sediment.

2. CONTRACTOR shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, wellpoints, deep wells, etc., necessary to depress and maintain the ground water level below the base of the excavations during all stages of construction operations. The ground water table shall be lowered in advance of excavation, for a sufficient period of time so as to permit dewatering o f fine grain soils, and maintained two feet below the lowest subgrade excavation made until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water. The system shall be operated on a 24-hour basis and standby pumping facilities and personnel shall be provided to maintain the continued effectiveness of the system. If, in the opinion of the ENGINEER, the water levels are not being lowered or maintained as required by these Specifications, CONTRACTOR shall install additional or alternate dewatering devices as necessary, at no additional cost to the OWNER.

   a. Elements of the system shall be located so as to allow a continuous dewatering operation without interfering with the construction of the permanent Work. Where portions of the dewatering system are located in the area of permanent construction, CONTRACTOR shall submit details of the methods he proposes to construct the permanent Work in this location for the approval of the ENGINEER. Controls of ground water shall continue until the permanent construction provides sufficient dead load to withstand the hydrostatic uplift of the normal ground water, until concrete has attained sufficient strength to withstand earth and hydrostatic loads, until all waterproofing Work has been completed and until pipelines are properly jointed. Dispose of all water removed from the excavation in such a manner so as not to endanger any portion of the Work under construction or completed. Convey water from the excavations in a closed conduit. Do not use trench excavations as temporary drainage ditches. Before discontinuing dewatering operations or permanently permitting the rise of the ground water level, computations shall be made to show that any pipeline or structure affected by the water level rise is protected by backfill or other means to sustain uplift. Use a safety factor of 1.25 when making these computations.

   b. Dewatering operations shall not be discontinued without the prior authorization of the ENGINEER.

c. Design of dewatering system, including both drawings and calculations, shall be performed by a Registered Professional Engineer in the State of Texas and shall be employed by CONTRACTOR. Dewatering system shall be designed so as to avoid settlement or damage to existing structures and utilities.

C. Disposal of Water Removed by Dewatering System:
1. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the Work under construction or completed.
2. Dispose of water in such a manner as to cause no inconvenience to OWNER, ENGINEER, or others involved in Work about the site.
3. Convey water from the construction site in a closed conduit. Do not use trench excavations as temporary drainage ditches.

3.6 SHEETING, SHORING AND BRACING

A. General:
1. Used material shall be in good condition, not damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary Work.
2. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade with a bending strength not less than 1500 psi or Southern Pine No. 2 Dense.
3. All steel Work for sheeting, shoring, bracing, cofferdams etc., shall be designed in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" of the AISC, except that field welding will be permitted.
4. Steel sheet piling shall be manufactured from steel conforming to ASTM A 328. Steel for soldier piles, wales and braces shall be new or used and shall conform to ASTM A 36.
5. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
6. Unless otherwise shown, specified, or ordered, all materials used for temporary construction shall be removed when Work is completed. Such removal shall be made in a manner not injurious to the structure or its appearance or to adjacent Work.
7. The clearances and types of the temporary structures, insofar as they affect the character of the finished Work and the design of sheeting to be left in place, shall be subject to the approval of ENGINEER; but CONTRACTOR shall be responsible for the adequacy of all sheeting, shoring, bracing, coffer-damming, etc.

8. Safe and satisfactory sheeting, shoring and bracing shall be the entire responsibility of CONTRACTOR.
9. All municipal, county, state and federal ordinances, codes, regulations and laws shall be observed.

B. Removal of Sheeting and Bracing:
1. Remove sheeting and bracing from excavations, unless otherwise directed in writing by ENGINEER. Removal shall be done so as to not cause injury to the Work. Removal shall be equal on both sides of excavation to ensure that no unequal loads are placed on pipe or structure.
2. Defer removal of sheeting and bracing where removal may cause soil to come into contact with concrete until the following conditions are satisfied:
   a. Concrete has cured a minimum of seven (7) days.
   b. Wall and floor framing, up to and including, grade level floors are in place.

3.7 TRENCH SHIELDS

A. Excavation of earth material below the bottom of a shield shall not exceed the limits established by ordinances, codes, laws and regulations.

B. When using a shield for pipe installation:
1. Any portion of the shield that extends below the mid-diameter of an installed rigid pipe (e.g., RCCP, etc.) shall be raised above this point prior to moving the shield ahead for the installation of the next length of pipe.
2. The bottom of the shield shall not extend below the mid-diameter of installed flexible pipe (e.g., Steel, DI, PVC, etc.) at any time.

C. When using a shield for the installation of structures, the bottom of the shield shall not extend below the top of the bedding for the structures.

D. When a shield is removed or moved ahead, extreme care shall be taken to prevent the movement of pipe or structures or the disturbance of the bedding for pipe or structures. Pipe or structures that are disturbed shall be removed and reinstalled as specified.

3.8 PLACEMENT OF FILL AND BACKFILL

A. General:
1. All select backfill and backfill required for structures and trenches and required to provide the finished grades shown and as described herein shall be furnished, placed and compacted by CONTRACTOR.
2. Backfill excavations as promptly as Work permits, but not until completion of the following:

a. Acceptance by the ENGINEER of construction below finish grade.
b. Inspection, testing, approval, and recording of locations of underground piping and ductwork.
c. Removal of concrete formwork.
d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
e. Removal of trash and debris.

3. Fill containing organic materials or other unacceptable material shall be removed and replaced with approved fill material as specified.

B. Placement of Select Backfill, Backfill and Fill:

1. Select backfill shall be placed to the grades shown on the Drawings. The lift thickness and compaction moisture content range given herein are approximate. These values shall be finally determined from the laboratory test results on the fill materials.
2. All select backfill shall be placed in horizontal loose lifts, not exceeding 8-inches in thickness, and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Each lift shall be compacted by not less than two complete coverages of the specified compactor. Select backfill shall be placed to the underside of all concrete slabs. The fill material shall extend a minimum of two feet outside the face of each structure and be 12-inches below finished grade. The maximum slope of select backfill to the subgrade shall be one vertical to one horizontal.
3. Backfill and fill around and outside of structures and over select backfill shall be deposited in layers not to exceed 8- inches in uncompacted thickness and mechanically compacted, using platform type tampers. Compaction of structures backfilled by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of select backfill and/or backfill by inundation with water will not be permitted. All materials shall be deposited as specified herein and as shown on the Drawings.
4. The material shall be placed at a moisture content and density as specified under Paragraph 3.8.G. CONTRACTOR shall provide equipment capable of adding measured amounts of water to the backfill and/or select backfill material to bring it to a condition within the range of the required moisture content. CONTRACTOR shall provide equipment capable of discing, aerating, and mixing the soil to ensure reasonable uniformity of moisture content throughout the fill material and to reduce the moisture content of the borrow material by air drying, if necessary. If the subgrade or lift of earth material must be moisture conditioned before compaction, the fill material shall be sufficiently mixed or worked on the subgrade to ensure a uniform moisture content throughout the lift of material to be compacted. Materials at moisture content in excess of the specified limit shall be dried by aeration or stockpiled for drying.

5. No backfill or fill material shall be placed when free water is standing on the surface of the area where the fill is to be placed. No compaction of fill will be permitted with free water on any portion of the fill to be compacted. No fill shall be placed or compacted in a frozen condition or on top of frozen material. Any fill containing organic materials or other unacceptable material previously described shall be removed and replaced with approved fill material prior to compaction.
6. Compaction shall be performed with equipment suitable for the type of fill material being placed. CONTRACTOR shall select equipment that is capable of providing the minimum density required by these Specifications. Hand operated compacting equipment shall be used within a distance of 10 feet from the wall of any completed below grade structure. Equipment shall be provided that is capable of compacting in restricted areas next to structures and around piping. The effectiveness of the equipment selected by CONTRACTOR shall be tested at the commencement of compacted fill Work by construction of a small section of fill within the area where fill is to be placed. If tests on this section of fill show that the specified compaction is not obtained, CONTRACTOR shall increase the amount of coverages, decrease the lift thicknesses and/or obtain a different type of compactor.
7. Levels of backfill against concrete walls shall not differ by more than two (2) feet on either side of walls, unless walls are adequately braced or all floor framing is in place up to and including grade level slabs. Particular care shall be taken to compact structure backfill that will be beneath pipes, roads, or other surface construction or structures. In addition, wherever a trench passes through structure backfill, the structure backfill shall be placed and compacted to an elevation 12-inches above the top of the pipe before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.
8. The compaction requirements specified are predicated on the use of normal materials and compaction equipment. In order to establish criteria for the placement of a controlled fill so that it will have compressibility and strength characteristics compatible with the proposed structural loadings, a series of laboratory compaction and/or compressive strength tests shall be performed on the samples of materials submitted by CONTRACTOR. From the results of the laboratory tests, the final values of the required percent compaction, the acceptable compaction moisture content range, and the maximum permissible lift thickness will be established for the fill material and construction equipment proposed.

C. Fill and Backfill Inside of Structure and Below Foundations, Base Slabs, Floor Slabs, Equipment Support Pads and Piping:
   1. General: Subgrade to receive fill or backfill shall be free of undesirable material as determined by Soils Engineer and scarified to a depth of 6 inches and compacted to density specified herein. Surface may be stepped by at not

more than 12 inches per step or may be sloped at not more than 2 percent. Do not place any fill or backfill material until subgrade under fill or backfill has been inspected and approved by Soils Engineer as being free of undesirable material and compacted to specified density.

2. Obtain approval of fill and backfill material and source from Soils Engineer prior to placing the material.
3. Drainage fill under floor slabs-on-grade: Place all floor slabs-on-grade on a minimum of 6 inches of granular fill unless otherwise indicated.
4. Vapor barrier: Install a continuous vapor barrier under floor slabs-on-grade shown on Contract Drawings.
5. Fill and backfill placement: Prior to placing fill and backfill material, optimum moisture and maximum density properties for proposed material shall be obtained from Soils Engineer. Place fill and backfill material in thin lifts as necessary, 8 inches maximum, to obtain required compaction density. Compact material by means of equipment of sufficient size and proper type to obtain specified density. Use hand-operated equipment for filling and backfilling next to walls. Do not place fill and backfill when the temperature is less than 40 DegF and when subgrade to receive fill and backfill material is frozen, wet, loose, or soft. Use vibratory equipment to compact granular material; do not use water.
6. Where fill material is required below foundations, place fill material, conforming to the required density and moisture content, outside the exterior limits of foundations located around perimeter of structure the following horizontal distance whichever is greater:
   a. As required to provide fill material to indicated finished grade.
   b. 5 FT.
   c. Distance equal to depth of compacted fill below bottom of foundations.
   d. As directed by Soils Engineer.

D. Backfill in Pipe Trenches:
1. Pipeline trenches may be backfilled prior to pressure testing, but no structure shall be constructed over any pipeline until it has been tested.
2. All pipe, except plastic pipe, shall be placed on a minimum 6-inch thick layer of granular embedment material. The granular embedment material shall extend 12-inches above the top of the pipe. CPVC, PVC, HDPE pipes and FRP ducts shall be placed on a minimum 6-inch layer of sand. Sand shall extend to 12-inches above top of pipe, and to the trenchwalls on each side of the pipe, unless otherwise noted.
3. Embedment materials both below and above the bottom of the pipe, classes of embedment to be used, and placement and compaction of embedment materials shall conform to the following requirements:
   a. Granular embedment shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the

finished subgrade surface by withdrawal of pipe slings or other lifting tackle. After each pipe has been graded, aligned, placed in final position on the bedding material and shoved home, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and to maintain alignment during subsequent pipe jointing and embedment operations. Embedment material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement. The embedment material shall then be placed and compacted to an elevation 12-inches above the top of pipe.

b. Compacted backfill shall be required for the full depth of the trench above the granular pipe embedment material. Where the trench for one pipe passes beneath the trench for another pipe or electrical ductbank, the lower trench shall be compacted to the level of the bottom of the upper trench.

c. Each layer of embedment material shall be compacted by at least two complete coverages of all portions of the surface of each lift using approved compaction equipment. One coverage is defined as the conditions reached when all portions of the fill lift have been subjected to the direct contact of the compacting surface of the compactor.

d. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.

e. The degree of compaction required for granular embedment is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698.

E. Backfill in Electrical Ductbank Trenches:

1. Compacted backfill shall be required for the full depth of the trench above the electrical ductbank. Where the trench for one ductbank passes beneath the trench for another pipe or ductbank select backfill shall be placed to the level of the bottom of the upper trench.
2. Placement and compaction of backfill in electrical ductbank trenches shall conform to the requirements of Paragraph 3.8.B.

F. Crushed Stone Placement:

1. Crushed stone shall be placed where shown on the Drawings to the limits shown.
2. Crushed stone shall be place in hand tamped lifts, not to exceed 6-inches.

G. Sand Placement:

1. Sand shall be placed as an envelope around PVC and CPVC pipes, FRP ducts and all pipe 2-inches and smaller. Place and compact minimum 6 inches of sand all around pipes, in 6-inch lifts, to a level 6 inches above the top of pipe.

H. Compaction Density Requirements:

1. The degree of compaction required for all types of fills shall be as listed below. Material shall be moistened or aerated as necessary to provide the moisture content that will facilitate obtaining the specified compaction.

Material Thick.(in)	Required Minimum Density-Percent Compaction (ASTM D 698)	*Maximum Uncompacted Lift (inches)
Subgrade and Subbase Fill:		
Below concrete slabs on grade	95	8
Below base of footings or mats, structural slabs and tank floors	95	8
Below asphalt concrete paving	95	8
**Structural Backfill:		
More than 5 feet below final grade	95	8
Less than 5 feet below grade	95	8
Aggregate Base Course:		
Below concrete slabs or mats	95	8
Below asphalt paving	100	8
Trench Backfill above pipe	95	9
Granular Pipe Embedment Material	95	6
Sand Embedment Material	95	6

* Where applicable

** Structural backfill shall not be used for support of facilities that are susceptible to damage from differential settlement of the fill section relative to walls.

All fill must be wetted and thoroughly mixed to achieve optimum moisture content, ± 2 percent, with the following exceptions: On site clayey soils optimum to plus 5 percent. Natural undisturbed soils or compacted soil subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

2. CONTRACTOR'S testing service shall perform tests necessary to provide data for selection of fill material and control of placement water content.

3. Field density tests, to ensure that the specified density is being obtained, shall be performed by CONTRACTOR'S testing service during each day of compaction Work.
4. If the tests indicate unsatisfactory compaction, CONTRACTOR shall provide the additional compaction necessary to obtain the specified degree of compaction. All additional compaction Work shall be performed by CONTRACTOR, at no additional cost to the OWNER, until the specified compaction is obtained. This Work shall include complete removal of unacceptable (as determined by the ENGINEER) fill areas and replacement and recompaction until acceptable fill is provided.

I. Replacement of Unacceptable Excavated Materials: In cases where over-excavation for the replacement of unacceptable soil materials is required, the excavation shall be backfilled to the required subgrade with select backfill material and thoroughly compacted as specified in Paragraph 3.8.G. Sides of the excavation shall be sloped in accordance to the maximum inclinations specified for each structure location.

3.9 EMBANKMENTS

A. To the maximum extent available, use excess earth obtained from structure and excavations for construction of embankments. Obtain additional material from borrow pits, as necessary. After preparation of the embankment area, level and roll the subgrade so that surface materials of the subgrade will be compact and well bonded with the first layer of the embankment. All material deposited in embankments shall be free from rocks or stones, brush, stumps, logs, roots, debris, and organic or other objectionable materials. Construct embankments in horizontal layers not exceeding 8 inches in uncompacted thickness. Spread and level material deposited by excavating and hauling equipment prior to compaction. Thoroughly compact each layer by rolling, or other method acceptable to the ENGINEER, to 95 percent of the maximum density at optimum moisture content, as determined by ASTM D 698. If the material fails to meet the density specified, compaction methods shall be altered. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 24-inches above the top of the pipe before the trench is excavated.

3.10 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth subgrade surfaces within specified tolerances, and compact with uniform levels or slopes between points where elevations are shown or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding, as follows:

1. Turfed Areas or Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover to within not more than 1-inch above or below the required subgrade elevations.
2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1-inch above or below the required subgrade elevation.
3. Pavements: Shape surface of areas under pavement to line, and grade and cross-section with finish surface not more than 1/2-inch above or below the required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.11 PAVEMENT BASE COURSE

A. General: Place subbase material, in layers of specified thickness, over ground surface to support pavement base course.
1. Refer to Section 02742, Bituminous Paving, and Section 02751, Concrete Paving, for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each base course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with compacting and rolling of each layer of base course.

D. Placing: Place base course material on prepared subgrade in layers of uniform thickness conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting base material during placement operations.
1. When a compacted base course is shown to be 6-inches thick or less, place material in a single layer. When shown to be more than 6-inches thick, place material in equal layers, except no single layer shall be more than 6-inches or less than 3-inches in thickness when compacted.

3.12 DISPOSAL OF EXCAVATED MATERIALS

A. Material removed from the excavations, which does not conform to the requirements for fill or is in excess of that required for backfill, shall be hauled away from the

Work site and disposed of by CONTRACTOR in compliance with ordinances, codes, laws and regulations at no additional cost to the OWNER.

3.13 RESTORING AND RESURFACING EXISTING ROADWAYS AND FACILITIES

A. Place 1-1/2-inches of temporary bituminous pavement immediately after backfilling trenches in paved roadways that are to be retained for permanent use. Maintain the surface of the paved area over the trench in good and safe condition during progress of the entire Work, and promptly fill all depressions over and adjacent to the trench caused by settlement of backfill. The permanent replacement pavement shall be equal to that of the existing roadways, unless otherwise specified.

B. Pavement, gutters, curbs, sidewalks or roadways disturbed or damaged by CONTRACTOR'S operations, except areas designated "New Pavement" or "Proposed Pavement", shall be restored by CONTRACTOR at their own expense to as good condition as they were previous to the commencement of the Work and in accordance with applicable local and state highway specifications.

3.14 TEMPORARY FENCING

A. CONTRACTOR shall furnish and install a temporary fence surrounding his excavations and work area, including the stockpile and storage areas. Fence shall have openings only at vehicular, equipment and worker access points.

3.15 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: CONTRACTOR'S testing service shall inspect and approve subgrades and fill layers before construction Work is performed thereon. Tests of subgrades and fill layers shall be taken as follows:
   1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one (1) test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to ENGINEER.
   2. Paved Areas and Building Slab Subgrade: Make at least one (1) field density test of subgrade for every 500 square feet of paved area or building slab, but in no case less than three (3) tests. In each compacted fill layer, make one field density test for every 2000 square feet of overlaying building slab or paved area, but in no case less than three (3) tests.
   3. Foundation Wall Backfill: Take at least two (2) field density tests, at locations and elevations as directed.

B. If testing service reports or inspections show subgrade or fills are below specified density, CONTRACTOR shall provide additional compaction and testing at no additional expense to OWNER. This Work shall include complete removal of unacceptable fill areas (as determined by the ENGINEER), and replacement and recompaction until acceptable fill is provided.

++ END OF SECTION ++

ATTACHMENT L
BMPS FOR SURFACE STREAMS

The site does not contain any surface streams, as shown on the USGS quad in Attachment B. All stormwater that flows off-site will be treated using silt fence and hay bales during construction, and vegetative filter strips after construction to prevent contamination of surface streams located off-site.

ATTACHMENT M
CONSTRUCTION PLANS

FM 3159
(ROW VARIES - 120' ET. MIN.)

EXIST FENCE

12' CONC. DRWY (TYP)

DRAINAGE AREA 1
0.47 AC.

FILTER STRIP AREA 1
0.29 AC.

DRAINAGE AREA 2
2.14 AC.

FILTER STRIP AREA 2
1.18 AC.

FILTER STRIP AREA 3
1.14 AC.

DRAINAGE AREA 3
2.38 AC.

DRAINAGE AREA 4
2.33 AC.

FILTER STRIP AREA 4
0.79 AC.

DRAINAGE AREA 5A
0.28 AC.

FILTER STRIP AREA 5A
0.13 AC.

DRAINAGE AREA 5B
0.45 AC.

FILTER STRIP AREA 5B
0.06 AC.

MEMBRANE BUILDING
FF= 1372.00

FUTURE MF/RO

FERRIC SULFATE STORAGE TANK

CHLORINE FEED VAULT

CONTROL VALVE VAULT

FLOW METER VAULT No. 1

RAPID MIX BASIN
FF= 1371.00

FLOCCULATION BASIN FF= 1371.00

CIP LAGOON 2
FF= 1357.50

CIP LAGOON 1
FF= 1357.50

LAGOON DRAIN PUMP

CHLORINE BUILDING
FF= 1365.00

FLOW METER VAULT No. 2

FUTURE CAC

OPERATIONS BUILDING
FF= 1371.50

BUS PARKING

RECYCLE PUMPS

2 MG TREATED WATER TANK
TWST-701
BASE EL. 1354.50

TANK INLET VALVE VAULT

TANK OUTLET VALVE VAULT

RESIDUALS LAGOON 1
FF VARIES

RESIDUALS LAGOON 2
FF VARIES

HYDROPNEUMATIC TANK SLAB

SITE DRAIN PUMP STATION

TANK INLET VALVE VAULT MH

CONCRETE PAVEMENT

HIGH SERVICE PUMP STATION
FF= 1357.5

TANK OUTLET VALVE VAULT

FUTURE 2 MG TREATED WATER TANK
TWST-702

CONC. RAMP

SEPTIC TANK

24" CATCH BASIN

HEADWALL

CHAIN LINK FENCE

EXIST. FENCE

CRAINES MILL ROAD

WAGNER RANCH

24' WIDE GATE
SEE DETAIL

20' X 40'
TURN AROUND

24" CATCH BASIN

HEADWALL

1370
1365
1360
1355
1350
1345
1340
1335

NOTES:

1. VEGETATIVE FILTER STRIP AREAS REPRESENT PERMANET BEST MANAGEMENT PRACTICES FOR CONTROL OF POLLUTION DISCHARGES AFTER COMPLETION OF CONSTRUCTION. PREPARE AND REVEGETATE FILTER STRIP AREAS AS DESCRIBED IN SEEDING, LANDSCAPE IRRIGATION AND LANDSCAPE MAINTENACE SPECIFICATIONS.
2. FILTER STRIP AREAS ARE DESIGNATED IN ACCORDANCE WITH THE EDWARDS AQUIFER CONTRIBUTING ZONE PLAN, AVAILABLE FOR REVIEW AT ISSUING OFFICE.

STATE OF TEXAS
KAREN R. PAPPA
88107
LICENSED
PROFESSIONAL ENGINEER
2-2-04

MALCOLM PIRNIE
HDR
HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER: JCW
DESIGNED: KRP
DESIGNED:
CHECKED: KP
DRAWN: JRH

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

SITE WORK
CIVIL
DRAINAGE AREAS
AND VEGETATIVE STRIPS

DATE: FEBRUARY 2004
SCALE: 1" = 160'
FILE NAME: GBRA-4-1C02-A
SHEET NO.: 1C02-A
ISSUE: 0

DAN LOWERY ON ORIGINAL
KAREN PAPPA ON COPIES
ROBERT BOWLES ON MYLAR

-10-02

CONTRIBUTING ZONE PLAN NOTES

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION CONTRIBUTING ZONE PLAN GENERAL CONSTRUCTION NOTES

1. WRITTEN CONSTRUCTION NOTIFICATION SHOULD BE PROVIDED TO THE APPROPRIATE TNRCC REGIONAL OFFICE NO LATER THAN 48 HOURS PRIOR TO COMMENCEMENT OF THE REGULATED ACTIVITY. INFORMATION SHOULD INCLUDE THE DATE ON WHICH THE REGULATED ACTIVITY WILL COMMENCE, THE NAME OF THE APPROVED PLAN FOR THE REGULATED ACTIVITY, AND THE NAME OF THE PRIME CONTRACTOR WITH THE NAME AND TELEPHONE NUMBER OF THE CONTACT PERSON.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT SHOULD BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED CONTRIBUTING ZONE PLAN AND THE TNRCC LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTOR(S) SHOULD KEEP COPIES OF THE APPROVED PLAN AND APPROVAL LETTER ON-SITE.

3. NO TEMPORARY ABOVEGROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM MAY BE INSTALLED WITHIN 150 FEET IF A DOMESTIC, INDUSTRIAL, IRRIGATION, OR PUBLIC WATER SUPPLY WELL.

4. PRIOR TO COMMENCING CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. CONTROLS SPECIFIED IN THE SWPPP SECTION OF THE APPROVED EDWARDS AQUIFER CONTRIBUTING ZONE PLAN ARE REQUIRED DURING CONSTRUCTION. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.

5. IF SEDIMENT ESCAPES THE CONSTRUCTION SITE, OFF-SITE ACCUMULATIONS OF 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).

6. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.

7. 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).

8. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE AND STORED ON-SITE MUST HAVE PROPER E&S CONTROLS INSTALLED.

9. 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.

10. THE FOLLOWING RECORDS SHOULD BE MAINTAINED AND MADE AVAILABLE TO THE TNRCC 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.

11. THE HOLDER OF ANY APPROVED CONTRIBUTING ZONE PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
    A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY BEST MANAGEMENT PRACTICES OR STRUCTURE(S), INCLUDING BUT NOT LIMITED TO TEMPORARY OR PERMANENT PONDS, DAMS, BERMS, SILT FENCES, AND DIVERSIONARY STRUCTURES;
    B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED;
    C. ANY CHANGE THAT WOULD SIGNIFICANTLY IMPACT THE ABILITY TO PREVENT POLLUTION OF THE EDWARDS AQUIFER AND HYDROLOGICALLY CONNECTED SURFACE WATER; OR
    D. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED IN A CONTRIBUTING ZONE PLAN AS UNDEVELOPED.

SAN ANTONIO REGIONAL OFFICE
14250 JUDSON ROAD
SAN ANTONIO, TEXAS 78233-4480
PHONE (210) 490-3096
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STATE OF TEXAS
KAREN R. PAPPAS
88107
LICENSED
PROFESSIONAL ENGINEER
2-2-04

MALCOLM PIRNIE | HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER: CW
DESIGNED: YW
DRAWN:
CHECKED: RH/SH
ERRATA: AR

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

GENERAL

CONTRIBUTING ZONE PLAN NOTES

DATE: FEBRUARY 2004
SCALE: NOT TO SCALE
FILE NAME: GBRA-4-0010
SHEET NO.: 0G05
ISSUE: 0

User:drivel Sset:PIRNIE STANDARD File:\\San...ons\CADD\ACAD\PROJ\3228014\ACAD\VER\GBRA-4-0005.DWG Scale:1:1 Date:01/22/2004 Time:12:58 Layout:LAYOUT

Western Canyon Water Supply Project - Water Treatment Plant
Contributing Zone Plan
Vegetative Filter Strip Calculations

Runoff Coefficient 0.75
Maximum Application Rate 4.6 ft3/ft2

Drainage Area	Area	Area	Precip Ann. Avg.	Req'd Filter Strip Area	Actual Filter Strip Area	Actual Filter Strip Area
	(sf)	(acres)	(in)	(ft2)	(ft2)	(acres)
1	19,840	0.46	33	8,896	8,900	0.20
2	93,434	2.14	33	41,893	51,292	1.18
3	102,900	2.36	33	46,137	49,486	1.14
4	101,487	2.33	33	45,504	34,367	0.79
5a	12,360	0.28	33	5,542	5,614	0.13
5b	5,227	0.12	33	2,344	2,631	0.06
RWCT site [1]	19,680	0.45	33	8,824		

(1) There is no filter strip for the RWCT due to site constraints.

Actual filter strip size for Areas 2 and 3 are greater than required to compensate for the decreased filter strip size of Area 4 so that the total load removal for the site is sufficient.

Load Removal Calculations

PREDEVELOPMENT LOAD

L = A * P * Rv * C * 0.226
Rv = 0.546 (IC)^2 + 0.328 * (IC) + 0.030
C = 80 mg/L (1)
IC = 0 (fraction of impervious cover)

Drainage Area	Area	Area	Rv	Precip Ann. Avg.	Load
	(sf)	(acres)		(in)	(lb/yr)
1	19,840	0.46	0.03	33	8.2
2	93,434	2.14	0.03	33	38.4
3	102,900	2.36	0.03	33	42.3
4	101,487	2.33	0.03	33	41.7
5a	12,360	0.28	0.03	33	5.1
5b	5,227	0.12	0.03	33	2.1
RWCT site	19,680	0.45	0.03	33	8.1
TOTAL					145.8

Notes
(1) TCEQ RG-348, p. 3-25.

POSTDEVELOPMENT LOAD

L = A * P * Rv * C * 0.226
Rv = 0.546 (IC)^2 + 0.328 * (IC) + 0.030
C = 170 mg/L (1)
IC = 0.9 (fraction of impervious cover)

Drainage Area	Area	Area	Rv	Precip Ann. Avg.	Load
	(sf)	(acres)		(in)	(lb/yr)
1	19,840	0.46	0.77	33	443.2
2	93,434	2.14	0.77	33	982.2
3	102,900	2.36	0.77	33	1081.7
4	101,487	2.33	0.77	33	1066.8
5a	12,360	0.28	0.77	33	129.9
5b	5,227	0.12	0.77	33	54.9
RWCT site	19,680	0.45	0.77	33	206.9
TOTAL					3965.6

Notes
(1) TCEQ RG-348, p. 3-24.

LOAD REMOVAL

Lr = L1 * Fraction of Site Treated * TSS Removal Efficiency
Lr = Load Removed (pounds)
L1 = Post development load (pounds)
Req'd TSS Reduction = (post development load - predevelopment load) * 0.8

Drainage Area	Pre Dev. Load	Post Dev. Load	TSS Removal Efficiency (1)	Post Development Load Removed	Required TSS Reduction
	(lb/yr)	(lb/yr)		(lb/yr)	(lb/yr)
1	8.2	443.2	0.85	376.7	348.0
2	38.4	982.2	0.85	834.8	755.0
3	42.3	1081.7	0.85	919.4	831.5
4	41.7	1066.8	0.85	906.8	820.1
5a	5.1	129.9	0.85	110.4	99.9
5b	2.1	54.9	0.85	46.7	42.2
RWCT	8.1	206.9	0	0.0	159.0
TOTAL	137.8	3758.7		**3194.9**	**3055.8**

Notes:
(1) TCEQ RG-348, p. 3-29.

The RWCT site does not have a vegetative filter strip due to space constraints.

The total TSS load removed by the vegetative filter strips exceeds the total required removal.

SECTION 02921

SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Seeding work encompasses areas disturbed by construction operations not indicated to be sodded.

B. Finish Grade Elevations: Work to establish finish grades is not specified in this section. Refer to Section - Soil Preparation.

1.2 SITE CONDITIONS

A. Verification of Dimensions: Refer to Section 02900, Soil Preparation.

B. Existing Conditions: Refer to Section 02900, Soil Preparation.

C. Obstructions: Refer to Section 02900, Soil Preparation.

D. Underground Utilities: Refer to Section 02900, Soil Preparation.

E. Existing Vegetation: Refer to Section 02900, Soil Preparation.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Landscape Irrigation System	Section 02442
Soil Preparation	Section 02900
Sodding	Section 02925
Exterior Plants	Section 02930
Landscape Maintenance	Section 02935
Treatment of Existing Trees	Section 02940

1.4 QUALITY ASSURANCE

A. Seeding installation or maintenance must be supervised by a staff member of the Contractor who possesses the current certification:

1. Certified Landscape Professional Contractor (CLPC) as administered by Texas Nursery and Landscape Association (TNLA).

B. It is the obligation of the Contractor to provide the Owner or Landscape Architect with documentation that the above qualification is met.

C. Source Quality Control:

1. General: Seeding materials shall meet or exceed the Specifications of Federal, State and local laws requiring inspection for plant disease and insect control.
2. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
3. Inspections: All necessary state, federal, and other inspection certificates shall accompany the invoice for each shipment or order for seeding materials as may be required by law. The Landscape Architect reserves the right to reject, at any time or place, prior to final acceptance of the work, any or all of the seeding materials which fail to meet requirements of these specifications.

D. The Landscape Architect reserves the right to inspect seeded areas from time of installation to Final Acceptance. The time of inspection shall be after the grass has gone unmowed for a minimum of two weeks. Any evidence of non-specified grasses or weeds will be cause for rejection and replacement of the unacceptable seeded areas.

1.5 SUBMITTALS

A. Furnish at Landscape Architect's office, prior to installation, the following samples:

1. Seed: Submit seed supplier's certification of grass species. Identify source location.
2. BioStimulant: Label from container or manufacturer's brochure.
3. Fertilizer: Label from bag or supplier's brochure and fertilizer analysis for seeded lawn areas.
4. Herbicide: Label from container or Supplier's brochure.
5. Mulching Agent: Label from bag and 1-ounce sample.

B. After completion of the project, submit the following:

1. Maintenance Instructions: See Section 02935- Landscape Maintenance for requirements.
2. Watering Schedule: See Section 02935- Landscape Maintenance for requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.7 ABBREVIATIONS

S.Y. Square Yard
S.F. Square Feet

1.8 JOB CONDITIONS

A. Basic Regulations: Seeding operations shall be conducted under favorable weather conditions during the seasons which are normal for such work as determined by acceptable practice in the locality. Contractor is hereby notified of active utilities and caution shall be exercised to avoid interruption of services. The Contractor is responsible for replacement of any buried utilities, irrigation lines, etc., if they are broken during the seeding operations. It is recommended that he contact the appropriate utility to get the locations of underground utilities. The replacement costs are at the Contractor's expense. When it is necessary to cross paved areas, curbing or walks, protection against damage shall be provided by the Contractor.

1. When conditions detrimental to grass growth are encountered during seeding , such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before seeding.

B. Planting Sequence: Seeding operations shall be conducted after final grades are established and after trees and shrubs are planted, unless otherwise acceptable to Landscape Architect. If planting of trees and shrubs occurs after seeding, protect seeded areas and promptly repair any damage resulting from planting operations

C. Plant trees and shrubs after final grades are established and prior to planting of grass areas, unless otherwise acceptable to Landscape Architect. If planting of trees and shrubs occurs after grass work, protect grass areas and promptly repair damage to grass areas resulting from planting operations.

D. Time Period of Seeding Operation: seeding of grass areas shall occur within the period of March 30 through September 1. Any additional work required, e.g. repair of erosion, weed control, temporary winter seeding, reseeding and any other work associated with the installation and germination/establishment of the grass, due to not completing the grass planting in this time period shall be fully borne by the Contractor.

1.9 WARRANTY & GUARANTEES

A. Contractor shall guarantee that at the end of the project warranty period, all lawn areas have established grass, are uniform in color and quality, and are reasonably free from visible imperfections. Any grass areas not in this condition will be replaced at no expense to the Owner.

B. The Contractor shall not be held responsible for damages to grass areas due to the Owner's neglect, the general building or other contractor's working on the site, application of fertilizers, pesticides or other materials not applied by him, or for damage caused by theft or vandalism.

C. Inspection to determine the condition of the grass areas prior to substantial completion of Project will be made by the Landscape Architect upon receiving such a request from the Contractor at a minimum of 30 days following acceptance of initial planting. Correction shall be as herein specified, and repeated until lawn is thoroughly established at all designated locations.

D. Repair: When any portion of the surface becomes gullied or otherwise damaged or treatment is destroyed, the affected portion shall be repaired to reestablish condition and grade of soil to as it was prior to injury as directed. Repair work required shall be performed without cost to the Owner. Repair shall be made within 10 days or as soon as weather conditions are satisfactory for planting.

PART 2 - PRODUCTS

2.1 SOIL ADDITIVES

A. Commercial Starter Fertilizers (Hydromulch Seeding): 13-13-13 or 15-15-15 water soluble fertilizer.

B. Lawn Fertilizer: 5-3-2 Soil Food manufactured by Gardenville (210)651-6115.

C. BioStimulant: Concentrated biostimulant liquid complex of vitamins, hormones, plant growth regulators, root growth stimulators with micronutrients and a non-phytotoxic wetting agent with analysis of poly-co-ferment liquid enzyme complexes (67.5%), kelp and fish extracts (9.00%), humic acid (2.00%), lignin polymers (1.5%), dimethylopyslioxone oxide and non-lonic surfactants (20.00%). Product Greenhouse Blend; manufactured by AgPro Systems, Inc. (800)946-5545.

D. Post-Emergence Herbicide: Round-Up by Monsanto Corp., or approved equal.

2.2 LAWN MATERIALS

A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and the Texas Seed Law.

1. Seed which has become wet, moldy or otherwise damaged in transition in storage will not be accepted. The seed shall not contain any objectionable foreign material that will hinder proper distribution. All seed shall have been treated with an approved fungicide by commercial or state laboratory not more than six months prior to date of planting.
2. All seeding rates to be Pure Live Seed (PLS). Minimum percent of PLS to be 85%. The seeds planted per acre shall be of the type specified with the mixture, rate and planting conditions as follows:
   a. Tall Native Grass Areas: Native grass mix consisting of Buffalograss, Sideoats Grama, Little Bluestem, Indian Grass, Tall Grama, Bushy Bluestem, Big Bluestem and Green Spangletop at a rate of 20#'s per acre. Distributed by Native American Seed, 127 N. 16Th St., Junction, Texas 76849, 1-800-728-4043. Time period March 1 thru September 1.
   b. Short Native Grass Areas: Native grass mix consisting of 66% buffalograss and 34% blue grama; seeding rate at 20#'s per acre. Time period March 1 thru September 1.

2.3 WILDFLOWER AREAS

A. Wildflower Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and the Texas Seed Law.

1. Seed which has become wet, moldy or otherwise damaged in transition in storage will not be accepted. The seed shall not contain any objectionable foreign material that will hinder proper distribution. All seed shall have been treated with an approved fungicide by commercial or state laboratory not more than six months prior to date of planting.
2. All seeding rates to be Pure Live Seed (PLS). Minimum percent of PLS to be 85%. The seeds planted per acre shall be of the type specified with the mixture, rate and planting conditions as follows:
   a. Wildflower Areas: Mix of wildflower seed consisting of Texas Bluebonnets, Drummond Phlox, Gayfeather, Indian Blanket, Lanceleaf Coreopsis, Purple Coneflower, Cutleaf Daisy, Huisache Daisy, Bush Sunflower, Lemon Mint, Lazy Daisy, Blackeyed Susan, Mexican Hat, Plains Coreopsis and Indian Paintbrush at a rate of ¼ #'s per 500 s.f.. Distributed by Native American Seed, 127 N. 16Th St., Junction, Texas 76849, 1-800-728-4043.

2.4 MISCELLANEOUS LANDSCAPE MATERIALS

A. Water: Furnished by the Contractor. Hose and other watering equipment to be provided by Contractor.

B. Mulching Agent: Provide Weyerhauser virgin wood fiber mulch, Silva-Fiber, distributed by James Lincoln Corp., Garland, Texas, 972/840-2440 or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Site Tolerances - Final grade of soil after seeding of grass areas is complete shall be one inch below top of adjacent pavement of any kind.

B. Broadcast Seeding - After grass areas are graded, sow seed with adequate equipment, by spreader or drill seeding machine, at time when wind velocity does not exceed 5 mph. Distribute seed evenly by sowing equal quantity in two directions at right angles to each other.

1. Top Dressing - After seeding, rake or broom seed in gently and roll area to firm in seed into top 1/8 inch of soil. After rolling, cover area evenly with top dressing of cellulose wood fiber at rate Per the following

    a. Mixture 1 (Standard Mix):
        1. 45#/1000 sq.ft. mulching agent
        2. 7.6#/1000 sq.ft. water soluble 13-13-13 fertilizer or 6.6#/1000 sq. ft. 15-15-15.
    b. Mixture 2 (for Slopes (over 6:1 or 17%) and Problem Areas):
        1. 50#/1000 sq.ft. mulching agent
        2. 7.6#/1000 sq.ft. water soluble 13-13-13 fertilizer or 6.6#/1000 sq. ft. 15-15-15.
        3. 1.5#/1000 sq.ft. glue agent

2. After Top Dressing - Thoroughly water seeded areas. Reseed areas that do not show prompt germination at 15 day intervals until an acceptable stand of grass is assured.

C. Wildflower Seed: after decomposed granite rings are compacted and graded to match final grading. Apply wildflower seed to decomposed granite rings by hand broadcast method.

1. Apply seed at a rate of ¼ #'s per 500 s.f. Seed area by evenly distributing seed over entire area using hand spreader/broadcast method. (SEE PLAN FOR AREA DETAIL).
2. After seeding rake seed into top ¼ inch of decomposed granite using firm bow

type rake. Roll entire area with roller to firm in seed.

3. Throughly water seeded area. Maintain water schedule to apply a 1 inch per week rate accounting for rainfall amounts. Reseed areas that do not show prompt germination at 15-day intervals until even distribution of seed germination is assured.

D. Apply four (4) fluid ounces/1000 s.f. Biostimulant to newly hydromulched areas. Contractor's option to include in original hydromulch slurry application.

E. Seed indicated areas and any areas beyond the areas indicated which are disturbed as a result of construction operations.

3.2 MAINTENANCE

A. Begin maintenance immediately after seeding. Maintenance shall continue for a total period of 90 days from the date of final acceptance of the project.

B. Three (3) weeks following completion of seeding, Contractor shall complete one additional application of BioStimulant as per manufacturer's recommendations.

C. Fertilization: 30 days following establishment of grass seed, fertilize the grass with lawn fertilizer at the rate of 10 pounds per 1000 square feet.

3.3 CLEANUP AND PROTECTION:

A. During seeding work, all debris shall be removed daily and the site kept neat at all times.

B. After seeding operations are finished, all paved areas, structures and etc. which may have become strewn with seeding materials shall be thoroughly cleaned by sweeping.

C. Protect other landscape work and materials from damage due to seeding operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged seeding work as directed.

3.4 INSPECTION AND ACCEPTANCE:

A. When seeding work is completed and established, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

1. A satisfactory stand of grass plants from the seeding operation for grass areas shall be a minimum 100 grass plants per square foot. Bare spots shall be a maximum 6 inches square. The total bare spots shall be a maximum 2 percent of the total seeded area.

B. Where inspected seeding work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by the Landscape Architect and found to be acceptable.

++END OF SECTION 02921++

SECTION 02442
LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

A. The work consists of installing a complete automatic underground irrigation system as shown on the drawings as hereinafter specified, including the furnishing of all labor, equipment, appliances and materials and in performing all operations in connection with the construction adjustment to ensure coverage and proper operations of the irrigation system. Irrigation work shall also include temporary irrigation in areas not covered by the automatic system.

B. The irrigation system shall be constructed using the sprinklers, valves, piping, fittings, etc., of sizes and types as shown on the drawings and as called for in these specifications. Spacing of the sprinkler heads is shown on the drawings and shall be exceeded only with the permission of the Landscape Architect.

C. Temporary irrigation shall be provided for the establishment of landscape areas not covered by the automatic irrigation system. Layout of the temporary system shall be coordinated with the requirements of the Landscape Contractor.

D. Closing-in Uninspected Work: This Contractor shall not allow or cause any of his work to be covered up or enclosed until it has been tested by the Contractor and observed and the system approved by the Landscape Architect. Should any of his work be enclosed or covered up before such inspection, and/or testing, he shall uncover his work. After it has been tested, observed and approved, backfill as required.

1.2 SITE CONDITIONS:

A. Verification of Dimensions: All scaled and figured dimensions are given for estimate purposes only. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and sizes, etc., and shall assume full responsibility for the correctness of all such items.

B. Existing Conditions: New work shall be tied to existing conditions and controls such as water lines and pipe. Finished grades shall bear proper relationship to such controls. The Contractor shall adjust new work as necessary and as directed to meet existing conditions and fulfill intent of the plans.

C. Point of Connection: For water supply to irrigation system, provide and install a dedicated irrigation water meter and backflow preventer.

D. Verification of Water Pressure: Prior to installing irrigation system, the Contractor shall verify actual on-site water pressure from the source. This pressure reading must exceed design static pressure by 10%. If on-site pressure does not meet this requirement, the Contractor shall notify the Landscape Architect for resolution. Do

not willfully proceed with construction as designed when it is obvious that pressure problems exist. The Irrigation Contractor shall assume full responsibility for all necessary revisions due to failure to give such notification.

E. Obstructions: If any unknown utilities and obstacles are encountered during the construction period, stop work and immediately contact the Owner's Representative and Landscape Architect before proceeding. Such obstructions shall be removed or relocated or the work adjusted as directed by the Landscape Architect. If work proceeds without contacting the Landscape Architect, the Contractor shall be held liable for any and all damages.

F. Underground Utilities: Prior to initiating any trenching, the Contractor shall contact the appropriate authorities in order that their personnel can locate underground utilities that may be encountered.

G. Applicable Codes: Install system according to applicable local and N.E.C. electrical codes, ordinances and regulations. Any permits required for inspection and installation shall be obtained and paid for by the Contractor. The Contractor will also arrange for any required inspections by local authorities during the course of the construction.

H. Permits: Any permits or approvals required for inspection and installation shall be obtained and paid for by the Contractor.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

Soil Preparation, Section 02900.
Seeding, Section 02921.
Sodding, Section 02925.
Exterior Plants, Section 02930.
Landscape Maintenance, Section 02935.
Treatment of Existing Trees, Section 02940.

1.4 SUBMISSION FOR APPROVAL:

A. The Contractor shall furnish the articles, equipment, materials or processes specified by name in the drawings and specifications. No substitutions will be allowed without prior approval by the Landscape Architect. If the Contractor desires consideration of "approved equal" material substitution, he shall furnish performance data and shop drawings for any changes required to the arrangement and spacing of the sprinkler heads or modification to any other component of the irrigation system.

B. The following procedures shall be used to obtain approval of a substitute sprinkler as an equal:

1. Actual samples of each type of sprinkler head proposed as a substitute.
2. Manufacturer's catalog sheet showing full specifications of each type

sprinkler proposed as a substitute, i.e., discharge in GPM, minimum allowable operating pressure at the sprinkler, maximum allowable spacing and distance of throw (coverage).

3. Detailed pressure loss computations based on the consumption of the proposed substitute sprinkler, if the manufacturer's specifications show than any one of the three characteristics in the above paragraph is a variance with the specified sprinklers. These pressure loss computations must prove that the proposed substitute sprinkler will perform in accordance with the intent of the designed sprinkler system either with the same piping and head layout design or with a change of either. (If design change is required, detailed drawings must accompany the request for approval of the substitute.) The detailed pressure loss computations must encompass the following:
   a. The total design pressure is defined as maximum pressure required to overcome all pressure losses and leave a residual pressure at the sprinkler not less than the manufacturer's minimum pressure requirement.
   b. Pressure loss computations must be based on an acceptable table of pressure losses for the type and size pipe to be used.
   c. All pressure loss tables are for straight pipe only, and an acceptable allowance must be made for the additional losses incurred in fittings.
   d. Allowance must be made for the pressure drop through all valves based on the specifications of the manufacturer of each type valve.
4. The decisions of approval or disapproval will be based on the comparative ability of the sprinkler to perform fully all purposes and functions of mechanics and general design and construction material considered to be possessed by the sprinkler.
5. Approval of a substitute sprinkler shall not relieve the Contractor of his responsibility to demonstrate that the final installed sprinkler system will operate according to the intent of the originally designed and specified system.

1.5 ADJUSTMENTS AND TESTS:

A. Before final acceptance of the installed system, the Contractor shall make the .

1. Tests:
   a. The piping system from the point of connection to the zone valves shall be tested under normal working pressure for a period of 48 hours. If leaks occur, the joints shall be replaced and the tests repeated. The pressure test shall be completed prior to backfilling; however, sufficient backfill material may be placed between fittings to ensure stability of the line under pressure. In all cases, fittings and couplings shall be open to visual inspection for the duration of the test.
   b. After completion of grading, grass planting and rolling of grass areas, carefully adjust lawn sprinkler heads to be flush with or not more than 1/2-inch above the finish grade.

c. Each section of sprinkler shall be tested for 100% coverage of each area and designed overlap between sprinklers.

d. The operating pressure of each section of sprinklers shall be tested by the following method:

e. Install pressure gauge at the base of the sprinkler most distant from the zone valve, in terms of the length of piping through which the water must flow to reach the sprinkler. This sprinkler must operate during the test.

f. With the section of sprinklers operating, throttle the zone valve until the pressure gauge at the most distant sprinkler reads according to the following:

1.) Adjusted Design Static Pressure- 65.0 PSI
2.) Spray Zones- 30 PSI
3.) Rotary Zones- 50 PSI
4.) Bubbler Zones- 30 PSI

B. Adjust and balance the pressure throughout the entire system.

C. All tests shall be observed and approved by the Landscape Architect or designated representative.

D. Contractor shall provide written notice of request for observation to the Landscape Architect a minimum of forty-eight (48) hours prior to testing.

1.6 CONTROL OF WORK:

A. The Landscape Architect shall, during construction, decide all questions relative to the quality of workmanship and materials furnished.

B. The Landscape Architect shall decide all questions relative to the interpretation of the drawings and specifications and the acceptable fulfillment of the contract.

C. The Contractor shall proceed with the increased, decreased or altered work only upon duly prepared and executed Change Order by the Owner.

D. Provisions by Others: If some portion of the work is to be provided by others, such as sleeves or electrical power to controller, to locations as shown on plans, the Contractor shall coordinate the exact locations of such with the General Contractor and others as required.

E. On site observation: At any time during the installation of the irrigation system, the Landscape Architect may visit the site to observe work underway. Upon request, the Contractor shall be required to uncover specified work as directed by the Landscape Architect without compensation. Should the material, workmanship or method of installation not meet the standards specified herein, the Contractor shall replace the

work at his own expense.

F. Contractor Qualifications: All work shall be installed by skilled personnel, proficient in the trades required, in a neat, orderly and responsible manner with recognized standards of workmanship. The Contractor must be a current licensed irrigator of the State of Texas.

G. Explanation of Drawings:

1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and other construction on site.
2. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.
3. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in design. Such obstructions or differences should be brought to the attention of the Owner's authorized representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revisions necessary.
4. Contractor shall be responsible for all costs involved with work.

1.7 SUBMITTALS:

A. Furnish to the Landscape Architect, prior to installation, the following:

1. Pressure Verification Letter: Verification of on-site static water pressure on Company Letter Head.
2. Certification: Copy of Irrigator's License on Company Letter Head.
3. Equipment and materials - Manufacturer's catalog sheets, clearly identified to which product is to be used.
4. Layout of temporary irrigation.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Abbreviations:

1. P.V.C. Polyvinyl Chloride

2. N.S.F. National Sanitation
3. P.S.I. Pounds Per Square Inch
4. I.P.S. Iron Pipe Size
5. N.E.C. National Electrical Code

B. P.V.C. pipe: Lateral piping shall be ANSI/ASTM D1785. All P.V.C. pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, class or schedule, type and number established by commercial standards: Main supply line Schedule 40, PS21-70, ASTM D1785-68; lateral shall be Class 200 for 3/4-inch to 3-inch piping and class 315 for 1/2-inch piping. 4-inch and larger irrigation main line shall be belled-spigot type, Class 200, SDR21 PVC.

C. Metal Pipe: Galvanized steel pipe; ASTM A 120, Schedule 40.

D. Fittings:

1. PVC Fittings: Fittings shall be Schedule 40 when joining PVC to PVC and Schedule 80 when joining PVC to metal.
2. Ductile Iron: For mainline 4" and larger provide push on, deep socket joint, ductile iron fittings, ASTM Grade 70-50-05, as manufactured by Harco, Lynchburg, Va.
3. Steel Pipe: ANSI B16.3 galvanized malleable iron screwed fittings.

E. Flexible PVC Tubing: Flexible PVC tubing shall be I.P.S. heavy wall hose meeting or exceeding schedule 80 wall thickness in conformance with ASTM D2887 and tested in accordance with ASTM D1598 as manufactured by AG-Products, Winter Haven, Florida.

F. Swing Joints and Nipples: Provide threaded and gasketed schedule 80 PVC 3-way swing joints and nipples.

G. Manual Valves:

1. Three (3) inches and smaller: Manual cut-off/isolation valves where indicated on the drawings shall be gate valves made in the USA and constructed of highest grade cast bronze body with screw-in bonnet, non-rising stem, solid wedge disc, cast iron handwheel 200 lb. WOG.

2. Four (4) inches and larger: Shall be made in the USA and constructed of iron body, bronze mounted, double disc with parallel or inclined seats, non-rising stem type turning counter clockwise to open, 200 lb. WOG.

3. Ball Valve: Manual cut-off/isolation valves where indicated on the drawings shall be schedule 80 PVC ball valves with union connection at both ends of valve sized same main line.

a. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Nibco Inc.
Dura Plastic Products, Inc.
Spears Mfg. Co.

H. Remote Control Valves: Refer to plans for size, model and location. Provide with pressure regulating module. Pressure at valve must be checked after installation and recorded on "as-built" drawings. Provide pressure hose gauge assembly Rain Bird PHG.

I. Backflow Preventer: Febco reduced pressure assembly with union end ball valves model 860 U-2" by CMB industries or approved equal.

J. Sprinkler Heads and Nozzles: Refer to plans for types, model, radius, arc, etc., and location of tree bubbler, lawn and shrub, spray and rotary sprinkler assemblies.

K. Valve Boxes:

1. Manual valve boxes, quick coupler shut-off valve boxes, and splice boxes shall be Ametek 10" circular series valve box with non-bolt cover and extension(s) as required or approved equal.
2. Remote control valves shall be Ametek standard rectangular control valve box with cover and extension(s) as required.

L. Drainage Backfill: Cleaned gravel or crushed stone, graded from 1-inch maximum to 3/8-inch minimum.

M. Filter Fabric: Continuous filament, non-woven needle punched, polypropylene, porous garden fabric such as Earth Felt by Soil-Tec, Inc. or approved equal.

N. Automatic Control System: ICC series controller with painted metal cabinet manufactured by Hunter Industries, Inc. refer to plan for model information and location. Provide the number of modules required to accommodate the number of zones indicated on plan. Install SmartPort connector within 50' of controller per manufacturer's recommendations utilizing SRR-SCWH shielded cable wiring harness.

O. Wire: Underwriters' Laboratories approved for direct underground burial on NEC Class II circuits 4/64 vinyl-insulated.

P. Valve Wire Hook-ups/Splice Connector: Valve wire hook-ups/splices shall be Wade Connectors WC10, WC-14R and WC-16; size as required for application by Wade Enterprises, San Antonio, Texas 210.694.0203.

Q. Pressure Reducing Valve: Bronze water pressure regulating valve with 300 lbs. max rating with adjustment within range required for performance of system within 10% of adjusted design static pressure; to be verified by Contractor.

R. Weather Sensors:

1. Rain Override Device: Hunter, Mini-Clik-C; refer to plan for location.
2. Freeze Sensor: Hunter, Freeze-Clik-REV; refer to plan for location.

S. Remote hose bib quick coupler:

1. Site: 44LRC quick coupling valve and 44K key by RainBird with SH-2 hose swivel or approved equal.

2. Vegetative Filter Strip: 44 RC quick coupling valve and 44 key with 65JADJ-TNT with 16 nozzle by RainBird or approved equal.

T. I.D. Tag: Christy's standard valve I.D. tag numbered to identify remote control valve sequence.

U. Remote Control Unit: Remote control unit complete ICR-KIT including transmitter, receiver, wiring harness and 4AA alkaline batteries manufactured by Hunter Industries, Inc.

2.2 SOLVENTS, CEMENTS, PRIMERS AND JOINT COMPOUNDS:

A. General: All solvents, cements, primers, and joint compounds shall be approved for use by the Uniform Plumbing Code; ASTM D 2564 for PVC pipe and fittings. Utilize appropriate type for application required.

1. Primer- Weld-On #P70 purple primer.
2. PVC- IPS Weld-On #721 solvent cement; color blue.
3. Flexible PVC- Weld-On #795 solvent cement; color gray or white.
4. Schedule 80 PVC- Weld-On #705

B. Connections for PVC and Metal Pipe and Metal Pipe to Metal Pipe: For all threaded connections use Heavy Duty Rectorseal thread sealing paste with virgin Teflon No. 100 as manufactured by Rectorseal Corp., Houston, Texas. Apply in accordance with manufacturer's instructions.

2.3 OTHER MATERIALS:

A. All other materials, not specifically described but required for a complete and proper irrigation system installation, shall be new, first quality and subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 TRENCHING AND BACKFILLING:

A. General: The Contractor shall verify on-site static water pressure and layout and verify all dimensions on the site prior to proceeding with work under this contract.

1. Contractor shall layout and flag locations of all heads. Locations shall be approved by Landscape Architect, upon being given a minimum forty-eight (48) hours notice as to when layout will be ready for review. If Contractor installs irrigation work without review of the head layout, any modification to the head locations requested by the Landscape Architect shall be done at the Contractor's expense.

a. Obtain coverage test approval from Landscape Architect prior to initiation of any landscape planting work.

2. Extreme care shall be exercised in excavating and working near existing utilities. Check mechanical, electrical and plumbing drawings for location of new and existing utilities.

B. No machine trenching is to be done within dripline of trees. Trenching is to be done by hand or by tunneling under root system by method approved by Landscape Architect. It is understood that the piping layout is diagrammatic and piping shall be routed around existing plant material in such a manner as to avoid damage to plants. Where tree roots are encountered, no root over 3/4-inch in diameter shall be cut. Any cuts made shall be clean cuts without frayed ends.

C. Property Line: Mainline pipe, wires and valves shall be trenched inside of property line.

D. Alignment: Trenches shall be dug straight, and pipe shall have the continuous support of the ditch bottom and shall be laid to an even grade. Trenching operations shall follow the layout indicated on the drawings. Deviations will be allowed to avoid obstructions.

E. Protection: Protect existing trees and other vegetation to be retained. Replace damaged plants with new to match existing.

F. Trench Depth: Excavate trenches to a depth of 3 inches below invert of pipe and to minimum cover over top of installed piping:

1. Main supply lines - 18 inches to top of pipe.
2. Lateral supply lines - 12 inches to top of pipe.
3. Lines under paving - 18 inches inside PVC sleeve unless indicated otherwise.

4. Maximum depth to all piping shall not exceed 24".

G. Backfill:

1. Initial backfill on all lines shall be a sand "envelope" 3 inches below, around and above pipe.
2. Complete backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than ½ inch diameter.
3. Backfill to be compacted to dry density equal to the adjacent grades, without dips, sunken areas, humps or other irregularities.
4. Under no circumstances shall trenches be compacted by wheel rolling the ditch line.
5. Contractor shall be responsible for all and any settling of trenches from his work following the site planting.

H. Sleeves: At new walkways, concrete and asphalt pavement (and elsewhere as required), provide PVC sleeves 18 inches minimum/24" maximum below bottom of paving materials; not all locations are indicated on plan.

1. Provide Schedule 40 PVC sleeves sized equal to twice the diameter of the pipe or combination of pipes enclosed within the sleeve. Extend sleeve 24 inches beyond edge of pavement at both ends.
2. Pipe with joints in sleeves shall be bell end only, no couplers, and all bells shall be oriented the same direction.
3. Dimensioned locations of all sleeves are to be shown on as-builts.

I. Sleeves in Pavement: At walks or other paved surfaces where sleeves have not been provided, bore beneath pavement if possible. Where existing pavement must be cut to install landscape irrigation system:

1. Saw cut pavement smoothly to straight lines 8 inches wider than trench (4 inches each side of trench).
2. Excavate trench to required depth and width.
3. Remove cut out pavement and excavated material from the site.
4. Backfill with flowable fill to bottom of existing aggregate base. Install and compact aggregate base to match the depth of the existing base.
5. Repair or replace pavement cuts with equivalent materials and finishes to be flush with adjacent surface.
6. In concrete paved areas, repairs shall be reinforced to match existing concrete pavement and doweled to the adjacent slab in a manner acceptable to the Landscape Architect.

J. Existing Grass Areas: Where trenching is required across existing grass areas:

1. Backfill trench and prepare the soil preparation per 02900 - SOIL PREPARATION.

2. Seed and establish grasses to restore area per 02921 - SEEDING.

3.2 INSTALLATION:

A. General: The Contractor shall, before starting work on the irrigation system, carefully check on-site static water pressure and all finish grades to satisfy himself that he may proceed with the work. Comply with requirements of the Uniform Plumbing Code and Texas Irrigators Advisory Council.

1. Provide all equipment as necessary and as appropriate for the installation. Contractor shall coordinate with other trades as required to accomplish the installation. Make adjustments as may be required to irrigation system to insure optimum operation of the system.

B. Connection to Main: Connect to existing water source at location indicated on the drawings. Maintain uninterrupted water service to surrounding existing facilities during normal working hours. Arrange for temporary water shut-off with appropriate authorities a minimum of 24 hours prior to work.

C. Piping Layout: Piping layout as indicated on the drawings is diagrammatic. Deviate where necessary to avoid obstacles. Install lines in such manner as to conform with the various details without altering the sequence of the various assemblies occurring along the pressure supply line.

D. Multiple Assemblies: No multiple assemblies shall be installed on plastic lines. Each assembly shall be provided with its own outlet.

E. Assemblies: All assemblies specified herein shall be installed in accordance with the respective details. In the absence of details, drawings or specifications pertaining to the specific items required to complete the work, the Contractor shall perform such work in accordance with the best standard practice and to the satisfaction of the Landscape Architect.

F. Backflow Preventer: Connect water supply of irrigation system to water source indicated on MEP drawings. Install backflow preventer as detailed and per applicable codes; provide clearances as required. Utilize metal pipe for piping exposed above grade. Provide dielectric fitting for connection of backflow preventer to piping. Provide protective plastic wrap for steel pipe below grade.

G. Pressure Reducing Valve: Install pressure reducing valve after backflow preventer and prior to master control valve in separate valve box when existing static pressure as to be verified by Contractor exceeds design static pressure by ten (10) percent.

H. Controller: Install automatic controller at location as indicated on plan. Coordinate provision of electrical requirements with others as required.

I. Remote Section Valves: Install in valve box, arranged for easy adjustment and removal. Provide 1" clearance between pipe and valve box (cut and sand smooth valve box as required).

1. Install with pressure regulator per manufacturer's requirements.
2. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
3. Install manual cut-off/isolation valve upstream of control valve and locate within valve box.
4. Install ID tags at solenoid wires to identify station.

J. Manual Valves: Install manual valves in valve box; set valve box flush with grade.

K. Quick Coupler Valves: Install quick coupler valves with manual shut-off valve within valve box as detailed.

L. Wire: Install with 6 curl expansion curls at all valves, at changes in direction of the pipe, at 150 foot intervals on long pipe runs, and at controllers. Wire is to be placed carefully in the controller box. Wires are to be snaked in the trench to allow for expansion and contraction.

1. Each valve is to have two wires. One wire shall be a station control valve power wire and shall not be smaller than No. 12, Type UF, and shall be a solid color (other than white). The second wire shall be a common neutral wire from each controller to each of the valves served by each particular controller. The common neutral wire shall not be smaller than No. 10 Type UF, with white insulation. Color coding is for identification purposes only.
   a. Wires for future use or for spare wires are to be different color than common and valve wires.

2. Install two (2) extra control wires from controller to the remote control valves located the greatest distances from the controller in all directions and label as spare wires. Spare wires shall be a different color than the common and valve wires. Provide a minimum 6' length of wire coiled up in valve box.

3. Wires installed for future use shall be placed in a separate valve box of the same type specified for remote valves at a location(s) indicated on the plan. Provide a minimum 6' length of wire coiled up in valve box.

4. Contractor shall clearly and permanently label each end of the wires for section identification at the controller and section valve box. Install I.D. tags within valve box.

5. Wire splices are to be made only at the valves. When repairs or other situations require wire splices, at location other than at valves, all additional splices shall be placed in the same type box specified for remote valves.

a. All splices must be brought to the attention of the Landscape Architect. Location to be recorded and dimensioned on as-built record drawing.

6. Secure wires together at 10-foot intervals maximum and place under main line; utilize nylon "TP-WRAPS".

7. Where control wire leaves main or lateral line, enclose wire in Class 200 PVC conduit.

8. Routing of all wiring is to be recorded on as-builts.

M. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions. Do not lay pipe in water or mud. Keep ends of pipe securely closed when work is not in operation to prevent water or other matter from entering lines.

1. Lay all pipe with material designations pointing up to accommodate visual verification.

2. Clean interior of pipe thoroughly and remove all dirt or foreign matter before lowering pipe into trench and keep clean during operation by plugs or other method. The ends of all pipe shall be reamed out full size. All off-sets shall be made with fittings. All water lines shall be thoroughly flushed out before the nozzles are installed.

3. Long runs of PVC pipe shall be slightly snaked in the trench to allow for contraction.

4. Replace any pipe that is found to be defective.

5. All sprinkler lines in a common trench shall have a minimum clearance of 4 inches from each other when parallel and 6 inches between sprinkler lines and supply main lines.

6. Install no more than two lines in a common trench.

N. Fittings: Install all fittings a minimum distance of four (4) times pipe size from other fittings or equipment.

O. Penetrations: At penetrations, through walls, building, foundation and etc., core drill for conduits size as required. Pack the opening around pipe with non-shrink grout. At exterior face, leave a perimeter slot approximately 1/2-inch wide by 3/4-inch deep. Fill this slot with backer rod and an acceptable elastomeric sealant. Repair below grade waterproofing disturbed by this work and make penetration watertight.

P. Temperature: Install PVC pipe in dry weather when temperature is above 40 degrees F (4 degrees C) in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40 degrees F (4 degrees C) before testing, unless otherwise recommended by manufacturer.

Q. Thrust Blocks: All main line pipe 4" and larger shall have thrust blocks installed at all fittings installed on the main line. Install per pipe manufacturer's requirements. Care shall be taken by the Contractor to keep all concrete on the fittings and from joints of pipe. Control, power and valve wires must be kept free of concrete by the Contractor and placed outside of the thrust. Thrust blocks shall be poured against undisturbed ground. No precast thrust blocks will be allowed.

R. Drain Pockets: Excavate to size required for valve box type or as indicated. Backfill with acceptable drainage backfill material. Create envelope completely around drainage backfill material with a sheet of filter fabric and backfill remainder with excavated material.

S. Part Circle Spray Heads: Locate part-circle heads to maintain a minimum distance of 6 inches from walls and 4 inches from walks and other boundaries, unless otherwise indicated.

T. Part Circle Rotary Heads: Locate part-circle rotary heads to maintain a minimum distance of 12 inches from walls, walks and other boundaries, unless otherwise indicated, locate 12 inches from building walls.

U. Tree Bubbler Heads: Coordinate location of tree bubbler heads and laterals with Landscape Contractor. Make adjustments as may be required in field for installation of trees at no additional cost to Owner.

V. Dielectric Protection: Use dielectric fittings at connection where pipes and products of dissimilar metal are joined.

W. Remote Control Unit: Install remote control unit at controller per manufacturer's instructions.

X. Weather Sensors: Place weather sensors on weatherproof J-Box as detailed on plan. Utilize schedule 80 PVC conduit and fittings to extend rain sensor 12" minimum beyond fascia/gutter. Location is to be approved by Owner, Architect and Landscape Architect. Coordinate with other trades as required for installation of ½ inch diameter galvanized rigid metal conduit from controller to weather sensors. Securely fasten to conduit wall by means acceptable to Landscape Architect.

3.3 TEMPORARY IRRIGATION SYSTEM:

A. Provide a temporary irrigation system for the establishment of landscape areas/surface vegetation not covered by the automatic irrigation system. Coordinate

with the landscape contractor to provide and ensure the appropriate coverage for the establishment period of the landscape areas/surface vegetation. Submittal of shop drawing of design of temporary system for review by Landscape Architect is required. Provide the temporary irrigation system as per the following:

1. Utilize the new irrigation system distribution main line as the water source. Locate supply points for the temporary system as deemed appropriate. All supply points shall be controlled by schedule 80 PVC ball valves. The ball valves shall be below grade in the same valve boxes used for remote control valves. Ball valves at the supply points shall remain in place after temporary system is removed.
2. The system shall operate manually or automatically as per the Contractor's discretion. If manually operated, use schedule 40 PVC ball valves for the section manual control valves. Use of 9 volt activated control valves to operate sections is at discretion/option to Contractor.
3. Mainline and lateral piping shall be class 200 PVC. All piping is to be installed above grade. Stake and/or cap the pipes with an appropriate amount of concrete as to provide a stabilizer for the pipe and to prevent any physical movement of the pipe.
9. Utilize RainBird 2045 PJ Maxi-Bird impact rotary heads or equal at a spacing not to exceed the performance of the standard nozzle installed. At smaller areas, utilize RainBird PA-8S shrub adapter with appropriate nozzle or equal on a PVC riser. Maximum size of each section shall be determined by the Contractor; zones shall not exceed total GPM flow of largest zone or total combined flow of linked sections as identified on plan.
10. Install the system so as not to throw any water onto the paved areas of roadways or parking lots. Minimum water throwing into native areas will be acceptable.
11. Operation of the temporary irrigation system shall be coordinated with the scheduling of the automatic irrigation system so as not to impede the performance of the automatic system.

3.4 CLEAN UP:

A. All ground surfaces where trenches have been cut will be leveled, debris removed; rubbish, materials of construction and equipment at the site shall be removed at the time of Final Inspection.

3.5 FINAL INSPECTION:

A. Notify the Landscape Architect, in writing, upon completion of the work and arrange for date of Final Inspection. Provide notice a minimum of 48 hours in advance of desired date of inspection.

B. Demonstrate to the Landscape Architect that all components of the entire system are operating properly and that all work has been completed in accordance with the plans

and specifications. Refer to TESTS this section.

3.6 ITEMS TO BE FURNISHED:

A. The Contractor shall provide as part of the work of this Section, the following:

1. Watering Schedule: The watering schedule includes the duration and frequency each irrigation zone will run per week and the resulting precipitation rate to be expected. This will be worked out jointly with the Landscape Contractor and shall be programmed on to the controller after review by the Landscape Architect.
   a. Produce water schedule for landscape at a maximum of 80% ET (evapotranspiration) as determined by the local ET.
2. Two (2) sets of sprinkler wrenches for adjusting, cleaning or disassembling each type of sprinkler; two (2) each of any special tools required for any other equipment shall also be furnished.
3. Two (2) service manuals for all equipment used shall be furnished to the Owner. Manuals may be loose-leaf and should show drawings or exploded views of equipment and catalog number and prices. Operating instructions for all equipment shall also be furnished.
4. Two (2) valve keys each for operating gate valves, both cast iron and brass.
5. One (1) quick coupling key with hose swivel of the proper size for every three (3) quick coupler valves.
6. Four (4) pop-up spray heads each type (standard and high-pop) and four (4) nozzles of each type installed.
7. Four (4) rotary heads of each type installed.
8. Irrigation Installation Certification Letter: Letter of certification by Licensed Irrigator certifying the irrigation system was installed in accordance with the irrigation plan.
9. One (1) pressure hose gauge assembly.

3.7 RECORD DRAWINGS:

A. The Contractor shall keep up-to-date, a complete "as-built" record set of blueline prints, corrected daily, showing any changes from the original plans. Record shall indicate dimensioned locations and depths below grade of all buried lines and equipment.

1. Drawings are to indicate wire routing layout (active, spare and future wires).
2. Dimensioned locations of all sleeves.
3. Dimensioned locations of all wire splice boxes.
4. Dimensioned locations of all remote control valves.
5. Dimensioned locations of all quick couplers.

B. Upon completion of the Project, provide the Landscape Architect with the "As Built" record drawings of changes to the work. The changes shall be recorded in a legible

and workman-like manner on a reproducible mylar or vellum.

3.8 SYSTEM INSTRUCTIONS:

A. Zone Map: Provide and locate on the wall next to the Controller a plastic laminated wood framed drawing at 50 percent reduced scale of overall plan image and valve schedule of the installed system showing the areas controlled by the controller identifying the location of the valves and the station number assigned to each. Drawing shall indicate color coded area of coverage per each zone and location of supply main and taps; colors to be coordinated and shown on the valve schedule.

B. When completed and approved, chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils thick, and placed in an appropriate wood frame over a stiffened back. Charts must be completed and approved prior to final inspection of the irrigation system.

C. Instruction Session: After the system has been completed, inspected and approved, conduct a training session for the Owner's maintenance personnel in the operation and general maintenance of the irrigation system. This will also include a review of the manuals to be furnished to the Owner as called for elsewhere in these specifications and field demonstrations of system components assembly and maintenance.

3.8 GUARANTEE:

A. The entire sprinkler system shall be guaranteed by the Contractor as to materials and workmanship, including settling of backfilled areas below grade for a period of one (1) year following date of final acceptance of the work.

1. Should any operational difficulties in connection with the irrigation system develop within the specified guarantee period, which, in the opinion of the Landscape Architect or Owner may be due to inferior material and/or workmanship, said difficulties shall immediately be corrected by the Contractor to the satisfaction of the Owner, at no additional cost.

3.9 TEMPORARY REPAIRS:

A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibility under the terms of the guarantee as herein specified.

++END OF SECTION++

SECTION 02935

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z60.1 (1990) Nursery Stock.
2. ANSI Z133.1 (1994) Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3. ANSI A300 (1995) Tree, Shrub and Other Woody Plant Maintenance-Standard Practices.

1.2 DESCRIPTION OF WORK

A. Maintenance of the landscape to be provided. Contractor shall provide maintenance for a period of 90 days after Final Acceptance.

B. Maintenance of vegetative filter strips.

1.3 SITE CONDITIONS

A. Verification of Dimensions: Refer to section 02900 - Soil Preparation.

1.4 RELATED WORK SPECIFIED ELSEWHERE

Landscape Irrigation System	Section 02442
Soil Preparation	Section 02900
Seeding	Section 02921
Sodding	Section 02925
Exterior Plants	Section 02930
Treatment of Existing Trees	Section 02940

1.5 QUALITY ASSURANCE

A. Landscape installation or maintenance must be supervised by a staff member of the Contractor who possesses the current certification:

Certified Landscape Professional Contractor (CLPC) as administered by Texas Nursery and Landscape Association (TNLA).

B. It is the obligation of the bidder to provide the Landscape Architect with documentation that the above qualification is met.

C. Source Quality Control:

1. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.

1.6 SUBMITTALS

A. After completion of the project, submit the following:

1. Maintenance Instructions
2. Watering Schedule

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.8 JOB CONDITIONS

A. Maintenance operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by acceptable practice in the locality.

PART 2 - PRODUCTS

2.1 MATERIALS - Refer to respective landscape sections for applicable materials.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

A. Maintain trees, shrubs and other plants by pruning removal of dead wood, cultivating, watering, weeding and mulching as required for normal, healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

B. Maintain grass areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable grass, free of eroded or bare areas (no one bare area greater than 6 inches square in seeded areas). Mowing shall be accomplished to maintain buffalograss at a 1-3/8- to 1½-inch height. Mowing shall not remove more than 1/3 height of the grass at each mowing.
   1. Do not mow native grass seeded areas.
   2. Water grass areas to provide an equivalent of 1 inch of water per week in consideration of natural rainfall received.

C. Fertilize all lawn areas within the project limits, including any renovated grass areas, 30 days following initial installation with lawn fertilizer at rate of 10 pounds per 1000 square feet.

D. Three (3) weeks following completion of landscaping/seeding/sodding, Contractor shall complete one additional application of Biostimulant. Apply Biostimulant at the rate of 4 fluid ounces per 1000 square feet as per manufacturer's instructions.

3.2 VEGETATIVE FILTER STRIP MAINTENANCE

A. Contractor is responsible for the following requirements concerning the maintenance of vegetative filter strips from initial planting through the 90 day period after Final Acceptance; thereafter, maintenance is responsibility of Owners.

B. Pest Management: Provide an Integrated Pest Management (IPM) Plan for vegetated areas. Specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

C. Seasonal Mowing and Grass Care: Mow as needed to limit vegetation height to 4 inches, using a mulching mower (or removal of clippings). For native grasses, mow a minimum of twice annually. Grass clippings and brush debris shall not be deposited on vegetated filter strip areas. Regular mowing shall include weed control practices; herbicide use kept to a minimum. Provide supplemental irrigation as required to assure a dense and healthy vegetative cover.

D. Inspection: Inspect filter strips at least twice annually for erosion or damage to vegetation; additional inspection after periods of heavy runoff is required. The strip shall be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. Provide frequent inspections of the grass cover during the first few years after establishment to determine if any problems are developing; plan for long-term restorative maintenance needs. Replant and restore bare spots and areas of erosion identified during semi-annual inspections to meet specifications.

E. Debris and Litter Removal: Filter strip structures shall be kept free of obstructions to reduce floatables being flushed downstream. Debris and litter

removal shall be performed no less than 4 times per year.

F. Sediment Removal: Excess sediment along the upstream boundary of the strip shall be removed by hand or with flat-bottomed shovels. Dispose of sediments off-site. Some sediment may be considered hazardous waste or toxic material; comply with restrictions for proper disposal off-site.

G. Grass Reseeding and Mulching: A healthy dense grass shall be maintained on the filter strip. Fill, compact and reseed so that the final grade is level. Grass damaged during the sediment removal process shall be promptly replaced using the same seed mix used during filter strip establishment. Flow shall be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections shall be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting shall be done more frequently in the first two to three years after installation to ensure stabilization. Provide supplementary irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

3.3 MAINTENANCE INSTRUCTIONS

A. Maintenance Instructions: Submit typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape areas and vegetative filter strips over the first year. Instructions shall present maintenance procedures/activities to be implemented over a one year period on a month by month basis.

B. Watering Schedule: The watering schedule is to include the duration and frequency each irrigation zone will run per week. This will be worked out jointly with the Landscape Irrigation Contractor and shall be programmed on to the controller after review by Landscape Architect. Program shall be submitted to the Owner as part of the final acceptance process.

3.4 CLEANUP AND PROTECTION

A. During maintenance period, all debris shall be removed daily and the site kept neat at all times.

B. After maintenance operations are finished, all paved areas which may have become strewn with soil or other material shall be thoroughly cleaned by sweeping, and if necessary, power washing.

C. Protect landscape work from damage due to maintenance operations, operations by other contractors and trades and trespassers. Treat, repair or replace damaged landscape work as directed.

3.5 INSPECTION AND ACCEPTANCE

A. When maintenance period is complete, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the Owner's Representative or Landscape Architect and found to be acceptable.

++END OF SECTION 02935++

SECTION 02940

TREATMENT OF EXISTING TREES

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z60.1 (1996) Nursery Stock.
2. ANSI Z133.1 (1994) Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3. ANSI A300 (1995) Tree, Shrub and Other Woody Plant Maintenance- Standard Practices.

1.2 DESCRIPTION OF WORK

A. The work covered by these Specifications consists of operation in connection with protection, pruning and feeding of existing trees to be saved within the limits of project and the installation of the tree protection barricade fence and tree armor.

1. Trees to be preserved are represented by a solid line. Trees to be removed are represented by a dashed or ghosted line. Trees to be planted are graphically differentiated from existing trees.

1.3 SITE CONDITIONS

A. Inspection: After layout of the improvements is accomplished, Contractor shall review impact of new construction and need for compensatory pruning. Report to Landscape Architect the extent of pruning required prior to initiating any work.

1.4 RELATED WORK SPECIFIED ELSE WHERE

Clearing	Section 02230
Exterior Plants	Section 02930

1.5 QUALITY CONTROL

A. Employ qualified certified Arborist for pruning and feeding as approved by the Landscape Architect. Arborist shall have the following minimum qualifications:

1. Membership in:
   a. NAA - National Arborist Association
   b. ISA - International Society of Arborists
2. Meet state requirements for insurance.
3. Licensed for application and use of pesticides.
4. Bonded.

1.6 SUBMITTALS

A. Furnish at Landscape Architect's office, prior to installation, the following samples:

1. Certification: Copy of Arborist qualifications.
2. Mulch: Label from bag (Supplier's statement of analysis if bulk), and 1-gallon container of mulch sample.
3. Fertilizer: Label from bag or Supplier's brochure.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fertilizer for Trees: Arbor Green 30-10-7 distributed by The Davey Company, San Antonio, Texas (210) 698-0515; Austin, Texas (512) 451-4986.

B. Tree Barricade Fencing: Fabric 11 to 12½ -gauge wire chain link 2-inch mesh with 1? inch minimum outside diameter galvanized steel pipe posts. (Contractor's option to utilize steel 'T' posts.) Fabric height at 6 feet. Annealed steel tie-wire at 16-gauge minimum. Provide posts of height to set in grade 12 – 18 inch depth.

C. Mulch: Mulch shall be free of deleterious material and shall be stored as to prevent inclusion of foreign material. Mulch shall be native shredded hardwood mulch, manufactured by Gardenville Horticultural Products, San Antonio, Texas, 210/651-6115. Mulch resulting from double shredding/grinding of trees removed from the site would be an acceptable alternative.

D. Tree Wound Paint: Bituminous based paint of standard manufacture specifically formulated for tree wounds.

E. Tree Armor:

1. Wood: SPFA utility grade, 2x4.
2. Wire: Annealed steel wire, 16 gage minimum.

PART 3 - EXECUTION

3.1 PROTECTION FOR EXISTING TREES TO BE PRESERVED

A. All trees to be preserved on the property shall be protected against damage from construction operations. Only those trees located within the limits of improvements to be constructed, or as indicated, are to be removed. All trees to be removed shall be flagged for review after the location of improvements to be constructed are staked in the field. Any tree to be removed shall be reviewed by the Landscape Architect and Owner for approval prior to removal.

B. Erect barricade fencing and armor protection prior to beginning any clearing, demolition or construction activity, and unless otherwise instructed, maintain in place until construction is completed.

1. Set posts to 12 – 18 inch depth at 10' maximum spacing set in packed earth or driven into undisturbed grade. Fasten fabric to posts with tie-wire at 18 inch on center.

C. Trees immediately adjacent to and within one hundred feet (100) of any construction activities are to be protected by barricade fencing; subject to approval of the Landscape Architect. Trees exposed to construction activity within the dripline are to have trunks protected with tree armor in addition to barricade fencing. The tree protection barricade shall be placed before any excavating or grading is begun and maintained in repair for the duration of the construction work unless otherwise directed. No material shall be stored or construction operation shall be carried on within the tree protection barricade. Tree protection barricade shall remain until all work is completed. Remove tree protection barricade at commencement of finish grading. Remove tree armor immediately prior to Substantial Completion.

D. Tree protection barricade shall be erected at the edge of the dripline where possible; in extreme circumstances and with the approval of the Landscape Architect, fencing may be located at the edge of the root protection zone. For trees 10 inch caliper and less, the minimum distance the barrier shall be erected is five (5) feet from the trunk of tree or clump of trees.

E. Protect tree trunk with tree armor to a height of 8' or to the limits of lower

branching (when exposed to construction activity within the drip line) with 2x4's butted side to side completely around trunk. Wire wrap do not nail, around trees.

F. Protect trees that are to remain, whether within barricade fencing or not, from the following:

1. Compaction of root area by equipment or material storage; construction materials shall not be stored closer to trees than the farthest extension of their limbs (dripline).
2. The proposed finished grade within the root protection zone of any preserved tree shall not be raised or lowered more than three (3) inches. Retaining methods can be used to protect and/or provide lateral support to the area outside the root protection zone.
3. Trunk damage by moving equipment, material storage, nailing or bolting.
4. Strangling by tying ropes or guy wires to trunks or large branches.
5. Poisoning by pouring solvents, gas, paint, etc., on or around trees and roots.
6. Cutting on roots by excavating, ditching, etc. Prior to excavation within the tree driplines or the removal of trees adjacent to other trees that are to remain, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment to minimize root damage. Refer to EXCAVATION AROUND TREES for additional information.
7. Damage of branches by improper pruning.
8. Drought from failure to water or by cutting or changing normal drainage pattern past roots. Contractor shall provide means as necessary to ensure positive drainage.
9. Changes of soil pH factor by disposal of lime base materials such as concrete, plaster, lime treatment at pavement subgrade, etc. When installing concrete adjacent to the root zone of a tree, use a minimum 6 mil. plastic vapor barrier behind the concrete to prohibit leaching of lime into the soil.
10. Do not cut roots 3/4" in diameter or over without approval of Owner's Representative. All excavation and earthwork within the drip line of trees shall be done by hand.
11. Protect all existing trees near areas to be stabilized from underground contaminations by placing a 6 mil. Plastic film barrier along exposed vertical cut extending a minimum 12" into undisturbed subgrade below depth of stabilization.
12. No vehicular traffic shall occur within the drip line of any tree.
13. No soil shall be spread, spoiled or otherwise disposed of under any tree within the drip line.

G. Any damage done to existing tree crowns or root systems shall be repaired by the Arborist to the satisfaction of the Landscape Architect. Broken branches shall be

cut cleanly. Any roots cut shall be cut cleanly with a saw other means approved by the Landscape Architect.

H. Repairs to the trees necessitated by damage caused through negligence of Contractor or his employees will be completed at the Contractor's expense. When trees other than those approved for removal are destroyed or killed, or badly damaged as a result of construction operations, the contract sum will be reduced by the value of the tree as determined by using the accepted International Society of Arboriculture's formula.

3.2 ROOT PROTECTION ZONE

A. The root protection zone (RPZ) is measured with a radius from the trunk of 1 foot for each caliper inch of trunk measured at four and one-half (4-1/2') feet above grade or at the point where the smallest diameter closest to the branching occurs. No disturbance shall occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater for trees 10 inch caliper or less.

3.3 ROOT PROTECTION ZONE IMPACTS

A. Those trees to remain which have some encroachment on their root protection zone shall have the following maximum allowable impacts:

1. Minimum Protection Criteria 'A': No disturbance of natural grade, e.g. trenching or excavation, can occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater in no more than 30 percent of the area of the RPZ.

2. Minimum Protection Criteria 'B': No cut or fill greater than three (3) inches will be located closer to the tree trunk than ½ the RPZ radius distance.

B. Trees impacted shall have a minimum of a six (6) inch layer of mulch placed and maintained over the root protection zone and the undisturbed area within the dripline. Immediate pruning and fertilization shall occur per the pruning and fertilization sections of this specification. Provide water in a slow drip manner to impacted trees as approved by the Landscape Architect. Provide water to apply equivalent to 1 inch once per week to deeply soak in over the area within the dripline of the tree during periods of hot, dry weather. Spray tree crowns periodically to reduce dust accumulation on the leaves.

3.4 EXCAVATING AROUND TREES

A. Excavate within the dripline of trees only where required and when absolutely

necessary. Refer to ROOT PROTECTION ZONE.

B. When excavating for new construction is required within dripline of trees, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment.

1. All exposed roots two (2) inches in diameter or greater of a tree shall be cut cleanly. In the case of oak species, in order to prevent infection by oak wilt spores, wounds must be painted with an acceptable wound dressing within thirty (30) minutes.
2. Clean cut roots using sharp ax approximately three (3) inches back from new construction.

3.5 PRUNING

A. All trees that are to be preserved within the confines of the facility (e.g. area defined by the security fence) shall be pruned to improve overall natural character and openness of the canopies and to repair or provide work clearance. Refer to PRUNING SCHEDULE for specifics regarding pruning requirements. Pruning shall be completed to the satisfaction of the Landscape Architect.

B. Pruning shall include but is not limited to removal of dead and broken branches, correction of structural defects or whenever the following conditions exist. Remove diseased wood, or structurally weak limbs that may cause a safety hazard. Remove branches that extend over buildings endangering roofs (e.g. branches rubbing against or touching roof). Remove branches in front of windows and which obstruct traffic signs or street intersections. Provide clearance for emergency vehicles, buses, moving vans and similar vehicles along the streets (13'6" height). Prune trees according to their natural growth characteristics leaving trees well shaped and balanced.

3.6 GOVERNING STANDARDS

A. Work procedures will be guided by the current provisions of the American National Standard Institute. Complete detail of the provisions are to be found in the references listed. The two basic objectives of the pruning operation shall include:

1. Hazard Reduction Pruning: Hazard reduction pruning shall be completed to remove visible hazards in a tree. Hazard pruning shall consist of one or more of the maintenance pruning types.

2. Maintenance Pruning: Maintenance pruning shall be completed to maintain and improve tree health and structure and includes hazard

reduction pruning.

3.7 MAINTENANCE PRUNING TYPES:

A. Both hazard reduction pruning and maintenance pruning shall consist of one or more of the following pruning types:

1. Crown Cleaning: Crown cleaning shall consist of the selective removal of one or more of the following items: dead, dying, or diseased branches, weak branches, water sprouts and stubbed branches.
2. Crown Thinning: Crown thinning shall consist of the selective removal of branches to increase light penetration, air movement, and reduce weight.
3. Crown Raising: Crown raising shall consist of the removal of the lower branches of a tree to provide clearance.
4. Crown Reduction, or Crown Shaping: Crown reduction shall consist of decreasing the height and/or spread of a tree.
5. Vista Pruning: Vista pruning shall consist of selective thinning of framework limbs or specific areas of the crown.
6. Crown Restoration: Crown restoration pruning shall improve the structure, form and appearance of a tree which has been severely headed, vandalized, storm damaged or improperly pruned.

3.8 PRUNING SCHEDULE

A. All of the pruning type(s) as applicable are required at each tree. All pruning shall be completed to remove branches/laterals ? inch and greater.

3.9 CROWN IMPACTS

A. Trees impacted by construction shall be limited to a maximum of 30 percent of the viable portion of a tree's crown removed as approved by the Landscape Architect. Removal of more than 30 percent of the viable portion of a tree's crown will necessitate the tree's removal and replacement at the Contractor's expense. Replacement shall be governed at the ratio of 1 inch of new tree per inch of tree removed. Replacement trees are to have a one (1) year warranty. Refer to Section EXTERIOR PLANTS.

3.10 APPROVAL: No major limbs or structure will be cut or removed without prior approval of the Landscape Architect.

3.11 STERILIZATION: All tools used will be sterilized with Clorox bleach prior to use and between each tree. Residue from sterilization operation shall be diluted so as not to damage any vegetation. At trees known to be diseased and where there is danger of transmitting that disease, tools are to be disinfected after each cut.

3.12 PAINT CUTS: Paint cuts more than 1 inch in diameter with an approved tree wound paint on trees of oak species.

3.13 FERTILIZATION OF PRESERVED TREES

A. All existing trees impacted by construction activities taking place within the dripline, including but not limited to trenching and grading, shall be fertilized. Feeding of existing trees to be impacted by construction shall be accomplished in accordance with the following specifications:

1. Feeding shall be completed prior to construction of permanent improvements adjacent to all trees including site fill or paving including trenching operations.
2. Liquid tree fertilizer applied with a standard hydrant sprayer at a pressure of 100 to 200 psi shall be injected in slightly slanted holes approximately twelve (12) inches in depth.
3. Concentration of suspension to be forty (40) pounds of fertilizer for trees in each 100 gallons of water. Application rate: six (6) pounds of actual nitrogen per 1,000 square feet of area under drip-line.
4. Holes are to be made in concentric circles and 3' on center around the tree with the last ring located at the dripline of the foliage of the trees.
5. Area beneath the dripline of the trees is to be well watered after the fertilization is placed.

3.14 MULCH

A. Mulch base of all existing trees four (4') feet radius/distance of the tree RPZ with 6" deep mulch layer. If existing trees are grouped, the entire area is to be mulched in between the trees.

3.15 CLEANUP

A. Wood and debris shall become property of the Contractor and shall be removed from the site. Cost of disposal to be paid by Contractor.

B. If acceptable to Owner, wood from tree removal and pruning activities can be double shredded/grinded and used on site as mulch at locations as approved by Landscape Architect.

++END OF SECTION ++

ATTACHMENT N
INSPECTION, MAINTENANCE, AND REPAIR PLAN

Care and maintenance of the vegetation on the filter strip areas will be the responsibility of the construction contractor during the first 90 days following completion of construction. As required by the contract specifications (Section 02935), the contractor must provide a landscape maintenance plan and watering schedule for the vegetative filter strips to the property owner for approval Temporary and permanent irrigation will be provided for the establishment of landscape areas. After the first few months following construction, the vegetation should be established and should require minimal additional maintenance. As described in the TCEQ Best Management Practice guidance manual (RG-348), maintenance activities for the vegetative filter strips include:

Pest Management
- Control insects and weeds in vegetated areas using minimal insecticides.

Seasonal Mowing and Lawn Care:
- Mow native grass filter strips and flow distribution channel twice per year (minimum)
- Do not deposit clippings on vegetative filter strip areas

Inspection:
- Inspect filter strips twice per year (minimum) and after heavy rainfall periods for erosion or vegetation damage.
- Check for uniformity of grass cover, debris, and litter.
- Check for areas of sediment accumulation

Litter and Debris Removal
- Remove and debris and litter from filter strip areas as needed, but no less than 4 times per year.

Sediment Removal
- Remove excess sediment as necessary near the upstream boundary of the filter strip by hand or with flat bottomed shovels.

Grass Reseeding and Mulching
- As identified during semi-annual inspections, repair (through replanting and restoration) bare spots and areas of erosion in the vegetative filter strip areas.

Beginning the fourth month after completion of construction, the Owner will assume the responsibility of the inspection, maintenance, and repair plan described above and within specification Section 02935. The Owner will complete the attached table after each inspection.

Gary Asbury
12/18/03

WESTERN CANYON WATER TREATMENT PLANT
VEGETATIVE FILTER STRIP
INSPECTION & MAINTENANCE REPORT

Inspector:_____ Date:_____

Reason for Inspection/Maintenance:_____

_____

_____

Filter Strip Areas
(Y/N)

	1	2	3	4	5	6
1) Inspection:						
a. Evidence of pests in vegetated areas						
b. Evidence of erosion or vegetation damage						
c. Bare spots without grass and/or tree cover						
d. Removed debris and litter						
2) Seasonal Mowing and Lawn Care:						
a. Areas mowed						
b. Clippings removed						
3) Sediment Removal						
a. Accumulated sediment						
b. Sediment removal performed						
4) Grass Reseeding and Mulching						
a. Filter strip repairs required						
b. Describe type of repair below						

Additional Comments:_____

_____

_____

_____

SECTION 02935

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z60.1 (1990) Nursery Stock.
2. ANSI Z133.1 (1994) Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3. ANSI A300 (1995) Tree, Shrub and Other Woody Plant Maintenance-Standard Practices.

1.2 DESCRIPTION OF WORK

A. Maintenance of the landscape to be provided. Contractor shall provide maintenance for a period of 90 days after Final Acceptance.

B. Maintenance of vegetative filter strips.

1.3 SITE CONDITIONS

A. Verification of Dimensions: Refer to section 02900 - Soil Preparation.

1.4 RELATED WORK SPECIFIED ELSEWHERE

Landscape Irrigation System	Section 02442
Soil Preparation	Section 02900
Seeding	Section 02921
Sodding	Section 02925
Exterior Plants	Section 02930
Treatment of Existing Trees	Section 02940

1.5 QUALITY ASSURANCE

A. Landscape installation or maintenance must be supervised by a staff member of the Contractor who possesses the current certification:

Certified Landscape Professional Contractor (CLPC) as administered by Texas Nursery and Landscape Association (TNLA).

B. It is the obligation of the bidder to provide the Landscape Architect with documentation that the above qualification is met.

C. Source Quality Control:

1. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.

1.6 SUBMITTALS

A. After completion of the project, submit the following:

1. Maintenance Instructions
2. Watering Schedule

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.8 JOB CONDITIONS

A. Maintenance operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by acceptable practice in the locality.

PART 2 - PRODUCTS

2.1 MATERIALS - Refer to respective landscape sections for applicable materials.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

A. Maintain trees, shrubs and other plants by pruning removal of dead wood, cultivating, watering, weeding and mulching as required for normal, healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and

reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

B. Maintain grass areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable grass, free of eroded or bare areas (no one bare area greater than 6 inches square in seeded areas). Mowing shall be accomplished to maintain buffalograss at a 1-3/8- to 1½-inch height. Mowing shall not remove more than 1/3 height of the grass at each mowing.
   1. Do not mow native grass seeded areas.
   2. Water grass areas to provide an equivalent of 1 inch of water per week in consideration of natural rainfall received.

C. Fertilize all lawn areas within the project limits, including any renovated grass areas, 30 days following initial installation with lawn fertilizer at rate of 10 pounds per 1000 square feet.

D. Three (3) weeks following completion of landscaping/seeding/sodding, Contractor shall complete one additional application of Biostimulant. Apply Biostimulant at the rate of 4 fluid ounces per 1000 square feet as per manufacturer's instructions.

3.2 VEGETATIVE FILTER STRIP MAINTENANCE

A. Contractor is responsible for the following requirements concerning the maintenance of vegetative filter strips from initial planting through the 90 day period after Final Acceptance; thereafter, maintenance is responsibility of Owners.

B. Pest Management: Provide an Integrated Pest Management (IPM) Plan for vegetated areas. Specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

C. Seasonal Mowing and Grass Care: Mow as needed to limit vegetation height to 4 inches, using a mulching mower (or removal of clippings). For native grasses, mow a minimum of twice annually. Grass clippings and brush debris shall not be deposited on vegetated filter strip areas. Regular mowing shall include weed control practices; herbicide use kept to a minimum. Provide supplemental irrigation as required to assure a dense and healthy vegetative cover.

D. Inspection: Inspect filter strips at least twice annually for erosion or damage to vegetation; additional inspection after periods of heavy runoff is required. The strip shall be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. Provide frequent inspections of the grass cover during the first few years after establishment to determine if any problems are developing; plan for long-term restorative maintenance needs. Replant and

restore bare spots and areas of erosion identified during semi-annual inspections to meet specifications.

E. Debris and Litter Removal: Filter strip structures shall be kept free of obstructions to reduce floatables being flushed downstream. Debris and litter removal shall be performed no less than 4 times per year.

F. Sediment Removal: Excess sediment along the upstream boundary of the strip shall be removed by hand or with flat-bottomed shovels. Dispose of sediments off-site. Some sediment may be considered hazardous waste or toxic material; comply with restrictions for proper disposal off-site.

G. Grass Reseeding and Mulching: A healthy dense grass shall be maintained on the filter strip. Fill, compact and reseed so that the final grade is level. Grass damaged during the sediment removal process shall be promptly replaced using the same seed mix used during filter strip establishment. Flow shall be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections shall be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting shall be done more frequently in the first two to three years after installation to ensure stabilization. Provide supplementary irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

3.3 MAINTENANCE INSTRUCTIONS

A. Maintenance Instructions: Submit typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape areas and vegetative filter strips over the first year. Instructions shall present maintenance procedures/activities to be implemented over a one year period on a month by month basis.

B. Watering Schedule: The watering schedule is to include the duration and frequency each irrigation zone will run per week. This will be worked out jointly with the Landscape Irrigation Contractor and shall be programmed on to the controller after review by Landscape Architect. Program shall be submitted to the Owner as part of the final acceptance process.

3.4 CLEANUP AND PROTECTION

A. During maintenance period, all debris shall be removed daily and the site kept neat at all times.

B. After maintenance operations are finished, all paved areas which may have

become strewn with soil or other material shall be thoroughly cleaned by sweeping, and if necessary, power washing.

C. Protect landscape work from damage due to maintenance operations, operations by other contractors and trades and trespassers. Treat, repair or replace damaged landscape work as directed.

3.5 INSPECTION AND ACCEPTANCE

A. When maintenance period is complete, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the Owner's Representative or Landscape Architect and found to be acceptable.

++END OF SECTION 02935++

ATTACHMENT O
PILOT-SCALE FIELD TESTING PLAN

Not Used

ATTACHMENT P
MEASURES FOR MINIMIZING SURFACE STREAM CONTAMINATION

No surface streams are located on-site. Impacts to surface streams located off-site, stream flashing, the creation of stronger flows and in-stream velocities will be minimized by implementing BMPs such as silt fences and hay bales during construction, and vegetative filter strips after construction.

GUADALUPE-BLANCO RIVER AUTHORITY

WESTERN CANYON WATER SUPPLY PROJECT
WATER TREATMENT PLANT

STORM WATER POLLUTION PREVENTION PLAN

1.0 Site Description
- 1.1 Nature of construction activity, potential pollutants and sources
- 1.2 Schedule/sequence of construction activities that will disturb soils on the site
- 1.3 Acreage of site and disturbed areas
- 1.4 Description of soil and quality of discharge from the site
- 1.5 Location map
- 1.6 Site Map
  - 1.6.1 Drainage patterns & slopes after construction
  - 1.6.2 Disturbed areas
- 1.7 Description of and location of asphalt and concrete plants supporting the construction site.
- 1.8 Receiving waters near site
- 1.9 TPDES general permit

2.0 Best Management Practices
- 2.1 Erosion and Sediment Controls
- 2.2 Stabilization Practices
- 2.3 Permanent Storm Water Controls
- 2.4 Other Controls
- 2.5 Inspection, Maintenance, and Repair

Attachment A:	Construction Schedule
Attachment B:	Location Map
Attachment C:	Site Plans
Attachment D:	TPDES General Permit
Attachment E:	Temporary BMPs
Attachment F:	Specifications pertaining to stabilization
Attachment G:	Permanent BMPs -- Vegetative Filter Strips
Attachment H:	Vegetative Filter Strip Inspection and Maintenance Report

1. Site Description

1.1 Nature of construction activity, potential pollutants and sources

The Western Canyon Water Supply Project (WCWSP) will divert water from Canyon Lake and send it through treatment and delivery facilities to provide treated water to customers in Comal, Kendall, and Bexar counties, Texas. The 18-foot diameter on-shore shaft intake structure and raw water pump station is designed to operate over a large range of lake surface level fluctuation. A 5-mile raw water transmission pipeline will deliver 10 million gallons per day (MGD) and ultimately 15 MGD to two raw water control tanks at Startz Hill. Water will flow by gravity from the tanks to the water treatment plant (WTP). When operational in 2005, the plant will combine coagulation and membrane microfiltration to produce high quality filtered water. Treated water will be delivered to wholesale customers through a 40-mile pipeline and will be blended with existing ground and surface water supplies. This Storm Water Pollution Prevention Plan (SWPPP) focuses on the activities at the WTP site. Construction activities at the site include site piping, foundations, buildings, electrical supply, switchgear, installation of process equipment, transfer pumps, finished water pump station, administration building, chemical feed, and finished water clearwells. This SWPPP also addresses the raw water control tanks (RWCT) site, which is located approximately 0.5 miles northeast of the WTP site.

Although no surface water is present on either the Raw Water Control Tanks or Water Treatment Plant site, stormwater run-off that leaves the site may reach surface waters in other nearby areas. The chemicals stored on site may impact the quality of this run-off. All chemicals will be stored in tanks with proper containment. However, the risk of a spill or leakage exists. A list of the chemicals to be stored on site is included on page 4 of the application. Additional factors that may affect surface eater quality include gas and oils on the paved roads or from the maintenance bay attached to the operations building.

1.2 Schedule/sequence of construction activities that will disturb soils on the site

A construction schedule is included in this SWPPP as Attachment A.

1.3 Acreage of site and disturbed areas

The total WTP site property is 27 acres. Approximately 9.6 acres of the site will be disturbed for construction, including the contractor staging area. The RWCT site is 0.45 acres.

1.4 Description of soil and quality of discharge from the site

The subsurface at the site consists of up to 18 inches of soil covering limestone rock. No surface water is present on either the Raw Water Control Tanks or Water Treatment Plant site.

Storm water run-off that leaves the site should not be impacted by the chemicals stored on site, as they are stored in tanks with containment that meets TCEQ requirements. Chemicals to be stored on site include:

- Caustic
- Ferric Sulfate
- Sodium hypochlorite
- Hydrochloric acid
- Chlorine (gas)

Additional factors that may affect runoff water quality include gas and oils on the paved roads or from the maintenance bay, which is attached to the operations building.

1.5 Location Map

A location map of the WTP and RWCT sites is included in Attachment B.

1.6 Site Map

Site plans for the WTP and RWCT sites are included in Attachment C.

1.7 Asphalt and Concrete plants supporting this construction site.

Approximately 4000 feet of roads within the site will be asphalt. Asphalt plants are located approximately 15 miles from the site in New Braunfels, Texas and approximately 25 miles from the site in San Antonio, Texas. A concrete plant is located 15 miles from the site in New Braunfels, Texas. There will be no dedicated asphalt of concrete plants for this construction project.

1.8 Receiving Waters Near Site

There are no receiving waters on the site. Stormwater discharges from the site may enter a tributary to Dry Comal Creek approximately 0.5 miles southwest of the site or a tributary to Dry Bear Creek, approximately 0.25 miles east of the site.

1.9 TPDES General Permit

A copy of the TPDES general permit is included in Attachment D.

2. Best Management Practices

2.1 Erosion and Sediment Controls

Before construction begins at the water treatment plant, a silt fence will be installed around the downstream perimeter of the WTP site to prevent construction-generated sediments from flowing off-site with stormwater runoff. The silt fence will be supported by the existing fence posts along the site property line. Hay bails will also be installed along the grassy swale at the site entrance to provide sediment control for the stormwater that flows between the silt fences at the property

entrance. A figure of the temporary BMPs is included in Attachment E. Erosion at the site is not expected to be problematic as the site consists of limestone rock covered by varying depths of soil. Earthwork and excavation on the site will be minimized due to the high expense of rock excavation. As noted by the protected areas on the WTP site plan, vegetation was protected from clearing wherever possible. A silt fence will also be installed around the downstream perimeters of the RWCT site, as shown in Attachment E.

Specification Section 02935, Landscape Maintenance, describes how the contractor is required to install, periodically inspect, and maintain the temporary BMPs throughout the duration of the construction. Sediment, litter, and debris shall be removed from the silt fences regularly and at a minimum when the design capacity has been reduced by 50%.

2.2 Stabilization Practices

Stabilization practices to be implemented at the WTP site include establishing permanent vegetation through seeding, leaving undisturbed vegetative buffer strips along the site perimeter, and protecting the existing trees and vegetation on the site. As described in Section 2.1, vegetated areas within the disturbed area boundary on the site will be protected wherever possible. Outside of the designated disturbed area, vegetative areas will not be disturbed. Each of these practices is discussed further in specification Sections 02921, 02935, 02940, and 02442, which are included in Attachment F.

All permanent stabilization practices will be implemented during construction, as soon as practicable (and no more than 14 days) following the cessation of construction activities in each area of the site.

2.3 Permanent Storm Water Controls

Vegetative filter strips will be used on the WTP site to manage stormwater following the completion of construction. Existing vegetation consisting of grassland and forested will be used for the filter strips. Where disturbance is required during construction, filter strip areas will be re-graded and seeded. Vegetative filter strip locations areas are shown in Attachment G. The areas delineated in Attachment G are the minimum filter strip areas required to conform to the design requirements of the TCEQ guidance manual. The areas outside the filter strip boundaries are also vegetated. Filter strips for each drainage area are located to receive even flow distribution in order to prevent flow channeling. Runoff from drainage area 3 is routed to an earthen distribution channel, from where it will overflow onto the filter strip for that area. The undisturbed land surrounding these designated areas will further reduce the TSS load exiting the site. The filter strips will be prepared and re-vegetated as described in the figure and in specification Section 02921, Seeding, and Section 02442, Landscape Irrigation System, which are included in Attachment F. The areas of seeding at the WTP site will include but not be limited to the designated filter strip areas.

In addition to the Best Management Practices discussed above, additional landscaping and vegetative practices such as the preservation and protection of existing trees and sodding will be implemented at the site, as described in specification Sections in Attachment F.

2.4 Other Controls

In addition to the storm water controls described above, the contractor will implement general housekeeping practices to prevent the pollution of storm water from any construction materials stored temporarily on-site. Following construction, the operators will also implement housekeeping practices to avoid pollution of storm water from potential contaminants that are used routinely at the site. This includes an immediate clean up of oil, fuel or other spill in maintenance bay or other spill locations at the site.

2.5 Inspection, Maintenance, and Repair

Care and maintenance of the vegetation on the filter strip areas will be the responsibility of the construction contractor during the first 90 days following completion of construction. As required by the contract specifications (Section 02935), the contractor must provide a landscape maintenance plan and watering schedule for the vegetative filter strips to the property owner for approval Temporary and permanent irrigation will be provided for the establishment of landscape areas. After the first few months following construction, the vegetation should be established and should require minimal additional maintenance. As described in the TCEQ Best Management Practice guidance manual (RG-348), maintenance activities for the vegetative filter strips include:

Pest Management

- Control insects and weeds in vegetated areas using minimal insecticides.

Seasonal Mowing and Lawn Care:

- Mow native grass filter strips and flow distribution channel twice per year (minimum)
- Do not deposit clippings on vegetative filter strip areas

Inspection:

- Inspect filter strips twice per year (minimum) and after heavy rainfall periods for erosion or vegetation damage.
- Check for uniformity of grass cover, debris, and litter.
- Check for areas of sediment accumulation

Litter and Debris Removal

- Remove and debris and litter from filter strip areas as needed, but no less than 4 times per year.

Sediment Removal

- Remove excess sediment as necessary near the upstream boundary of the filter strip by hand or with flat bottomed shovels.

Grass Reseeding and Mulching

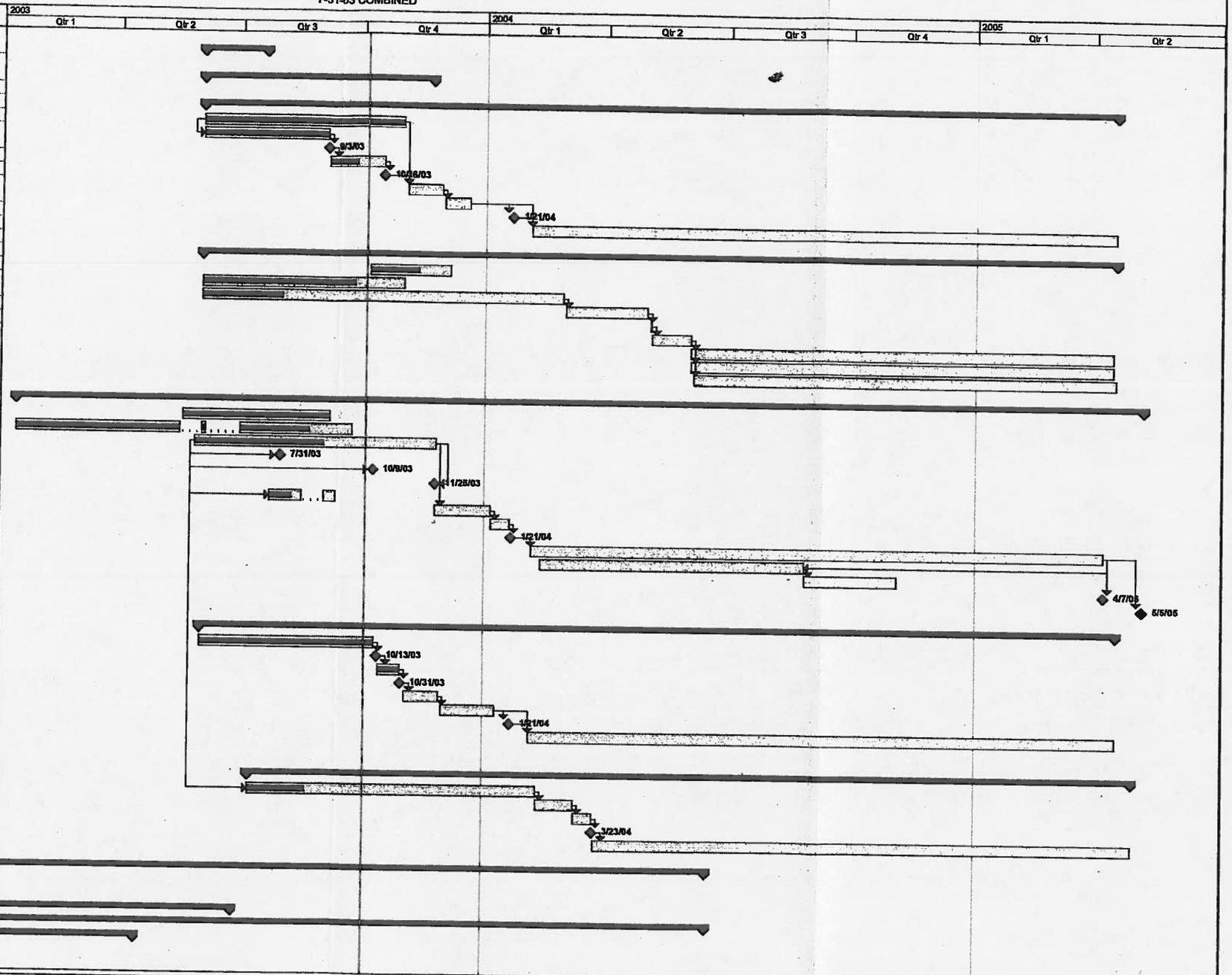
- As identified during semi-annual inspections, repair (through replanting and restoration) bare spots and areas of erosion in the vegetative filter strip areas.

Beginning the fourth month after completion of construction, the Owner will assume the responsibility of the inspection, maintenance, and repair plan described above and within specification Section 02935. The Owner will complete the record table, included in Attachment H, after each inspection.

ATTACHMENT A

WESTERN CANYON SCHEDULE
7-31-03 COMBINED

ID	Task Name	Duration	Start	Finish
1				
2	**EA**	35 days	Mon 6/2/03	Fri 7/18/03
4				
5	**404 Permit**	125 days	Mon 6/2/03	Fri 11/21/03
9				
10	**Contract 1 - Intake / Pump Station**	490 days	Mon 6/2/03	Fri 4/15/05
11	Geotech Baseline Report	109 days	Mon 6/2/03	Thu 10/30/03
12	50% Design Package	67 days	Mon 6/2/03	Tue 9/2/03
13	Submit 50% Package	1 day	Wed 9/3/03	Wed 9/3/03
14	90% Design Package	30 days	Thu 9/4/03	Wed 10/15/03
15	Submit 90% Package	1 day	Thu 10/16/03	Thu 10/16/03
16	Water Intake Bid Package	20 days	Mon 11/3/03	Fri 11/28/03
17	Bid Phase - Water Intake	15 days	Mon 12/1/03	Fri 12/19/03
18	Award-Wtr Intake Constr Contract	1 day	Wed 1/21/04	Wed 1/21/04
19	Intake Construction	313 days	Wed 2/4/04	Fri 4/15/05
20				
21	**Contracts 2 & 3 - Pipeline**	490 days	Mon 6/2/03	Fri 4/15/05
22	Geotech	45 days	Mon 10/6/03	Fri 12/5/03
23	Hydraulic Design	110 days	Mon 6/2/03	Fri 10/31/03
24	Plans and Specs	195 days	Mon 6/2/03	Fri 2/27/04
25	Bid Phase - Pipeline	45 days	Mon 3/1/04	Fri 4/30/04
26	Award - Pipelines (Date?)	1 day	Mon 5/3/04	Mon 5/3/04
27	Prepare & execute contracts	21 days	Tue 5/4/04	Tue 6/1/04
28	PL Construction - Contract 2	226 days	Wed 6/2/04	Wed 4/13/05
29	PL Construction - Contract 3A	226 days	Wed 6/2/04	Wed 4/13/05
30	PL Construction - Contract 3B	226 days	Fri 6/4/04	Fri 4/15/05
31				
32	**Contract 4 - Water Treatment Plant**	604 days	Mon 1/13/03	Thu 8/5/05
33	Piloting - Stage 2/3	80 days	Mon 5/19/03	Fri 9/5/03
34	Membrane Shop Drawing Review	150 days	Mon 1/13/03	Mon 8/22/03
35	WTP Design	130 days	Wed 5/28/03	Tue 11/25/03
36	50% Design Submittal	1 day	Thu 7/31/03	Thu 7/31/03
37	90% Design Submittal	1 day	Thu 10/9/03	Thu 10/9/03
38	Final Design Submittal	1 day	Tue 11/25/03	Tue 11/25/03
39	Geotech	25 days	Wed 7/23/03	Tue 9/9/03
40	Bid Period	30 days	Tue 11/25/03	Mon 1/5/04
41	Review	10 days	Tue 1/6/04	Mon 1/19/04
42	Award WTP	1 day	Wed 1/21/04	Wed 1/21/04
43	Construction	305 days	Thu 2/5/04	Wed 4/6/05
44	Equipment Manufacture	140 days	Thu 2/12/04	Wed 8/25/04
45	Equipment Delivery	50 days	Thu 8/26/04	Wed 11/3/04
46	Limited Capacity to System	1 day	Thu 4/7/05	Thu 4/7/05
47	Full Capacity to System	1 day	Thu 5/5/05	Thu 5/5/05
48				
49	**Contract 5 - Remote Pump Stations**	490 days	Mon 6/2/03	Fri 4/15/05
50	50% Design Package	95 days	Mon 6/2/03	Fri 10/10/03
51	Submit 50% Package	1 day	Mon 10/13/03	Mon 10/13/03
52	90% Design Package	13 days	Tue 10/14/03	Thu 10/30/03
53	Submit 90% Package	1 day	Fri 10/31/03	Fri 10/31/03
54	Remote Pump Station Bid Package	20 days	Mon 11/3/03	Fri 11/28/03
55	Bid Phase - Remote Pump Station	30 days	Mon 12/1/03	Fri 1/9/04
56	Award-Remote Pump Station	1 day	Wed 1/21/04	Wed 1/21/04
57	Remote Pump Station Construction	313 days	Wed 2/4/04	Fri 4/15/05
58				
59				
60	**Contract 6 - SCADA & Telemetry**	471 days	Wed 7/9/03	Wed 4/27/05
61	SCADA Design	154 days	Wed 7/9/03	Mon 2/9/04
62	Bid Period	20 days	Tue 2/10/04	Mon 3/8/04
63	Review	10 days	Tue 3/9/04	Mon 3/22/04
64	Award SCADA	1 day	Tue 3/23/04	Tue 3/23/04
65	Construction	286 days	Wed 3/24/04	Wed 4/27/05
66				
67	**Rights of Way**	529 days	Wed 6/5/02	Mon 6/14/04
68	General	30 days	Wed 6/5/02	Tue 7/16/02
73	General	90 days	Wed 6/5/02	Tue 10/8/02
78	Section A	235 days	Mon 6/5/02	Fri 6/27/03
84	Section B	529 days	Wed 6/5/02	Mon 6/14/04
91	Section C	225 days	Wed 6/5/02	Tue 4/15/03



Project: Update 5/28/02 (dcw)
Date: Fri 10/3/03

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary | External Milestone | External Milestone | External Milestone | Deadline

Fri 10/3/03 4:22 PM

ATTACHMENT B

N
W E
S
0 1 2 Miles

KENDALL COUNTY
COMAL COUNTY

Canyon Lake
Intake
2673
SEGMENT A
Startz Hill Raw Water Reservoir
WTP
SEGMENT B
SEGMENT C
SEGMENT D
SEGMENT E
SEGMENT F
SEGMENT G
SEGMENT H
SEGMENT I
SEGMENT J
SEGMENT K
Cordillera Ranch
Bergheim Booster Pump Station
Booster Pump Station
City of Fair Oaks Ranch
City of Boerne, Tapatio Springs and Kendall County Utility
Johnson Ranch
City of Bulverde
San Antonio Water System (West)
San Antonio Water System (East)
San Antonio River Authority
COMAL COUNTY
BEXAR COUNTY
281
311
46
1863
3351
10
87
3009

Legend

- Pipeline Route in Private Property
- Pipeline Route in Public ROW
- Project Participants Point of Delivery
- Comal ISD School

GBRA

HDR

GBRA WESTERN CANYON REGIONAL WATER SUPPLY PROJECT

TREATED WATER DELIVERY SYSTEM

Date: October 2003

Figure: 1

ATTACHMENT C

FM 3159
(ROW VARIES - 120 FT. MIN.)

EXIST. FENCE

MEMBRANE BUILDING AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

PROTECTED AREA

CIP LAGOON AREA

RESIDUALS LAGOON AREA

TREATED WATER TANKS AND PUMP STATION AREA

CLEARING AREA
377027 S.F.
8.655 AC.

CONTRACTOR STAGING AREA, SEE NOTE 4

SEE NOTE 9

STABILIZED CONSTRUCTION ENTRANCE

EXIST. FENCE

CRANES MILL ROAD

WAGNER RANCH

3.6%
2.9%
1.3%
3.6%
12.9%
2.4%
4.0%
5.9%
2.5%
6.3%
3.0%
12.5%
5.0%
14.9%
10.7%
7.7%
6.6%
4.5%
3.0%

NOTES:

1. TEMPORARY BENCHMARK
   #_____ IS LOCATED AT
   ELEVATION = _____
   N = _____
   E = _____
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL _____ ON SHEET _____.
3. CLEAR PRIME AREAS AS OUTLINED. CLEAR ALONG ROADS AT 25 FOOT WIDTHS, PROTECT ALL TREES ON THE PROPERTY OUTSIDE OF AREAS TO BE CLEARED. TREE REPRESENTATIONS ARE APPROXIMATE. DETAIL SURVEY NOT DONE, CONTRACTOR TO VERIFY TREES TO REMAIN AND CLEAR ONLY THAT NECESSARY TO CONSTRUCT.
4. CONTRACTOR SHALL USE DESIGNATED LOCATIONS FOR LAYDOWN, SPOIL AREAS, AND TRAILER STORAGE WITHIN AREA SHOWN.
5. CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL OFF-SITE. STORE ONLY THAT MATERIAL REQUIRED TO ESTABLISH FINAL GRADES.
6. FOR SITE PLAN, SEE SHEET 1C02. FOR SITE PIPING PLAN, SEE SHEET 1C04.
7. REFER TO SPECIFICATIONS FOR GENERAL SITE CLEARING REQUIREMENTS.
8. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
9. REMOVE EXISTING DRAINAGE CONTAINMENT. SEE GRADING PLANS FOR DETAILS.
10. THE SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.
11. GENERAL BORING LOCATION AND REPORT AVAILABLE UPON REQUEST.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED RCE
DESIGNED
CHECKED
DRAWN JRM

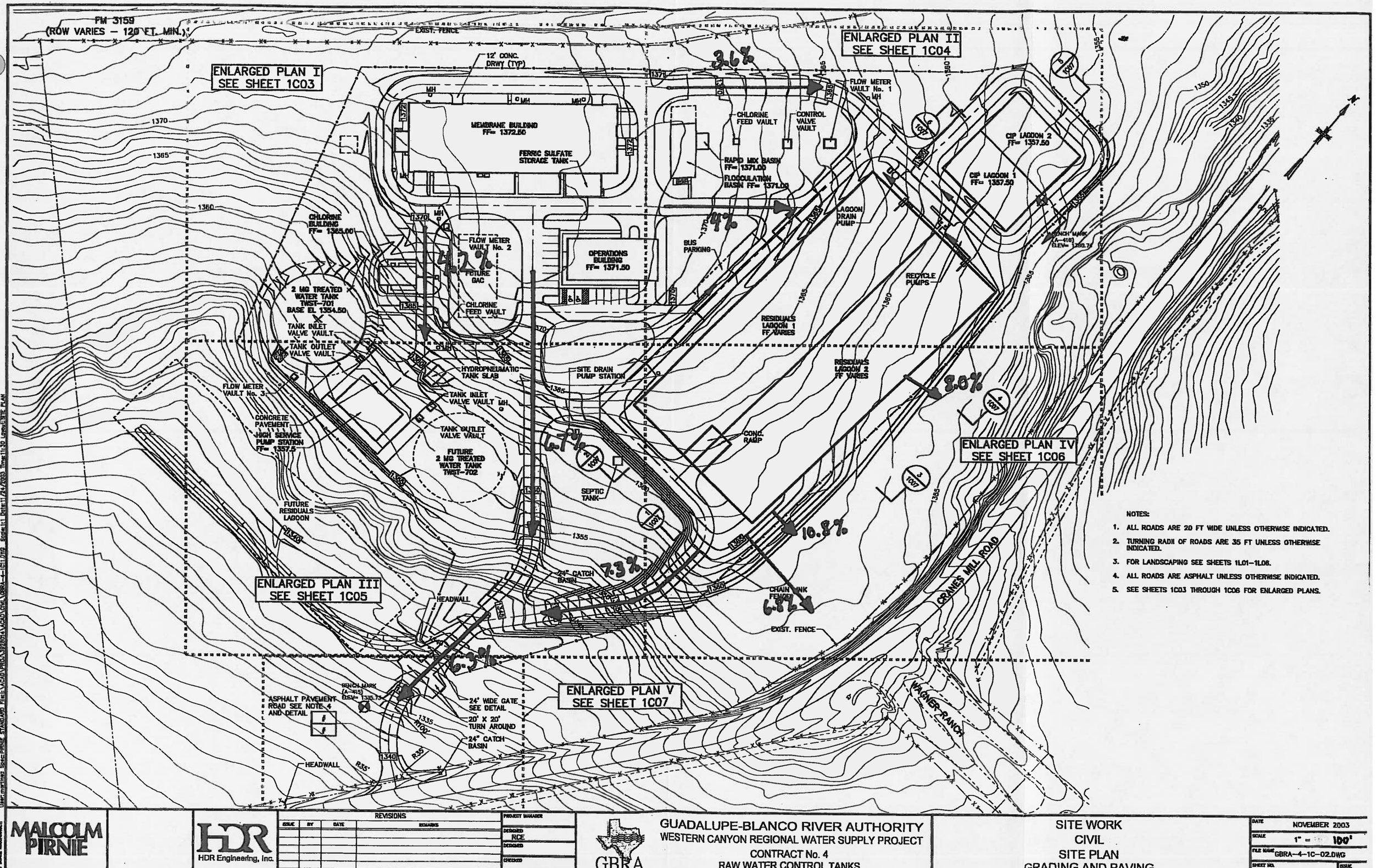
GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL
WATER TREATEMENT PLANT
EXISTING SITE PLAN

DATE OCTOBER 2003
SCALE 1" = 100'
FILE NAME GBRA-4-1C01.DWG
SHEET NO. 1C01
ISSUE B

BAR LENGTH ON ORIGINAL ARCHITECTURAL D SIZE SHEET. ADJUST SCALE ACCORDINGLY



NOTES:

1. ALL ROADS ARE 20 FT WIDE UNLESS OTHERWISE INDICATED.
2. TURNING RADII OF ROADS ARE 35 FT UNLESS OTHERWISE INDICATED.
3. FOR LANDSCAPING SEE SHEETS 1L01-1L06.
4. ALL ROADS ARE ASPHALT UNLESS OTHERWISE INDICATED.
5. SEE SHEETS 1C03 THROUGH 1C06 FOR ENLARGED PLANS.

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER
DESIGNED RCE
DRAWN
CHECKED

GBRA

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

SITE WORK
CIVIL
SITE PLAN
GRADING AND PAVING

DATE NOVEMBER 2003
SCALE 1" = 100'
FILE NAME GBRA-4-1C-02.DWG
SHEET NO.
ISSUE

= PRE CONSTRUCTION

= POST CONSTRUCTION

ORA MAE PFEUFFER
39830 FN 3159
CANYON LAKE, TX 78133

83.60 ACRES
VOL. 130, PG. 529–531

ORA MAE PFEUFFER
VOL. 184, PG. 734
5.716 AC.

EXISTING STRUCTURE

EXISTING DIRT/GRAVEL ROAD

BENCH MARK
(A-413)
ELEV= 1381.41

EXISTING GRAVEL DRIVEWAY

EXISTING STRUCTURE

CHAIN LINK FENCE SEE DETAIL 1/11C02

PROTECT EXISTING TREES

PROPERTY LINE

CHAINLINK FENCE SET 2FT. INSIDE PROPERTY LINE (TYP AROUND PERIMETER) 1/11C02

20.0'x80.0' CONSTRUCTION STAGING AREA

NORTH ENTRANCE DOUBLE SWING GATE SEE DETAIL

PROTECT EXISTING TREES

164.0'

40'-0"

3.0%

2.0%

SITE BOLLARD (TYP) 5/11C03

30" RW

8" DR INV. EL. 1379.00

162,000 GAL 34'-0" RWCT-201

162,000 GAL 34'-0" RWCT-202

B-2

B-1

BASE EL. 1384.00

BASE EL. 1384.00

30.0'

25'-0"

11.0'

19.0'

10.0'

24.0'

16.3'

120.0'

R 42'

R 20'

R 10'

180°

270°

90°

360°

REMOVE EXISTING GRAVEL DRIVEWAY WITHIN FENCE AND REPLACE WITH COMPACTED GRAVEL ROAD

JUNCTION BOX SEE SHEET 9E19 & 9E20

JUNCTION BOX SEE SHEET 9E19 & 9E20

SOUTH ENTRANCE DOUBLE SWING GATE SEE DETAIL

3.0%

4.0%

1.5%

COMPACTED GRAVEL ROAD 7/11C01

(FUTURE RADIO ANTENNA BY OTHERS)

36" RW

30" RW

BY OTHERS THIS CONTRACT

24" DRAIN BOX SEE DETAIL 4/2C02

8" DR INV. EL. 1375.50

8" DR INV. EL. 1375.50

8" DR 40'-0"

TANKS PLAN SEE SHEET 2C02

PROTECT EXISTING TREES

THIS CONTRACT

BY OTHERS

ELECTRICAL TRANSFORMER SEE SHEET 9E19 & 9E20

SITE BOLLARD (TYP) 5/11C03

50' TEMPORARY CONSTRUCTION EASEMENT

50' WATER LINE EASEMENT

EXISTING FENCE

SITE BENCH MARK
(A-414)
ELEV= 1378.46

EXISTING DIRT/GRAVEL ROAD

EXIST. PL

NOTES:

1. ⊕ DENOTES POINT NO.
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL ON SHEET 11C01.
3. ALL CONSTRUCTION WORK SHALL BE LIMITED WITHIN PROPERTY LINE.
4. REFER TO SPECIFICATIONS FOR GENERAL SITE REQUIREMENTS.
5. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
6. GENERAL BORING LOCATIONS ARE SHOWN. THE GEOTECH REPORT IS AVAILABLE UPON REQUEST.
7. WHERE PIPE ELEVATIONS ARE NOT SHOWN, MINIMUM 4FT EARTH COVER SHALL BE PROVIDED. FOR 8" DRAIN SEE PLAN FOR ELEVATIONS. CONTRACTOR SHALL SUBMITT PIPE LAY SCHEDULES FOR APPROVAL.
8. ALL PIPELINES SHALL BE DESIGNED TO RESIST THRUST FORCES DEVELOPED DURING PRESSURE TESTING AND OPERATION. PROVIDE RESTRAINED PIPE JOINTS FOR ALL PIPING.
9. PROVIDE TAPS IN THE PIPELINES FOR PRESSURE TESTING. ALL PIPELINES SHALL BE PRESSURE TESTED. PROVIDE TEMPORARY BULKHEADS AND BLIND FLANGES AS NEEDED. SEE THE SPECIFICATIONS FOR PRESSURE TEST REQUIREMENTS.
10. UNLESS NOTED OTHERWISE, ALL FLANGE COUPLING ADAPTERS (FCA) SHALL BE RESTRAINED.
11. CONCRETE ENCASE 8" DR 2FT EITHER SIDE OVE 30" RW PIPE AT CROSSING.
12. WORK DESIGNATED "BY OTHERS" WILL BE PROVIDED UNDER A SEPARATE CONSTRUCTION CONTRACT. CONTRACTOR SHALL COORDINATE WITH OTHER CONTRACTOR TO VERIFY THE COORDINATES AND DEPTH OF CONNECTIONS TO 30" AND 36" RW PIPELINES PRIOR TO FABRICATION OF PIPE. FAILURE TO VERIFY CONNECTIONS SHALL NOT CONSTITUTE ADDITIONAL COST TO OWNER IF MODIFICATIONS ARE REQUIRED.
13. CONTRACTOR SHALL PROTECT TREES IN AREAS WHERE CONSTRUCTION DOES NOT DISTURB THE EXISTING TREES AND VEGETATION. CLEARING SHALL BE LIMITED WITHIN 10 FT. OF NEW WORK. PROVIDE RE-SEEDING OF DISTRUBED AREAS PER THE SPECIFICATIONS.
14. MAXIMUM SLOPE OF GRADING AT SOUTH GATE SHALL BE NO MORE THAN 7% CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM TANKS.
15. SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.

SITE COORDINATES

Point No.	Northing	Easting	Fill Desc
200	849165.4879	194080.3608	FENCE CORNER
201	849249.2749	193984.4554	FENCE CORNER
202	849368.6789	194108.9843	FENCE CORNER
203	849282.8619	194194.8897	FENCE CORNER
204	849240.3824	194075.1829	CENTER RW-TANK
205	849288.1988	194119.8893	CENTER RW-TANK
206	849296.8684	194180.5521	POINT OF CONN. 30" RW
207	849283.6222	194118.3265	BORE B-1 RW-TANK
208	849241.9029	194076.6072	BORE B-2 RW-TANK
209	849179.4524	194088.0432	POINT OF CONN. 36" RW
210	849200.3991	194044.5889	END OF ROAD CURVE
211	849212.8382	194043.6104	END OF ROAD CURVE
212	849269.8642	194045.0982	END OF ROAD CURVE
213	849315.5004	194089.7626	END OF ROAD CURVE
214	849328.5718	194105.5957	END OF ROAD CURVE
215	849341.4139	194118.5299	END OF ROAD CURVE
216	849321.5623	194143.7199	END OF ROAD CURVE
217	849316.2418	194149.1750	END OF ROAD CURVE
218	849256.8495	194149.9184	END OF ROAD CURVE
219	849211.0333	194105.2300	END OF ROAD CURVE
220	849198.4420	194077.8065	END OF ROAD CURVE
221	849192.4462	194084.7477	END OF ROAD CURVE
222	849187.8664	194080.2809	END OF ROAD CURVE
223	849198.7811	194084.8953	℄ 30" PIPE JOINT
224	849243.4675	194039.0791	℄ 30" PIPE JOINT
225	849259.9327	194056.1383	℄ 30" PIPE JOINT
226	849305.7185	194099.7950	℄ 30" PIPE JOINT
227	849261.0625	194145.6409	℄ 30" PIPE JOINT
228	849215.2483	194100.9548	℄ 30" PIPE JOINT
229	849257.3794	194074.9678	0° POINT OF RWCT-201
230	849303.1938	194118.6560	0° POINT OF RWCT-202
231	849248.00	194122.00	FUTURE RADIO ANTENNA
232	849144.6389	194080.3309	BENCH MARK A-413
233	849383.0745	194105.0855	BENCH MARK A-414

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER CW
DESIGNED
DESIGNED YW
CHECKED RH
DRAWN

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

CIVIL

RAW WATER CONTROL TANKS
SITE PLAN

DATE NOVEMBER 2003
SCALE SCALE 1" = 20'
FILE NAME GBRA-4-2C01.DWG
SHEET NO. 2C01
ISSUE 0

PRELIMINARY NOT FOR CONSTRUCTION

ATTACHMENT D

TPDES General Permit
NO. TXR150000

This is a new general permit issued pursuant to Section 26.040 of the Texas Water Code and Section 402 of the Clean Water Act.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
Austin, TX 78711-3087

GENERAL PERMIT TO DISCHARGE WASTE
under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

Construction sites 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 five years after the date of issuance.

ISSUED AND EFFECTIVE DATE: MAR 05 2003

For the Commission

TCEQ General Permit Number TXR150000 Relating To Discharges From Construction Activities

Table of Contents

Part I. Definitions

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 exposure of soils resulting from activities such as clearing, grading, and excavating.

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 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.

Facility or Activity - Any TPDES "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the TPDES program.

Final Stabilization - A construction site status where either of the following conditions are met:

(a) All soil disturbing activities at the site have been completed and a uniform (e.g, evenly distributed, without large bare areas) perennial vegetative cover with a density of 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 goetextiles) 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.

(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 a surface water and areas which are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.

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, and original purpose of a ditch, channel, or other similar storm water conveyance. Large construction activity does not include 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 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.

Notice of Intent (NOI) - A written submission to the executive director from an applicant requesting coverage under a general permit.

Notice of Termination (NOT) - A written submission to the executive director from a permittee authorized under a general permit requesting termination of coverage.

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 to the extent necessary to meet the requirements and conditions of this general permit; or

(b) the person or persons have day-to-day operational control of those activities at a construction site which are necessary to ensure compliance with a storm water pollution prevention plan 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 Storm Water Pollution Prevention Plan or comply with other permit conditions).

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 - 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 - (from the Texas Water Code, Chapter 26) 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.

Pollution - (from the Texas Water Code, Chapter 26) 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.

Runoff Coefficient - The fraction of total rainfall that will appear at the conveyance as runoff.

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, and original purpose of a ditch, channel, or other similar storm water conveyance. Small construction activity does not include 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 - Storm water 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 protective cover, which may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place.

Waters of the United States - (from title 40, part122, section 2 of the Code of Federal Regulations) 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.

2. Discharges of Storm Water Associated with Construction Support Activities

   Discharges of storm water runoff from construction support activities, including concrete batch plants, asphalt batch plants, equipment staging areas, material storage yards, material borrow areas, and excavated material disposal areas may be authorized under this general permit provided:

   (a) the activity is located within a 1-mile distance from the boundary of the permitted construction site and directly supports the construction activity;

   (b) the 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 supporting industrial activity site; and

   (c) the industrial activity either does not operate beyond the completion date of the construction activity or obtains separate TPDES authorization for discharges.

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;

(b) fire hydrant flushings;

(c) vehicle, external building, and pavement wash water 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, an dust;

(d) water used to control dust;

(e) potable water sources including waterline flushings;

(f) 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.

4. Other Permitted Discharges

Any discharge authorized under a separate NPDES, TPDES, or TCEQ permit may be combined with discharges authorized by this permit.

Section B. 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 provided in Part II. A.2., A3., and A4., all discharges authorized by this general permit must be composed entirely of storm water associated with construction activity.

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 Part II.G.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. G.2.

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) implementation plan are not eligible for this permit unless they are consistent with the approved TMDL and the implementation plan. 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).

(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, 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 contributing zone, applicants must also submit a copy of the NOI to the appropriate TCEQ regional office."

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 1921 Cedar Bend Dr., Ste. 150 Austin, Texas (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 Section 401.002 of the Texas Local Government Code.

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.

Section C. 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 issuance 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 issuance date of this permit, and authorized under NPDES general permit TXR100000 (issued July 6, 1998, FR 36490), must submit an NOI to obtain authorization under this general permit within 90 days of the issuance 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 federal NPDES permit. If the construction activity is completed prior to this 90-day deadline, and the site would otherwise qualify for termination of coverage under that federal NPDES permit, the operator must notify the executive director of the TCEQ in writing within 30 days of that condition.

2. Small Construction Activities

(a) New Construction - Discharges from sites where the commencement of construction occurs on or after the issuance 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 March 10, 2003, 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 be authorized, either under this general permit or a separate TPDES permit, prior to March 10, 2003.

Section D. Obtaining Authorization to Discharge

1. Small construction activities are determined to occur during periods of low potential for erosion, and operators of these sites may be automatically authorized under this general permit and not required to develop a storm water pollution prevention plan or submit a notice of intent (NOI), provided:

   (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, final 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 receiving the discharge at least two days prior to commencement of construction activities; and

   (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).

2. Operators of small construction activities not described in Part II.D.1. above may be automatically authorized under this general permit, and operators of these sites are not required to submit an NOI provided they:

   (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 a completed construction site notice (Attachment 2 of this general permit);

(c) post a signed copy of the construction site notice 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 maintain the notice in that location until completion of the construction activity; and

(d) 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.

3. Operators of all other construction activities that qualify for coverage under this general permit must:

(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) submit a Notice of Intent (NOI), using a form provided by the executive director, at least 2 days prior to commencing construction activities; or

(c) if the operator changes, or an additional operator is added after the initial NOI is submitted, the new operator must submit an NOI at least two (2) days before assuming operational control;

(d) post a copy of the NOI at the construction site in a location where it is readily available for viewing prior to commencing construction activities, and maintain the notice in that location until completion of the construction activity;

(e) provide a copy of the signed NOI to the operator of any municipal separate storm sewer system receiving the discharge, at least two (2) days prior to commencing construction activities; and

(f) implement the SWP3 prior to beginning construction activities.

4. Effective Date of Coverage

(a) Operators of construction activities described in either Part II. D.1. or D.2. are authorized immediately following compliance with the conditions of Part II. D.1. or D.2. that are applicable to the construction activity.

(b) Operators of all other construction activities eligible for coverage under this general permit, unless otherwise notified by the executive director, are provisionally authorized two (2) days from the date that a completed NOI is postmarked for delivery to the TCEQ. If electronic submission of the NOI is provided, and unless otherwise notified by the executive director, operators are provisionally authorized 24 hours 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.

(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 is obtained.

5. Notice of Change (NOC) Letter

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 a NOC letter within 14 days after discovery. If relevant information provided in the NOI changes, a NOC letter must be submitted within 14 days of the change. A copy of the NOC must be provided to the operator of any MS4 receiving the discharge.

6. 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 must be signed according to 30 TAC § 305.44 (relating to Application for Permit).

7. Contents of the NOI

The NOI form shall require, at a minimum, the following information:

(a) the name, address, and telephone number of the operator filing the NOI for permit coverage;

(b) the name (or other identifier), address, county, and latitude/longitude of the construction project or site;

(c) number of acres that will be disturbed (estimated to the largest whole number);

(d) whether the project or site is located on Indian Country lands;

(e) confirmation that a SWP3 has been developed and that the SWP3 will be compliant with any applicable local sediment and erosion control plans; and

(f) name of the receiving water(s).

Section E. Application to Terminate Coverage

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 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.

1. Notice of Termination Required

The NOT must be submitted to TCEQ, and a copy of the NOT provided to the operator of any MS4 receiving the discharge, within thirty (30) days, after:

(a) final stabilization has been achieved on all portions of the site that is the responsibility of the permittee: or

(b) another permitted operator has assumed control over all areas of the site that have not been finally stabilized; and

(c) 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 if the new operator has sought 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.

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 a NOI, the permittees site-specific TPDES general permit 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 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.

Section F. Waivers from Coverage

The executive director may waive the otherwise applicable requirements of this general permit for storm water discharges from small construction activities under the terms and conditions described in this section.

1. Waiver Applicability and Coverage

Operators of small construction activities may apply for and receive a waiver from the requirements to obtain authorization under this general permit where:

(a) the calculated rainfall erosivity R factor for the entire period of the construction project is less than five (5);

(b) the operator submits 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 submitted to the TCEQ at least two (2) days before construction activity begins.

2. 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.

3. 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 factor 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.D.2. or Part II.D.3. at least two (2) days before the end of the approved waiver period.

Section G. 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 NOI in accordance with the procedures set forth in 30 TAC Chapter 205, 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 because of:

(a) the conditions of an approved TMDL or TMDL implementation plan;

(b) the activity is determined to cause a violation of water quality standards or is found to cause, or contribute to, the loss of a designated use of surface water in the state: and

(c) any other considerations defined in 30 TAC Chapter 205 would include the provision at 30 TAC § 205.4(c)(3)(D), which allows TCEQ 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."

3. Any discharge eligible for authorization under this general permit may alternatively be authorized under a separate, applicable general permit according to 30 TAC Chapter 205 (relating to General Permits for Waste Discharges).

Section H. Permit Expiration

This general permit shall be issued for a term not to exceed five (5) years. 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. If the TCEQ publishes a notice of its 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.

In the event that the general permit is not renewed, discharges that are authorized under the general permit must obtain either a TPDES individual permit or coverage under an alternative general permit.

Part III. Storm Water Pollution Prevention Plans (SWP3)

Storm water pollution prevention plans must be prepared for storm water discharges that will reach Waters of the United States, including discharges to MS4 systems 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 and ensure the implementation of practices that will be used to reduce the pollutants in storm water discharges associated with construction activity at the construction site and assure 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 that compliance with the terms and conditions of this general permit is met in the areas of the construction site where that operator has operational control over construction plans and specifications or day-to-day operational control.

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 submit an NOI and 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 participant 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. Operators with Control Over Construction Plans and Specifications

All operators with operational control over construction plans and specifications to the extent necessary to meet the requirements and conditions of this general permit must:

(a) ensure the project specifications allow or provide that adequate BMPs may be 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 operational 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 such that those operators may modify best management practices as are 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 TPDES permit numbers for permittees with the day-to-day operational control over those activities necessary to ensure compliance with the SWP3 and other permit conditions. In the case that responsible parties have not been identified, the permittee with operational control over project specifications must be considered to be the responsible party until such time as the authority is transferred to another party and the plan is updated.

2. Operators with Day-to-Day Operational Control

Operators with day-to-day operational control of those activities at a project that are necessary to ensure compliance with a SWP3 and other permit conditions must:

(a) ensure that the SWP3 for portions of the project where they are operators meets the requirements of this general permit;

(b) ensure that the SWP3 identifies the parties responsible for implementation of best management practices described in the plan;

(c) ensure that the SWP3 indicates areas of the project where they have operational control over day-to-day activities;

(d) ensure that the SWP3 indicates, for areas where they have operational control over day-to-day activities, the name and TPDES permit number of the parties with operational control over project specifications (including the ability to make modifications in specifications).

Section C. Deadlines for SWP3 Preparation and Compliance

1. The SWP3 must be:

(a) completed prior to obtaining authorization under this general permit;

(b) implemented prior to commencing construction activities that result in soil disturbance;

(c) updated as necessary to reflect the changing conditions of new operators, new areas of responsibility, and changes in best management practices; and

(d) 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. Operators of a large construction activity obtaining authorization to discharge through submission of a NOI must post a notice near the main entrance of the

construction site. If the construction project is a linear construction project (e.g. pipeline, highway, etc.), the 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. The notice must be readily available for viewing by the general public, local, state, and federal authorities, and contain the following information:

(a) the TPDES general permit number for the project (or a copy of the NOI that was submitted to the TCEQ if a permit number has not yet been assigned);

(b) the name and telephone number of a representative for the operator;

(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. Keeping Plans Current

The permittee must revise or update the storm water pollution prevention plan whenever:

1. there is 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; or

2. 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 description, or project description must be developed to include:

(a) a description of the nature of the construction activity, potential pollutants and sources;

(b) a description of the intended schedule or sequence of major activities that will disturb soils for major portions of the site;

(c) 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;

(d) data describing the soil or the quality of any discharge from the site;

(e) a map showing the general location of the site (e.g. a portion of a city or county map);

(f) 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 stabilization practices are expected to be used;

(v) locations of off-site material, waste, borrow, fill, or equipment storage areas;

(vi) surface waters (including wetlands) either adjacent or in close proximity; and

(vii) locations where storm water discharges from the site directly to a surface water body.

(g) the location and description of asphalt plants and concrete plants providing support to the construction site and authorized under this general permit;

(h) the name of receiving waters at or near the site that will be disturbed or that will receive discharges from disturbed areas of the project; and

(i) a copy of this TPDES general permit.

2. The SWP3 must describe the best management practices 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) Erosion and Sediment Controls

(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. Controls must also be designed and utilized to reduce the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water from the site.

(ii) Control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications. If periodic inspections or other information indicates a control has been used incorrectly, or that the control is performing inadequately, the operator must replace or modify the control as soon as practicable after discovery that the control has been used incorrectly, is performing inadequately, or is damaged.

(iii) Sediment must be removed from sediment traps and sedimentation ponds no later than the time that design capacity has been reduced by 50%.

(iv) If sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain event.

(v) Controls must be developed to limit, to the extent practicable, offsite transport of litter, construction debris, and construction materials.

(b) Stabilization Practices

The SWP3 must include a description of interim and permanent 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) Stabilization practices may include but are not limited to: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, 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 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) Stabilization measures must be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and except as provided in (a) through (c) below, must be initiated no more than fourteen (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 day after 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 is temporarily ceased, and earth disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures do not have to be initiated on that portion of site.

(c) In arid areas (areas with an average rainfall of 0 to 10 inches), semiarid areas (areas with an average annual rainfall of 10 to 20 inches), and areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practicable.

3. Structural Control Practices

The SWP3 must include a description of any structural control practices used to divert flows away from exposed soils, to limit the contact of runoff with disturbed areas, or to lessen the off-site transport of eroded soils.

(a) Sediment basins are required, where feasible for common drainage locations that serve an area with ten (10) or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. 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 is required where attainable until final stabilization of the site. 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 final stabilization, if

these flows are diverted around both the disturbed areas of the site and the sediment basin. In determining whether installing a sediment basin is feasible, the permittee may consider factors such as site soils, slope, available area on site, public safety, precipitation patterns, site geometry, site vegetation, infiltration capacity, geotechnical factors, depth to groundwater and other similar considerations. Where sediment basins are not feasible, equivalent control measures , which may include a series of smaller sediment basins, must be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area.

(b) Sediment traps and sediment basins may also 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 (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction. 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, or equivalent control measures, may be provided or 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.

4. 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 will 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.

5. Other Controls

(a) Off-site vehicle tracking of sediments and the generation of dust must be minimized.

(b) The SWP3 must include a description of construction and waste materials expected to be stored on-site and a description of controls to reduce pollutants from these materials.

(c) The SWP3 must include a description of pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants and dedicated concrete plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.

monitoring period. A copy of the DMR must either be retained at the facility or shall be made readily available for review by authorized TCEQ personnel upon request, by March 31st following the end of each annual monitoring period. If the results indicate the violation of one or more of these numeric limitations, the permittee must also submit the DMR to the TCEQ's Information Resources Center (MC 212) by March 31st of each annual monitoring period.

Part V. 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.D. For activities that are not required to submit an NOT, records shall be retained for a minimum period of three (3) years from the date that either: final stabilization has been achieved on all portions of the site that is the responsibility of the permittee; or another permitted operator has assumed control according to over all areas of the site that have not been finally stabilized. Records include:

1. A copy of the SWP3 plan.
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.

Part VI. 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, 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 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 VII. Fees

Section A. Application Fees

An application fee of $100 must be submitted with each NOI for coverage of a large construction activity. A fee is not required for submission of an NOT or NOC letter.

Section B. Water Quality Fees

Large construction activities authorized under this general permit must pay an annual Water Quality Fee of $100 under Texas Water Code 26.0291 and according to TAC Chapter 205 (relating to General Permits for Waste Discharges).

Appendix A.
Periods of Low Erosion Potential by County

Start Date - End Date
Dec. 15 - Feb. 14
Archer
Baylor
Brown
Callahan
Childress
Coke
Coleman
Concho
Cottle
Dimmit
Eastland
Edwards
Fisher
Foard
Hardeman
Haskell
Irion
Jones
Kerr
Kimble
King
Kinney
Knox
Mason
Maverick
McCulloch
Menard
Nolan
Real
Runnels
Schleicher
Shackelford
Stephens
Stonewall
Sutton
Taylor
Throckmorton
Tom Green
Uvalde
Wichita
Wilbarger
Young
Zavala

Start Date - End Date
Nov. 15 - Apr. 30
Andrews
Armstrong
Borden
Brewster
Briscoe
Carson
Castro
Crane
Crosby
Dawson
Deaf Smith
Ector
Floyd
Gaines
Garza
Glasscock
Hale
Hansford
Hartley
Howard
Hutchinson
Lubbock
Lynn
Martin
Midland
Mitchell
Moore
Oldham
Pecos
Potter
Randall
Reagan
Scurry
Sherman
Sterling
Swisher
Terrell
Terry
Upton

Start Date - End Date
Feb. 1 - Mar. 30
Hall

Start Date - End Date
Nov. 15 - Jan. 14 or **Feb. 1 - Mar. 30**
Crockett
Dickens
Kent
Motley
Val Verde

Start Date - End Date
Nov. 1 - Apr. 14 or **Nov. 15 - Apr. 30**
Dallam
Hockley
Lamb
Parmer
Ward

Start Date - End Date
Nov. 1 - Apr. 30 or **Nov. 15 - May. 14**
Bailey
Cochran
Jeff Davis
Loving
Presidio
Reeves
Winkler
Yoakum

Start Date - End Date
Nov. 1 - May. 14
Culberson
Hudspeth

Start Date - End Date
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**
El Paso

Start Date - End Date
Jan. 1 - Mar. 30 or **Dec. 1 - Feb. 28**
Collingsworth Wheeler
Donley
Gray
Hemphill
Lipscomb
Ochiltree
Roberts

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.D.1.** of the TCEQ General Permit Number TXR150000 for discharges of storm water runoff from construction sites. Additional information regarding the TCEQ storm water permit program may be found on the internet at:
www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdestorm

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 Construction Sites Authorized Under Part II.D.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 authorization by waiver under Part II.D.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 this general permit. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4 system. 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

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.D.2.** of the TCEQ General Permit Number TXR150000 for discharges of storm water runoff from construction sites. Additional information regarding the TCEQ storm water permit program may be found on the internet at:
www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdestorm

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 Construction Sites Authorized Under Part II.D.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.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 implemented according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4 system. 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

CONCRETE BATCH FACILITIES

STW/ TXR15_____/ CO

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME

ADDRESS

FACILITY LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

NOTE: Enter your permit number in the underlined space in the upper right hand corner of this page. Example: STW/TXR15 00123/ CO

Mail to: TCEQ (MC 212)
P.O. Box 13087
Austin, TX 78711-3087

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER

MONITORING PERIOD					
YEAR (20-21)	MO (22-23)	DAY (24-25)	YEAR (26-27)	MO (28-29)	DAY (30-31)
	01	01		12	31

☐

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING			(4 Card Only) QUALITY OR CONCENTRATION				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	MINIMUM (38-45)	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS			
Total Suspended Solids	SAMPLE MEASUREMENT	*******	*******	*******	*******	*******					
	SAMPLE REQUIREMENT	*******	*******	*******	*******	*******	65 Daily Max	mg/l		1/Year	Grab
Oil & Grease	SAMPLE MEASUREMENT	*******	*******	*******	*******	*******					
	SAMPLE REQUIREMENT	*******	*******	*******	*******	*******	15 Daily Max	mg/l		1/Year	Grab
pH	SAMPLE MEASUREMENT	*******	*******	*******	*******	*******					
	SAMPLE REQUIREMENT	*******	*******	*******	*******	*******	6.0 - 9.0 Range	S.U.		1/Year	Grab
	SAMPLE MEASUREMENT										
	SAMPLE REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
	I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.						
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

EPA Form 3320-1 (3-99) (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED) PAGE OF
Form Approved OMB No. 2040-004

ATTACHMENT E

TEMPORARY BMPS FOR ON-SITE STORMWATER

Best Management Practices used to prevent surface water and groundwater pollution are listed and described below.

Temporary BMPs

Before construction begins at the water treatment plant, a silt fence will be installed around the downstream perimeter of the WTP site to prevent construction-generated sediments from flowing off-site with stormwater runoff. The silt fence will be supported by the existing fence posts along the site property line. Hay bales will also be installed along the grassy swale at the site entrance to provide sediment control for the stormwater that flows between the silt fences at the property entrance. Temporary BMPs are shown in the attached Figure 1. Erosion at the site is not expected to be problematic as the site consists of limestone rock covered by varying depths of soil. Sediment and erosion control practices during construction are specified in the attached specification Section 02315. Earthwork and excavation on the site will be minimized due to the high expense of rock excavation. As shown in the existing WTP site plan (Sheet 1C01), vegetation was protected from clearing wherever possible. A silt fence will also be installed around the downstream perimeters of the RWCT site, as shown in Figure 2C01.

= SILT FENCE

ORA MAE PFEUFFER
39830 FN 3159
CANYON LAKE, TX 78133

83.60 ACRES
VOL. 130, PG. 529-531

ORA MAE PFEUFFER
VOL. 184, PG. 734
5.716 AC.

EXISTING STRUCTURE

EXISTING DIRT/GRAVEL ROAD

BENCH MARK (A-413)
ELEV= 1381.41

EXISTING GRAVEL DRIVEWAY

EXISTING STRUCTURE

184.0'

40'-0"

CHAIN LINK FENCE SEE DETAIL 1/11C02

PROTECT EXISTING TREES

PROPERTY LINE

CHAINLINK FENCE SET 2FT. INSIDE PROPERTY LINE (TYP AROUND PERIMETER) 1/11C02

20.0'x80.0' CONSTRUCTION STAGING AREA

NORTH ENTRANCE DOUBLE SWING GATE SEE DETAIL

PROTECT EXISTING TREES

REMOVE EXISTING GRAVEL DRIVEWAY WITHIN FENCE AND REPLACE WITH COMPACTED GRAVEL ROAD

JUNCTION BOX SEE SHEET 9E19 & 9E20

50' TEMPORARY CONSTRUCTION EASEMENT

50' WATER LINE EASEMENT

EXISTING STRUCTURE

SITE BOLLARD (TYP) 5/11C03

162,000 GAL 34'-0" RWCT-201

162,000 GAL 34'-0" RWCT-202

BASE EL. 1384.00

BASE EL. 1384.00

8" DR INV. EL. 1379.00

(FUTURE RADIO ANTENNA BY OTHERS)

COMPACTED GRAVEL ROAD 7/11C01

JUNCTION BOX SEE SHEET 9E19 & 9E20

SOUTH ENTRANCE DOUBLE SWING GATE SEE DETAIL

36" RW

BY OTHERS THIS CONTRACT

24" DRAIN BOX SEE DETAIL 4/2C02

8" DR INV. EL. 1375.50

8" DR 40'-0"

6" DR INV. EL. 1375.50

TANKS PLAN SEE SHEET 2C02

PROTECT EXISTING TREES

THIS CONTRACT BY OTHERS

30" RW

ELECTRICAL TRANSFORMER SEE SHEET 9E19 & 9E20

SITE BOLLARD (TYP) 5/11C03

EXISTING FENCE

SITE BENCH MARK (A-414)
ELEV= 1378.46

EXISTING DIRT/GRAVEL ROAD

EXIST. PL

NOTES:

1. ⌖ DENOTES POINT NO.
2. PROVIDE FILTER FABRIC FENCE DURING CONSTRUCTION FOR EROSION CONTROL. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND INSTALLING FILTER FABRIC FENCE IN ACCORDANCE WITH DETAIL ON SHEET 11C01.
3. ALL CONSTRUCTION WORK SHALL BE LIMITED WITHIN PROPERTY LINE.
4. REFER TO SPECIFICATIONS FOR GENERAL SITE REQUIREMENTS.
5. REFER TO SPECIFICATIONS FOR SITE SECURITY REQUIREMENTS DURING CONSTRUCTION.
6. GENERAL BORING LOCATIONS ARE SHOWN. THE GEOTECH REPORT IS AVAILABLE UPON REQUEST.
7. WHERE PIPE ELEVATIONS ARE NOT SHOWN, MINIMUM 4FT EARTH COVER SHALL BE PROVIDED. FOR 8" DRAIN SEE PLAN FOR ELEVATIONS. CONTRACTOR SHALL SUBMITT PIPE LAY SCHEDULES FOR APPROVAL.
8. ALL PIPELINES SHALL BE DESIGNED TO RESIST THRUST FORCES DEVELOPED DURING PRESSURE TESTING AND OPERATION. PROVIDE RESTRAINED PIPE JOINTS FOR ALL PIPING.
9. PROVIDE TAPS IN THE PIPELINES FOR PRESSURE TESTING. ALL PIPELINES SHALL BE PRESSURE TESTED. PROVIDE TEMPORARY BULKHEADS AND BLIND FLANGES AS NEEDED. SEE THE SPECIFICATIONS FOR PRESSURE TEST REQUIREMENTS.
10. UNLESS NOTED OTHERWISE, ALL FLANGE COUPLING ADAPTERS (FCA) SHALL BE RESTRAINED.
11. CONCRETE ENCASE 8" DR 2FT EITHER SIDE OVE 30" RW PIPE AT CROSSING.
12. WORK DESIGNATED "BY OTHERS" WILL BE PROVIDED UNDER A SEPARATE CONSTRUCTION CONTRACT. CONTRACTOR SHALL COORDINATE WITH OTHER CONTRACTOR TO VERIFY THE COORDINATES AND DEPTH OF CONNECTIONS TO 30" AND 36" RW PIPELINES PRIOR TO FABRICATION OF PIPE. FAILURE TO VERIFY CONNECTIONS SHALL NOT CONSTITUTE ADDITIONAL COST TO OWNER IF MODIFICATIONS ARE REQUIRED.
13. CONTRACTOR SHALL PROTECT TREES IN AREAS WHERE CONSTRUCTION DOES NOT DISTURB THE EXISTING TREES AND VEGETATION. CLEARING SHALL BE LIMITED WITHIN 10 FT. OF NEW WORK. PROVIDE RE-SEEDING OF DISTRUBED AREAS PER THE SPECIFICATIONS.
14. MAXIMUM SLOPE OF GRADING AT SOUTH GATE SHALL BE NO MORE THAN 7%. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM TANKS.
15. SWPPP AND NOI PLANS ARE AVAILABLE UPON REQUEST.

SITE COORDINATES

Point No.	Northing	Easting	Full Desc
200	849185.4879	194080.3608	FENCE CORNER
201	849249.2748	193994.4554	FENCE CORNER
202	849368.6789	194108.8843	FENCE CORNER
203	849287.8819	194154.3697	FENCE CORNER
204	849240.3624	194075.1525	CENTER RW-TANK
205	849286.1888	194118.8893	CENTER RW-TANK
206	849286.8584	194140.5521	POINT OF CONN. 30" RW
207	849283.6222	194118.3285	BORE B-1 RW-TANK
208	849241.9029	194076.6072	BORE B-2 RW-TANK
209	849179.4524	194086.0432	POINT OF CONN. 36" RW
210	849200.3891	194044.5689	END OF ROAD CURVE
211	849212.8382	194043.6104	END OF ROAD CURVE
212	849289.8842	194045.0962	END OF ROAD CURVE
213	849315.5004	194089.7926	END OF ROAD CURVE
214	849325.0718	194105.5887	END OF ROAD CURVE
215	849341.4139	194118.5280	END OF ROAD CURVE
216	849321.5253	194143.7199	END OF ROAD CURVE
217	849316.2418	194149.1750	END OF ROAD CURVE
218	849258.8495	194149.8164	END OF ROAD CURVE
219	849211.0333	194105.2300	END OF ROAD CURVE
220	849198.4420	194077.8065	END OF ROAD CURVE
221	849192.4482	194064.7477	END OF ROAD CURVE
222	849187.8864	194060.2809	END OF ROAD CURVE
223	849198.7811	194084.8953	℄ 30" PIPE JOINT
224	849243.4875	194039.0781	℄ 30" PIPE JOINT
225	849259.9327	194055.1383	℄ 30" PIPE JOINT
226	849305.7185	194099.7950	℄ 30" PIPE JOINT
227	849261.0625	194145.6409	℄ 30" PIPE JOINT
228	849215.2483	194100.8545	℄ 30" PIPE JOINT
229	849257.3794	194074.9878	⊙ POINT OF RWCT-201
230	849303.1938	194119.8580	⊙ POINT OF RWCT-202
231	849248.00	194122.00	FUTURE RADIO ANTENNA
232	849144.8389	194080.3309	BENCH MARK A-413
233	849383.0745	194105.0855	BENCH MARK A-414

MALCOLM PIRNIE

HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER CW
DESIGNED
DRAWN YW
CHECKED RH

GBRA GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

TEMPORARY BMPS

RAW WATER CONTROL TANKS
SITE PLAN

DATE NOVEMBER 2003
SCALE SCALE 1" = 10'
FILE NAME GBRA-4-2C01.DWG
SHEET NO. 2C01
ISSUE 0

FM 3159
(ROW VARIES – 120 FT. MIN.)

EXIST. FENCE

12' CONC. DRWY (TYP)

MEMBRANE BUILDING
FF= 1372.50

FERRIC SULFATE STORAGE TANK

CHLORINE FEED VAULT

CONTROL VALVE VAULT

FLOW METER VAULT No. 1

RAPID MIX BASIN
FF= 1371.00

FLOCCULATION BASIN FF= 1371.00

CIP LAGOON 2
FF= 1367.50

CIP LAGOON 1
FF= 1367.50

LAGOON DRAIN PUMP

CHLORINE BUILDING
FF= 1368.00

FUTURE GAC

FLOW METER VAULT No. 2

OPERATIONS BUILDING
FF= 1371.50

BUS PARKING

RECYCLE PUMPS

RESIDUALS LAGOON 1
FF VARIES

RESIDUALS LAGOON 2
FF VARIES

2 MG TREATED WATER TANK
THST-701
BASE EL. 1354.50

TANK INLET VALVE VAULT

TANK OUTLET VALVE VAULT

HYDROPNEUMATIC TANK SLAB

SITE DRAIN PUMP STATION

FLOW METER VAULT No. 3

TANK INLET VALVE VAULT MH

CONCRETE PAVEMENT

HIGH SERVICE PUMP STATION
FF= 1357.5

TANK OUTLET VALVE VAULT

FUTURE 2 MG TREATED WATER TANK
THST-702

CONC. RAMP

SEPTIC TANK

FUTURE RESIDUALS LAGOON

24" CATCH BASIN

HEADWALL

CHAIN LINK FENCE

EXIST. FENCE

CRANES MILL ROAD

WARNER RANCH

ASPHALT PAVEMENT ROAD SEE NOTE 4 AND DETAIL

24' WIDE GATE SEE DETAIL

20' X 20' TURN AROUND

24" CATCH BASIN

HEADWALL

- SILT FENCE
- HAY BALES

PRELIMINARY - NOT FOR CONSTRUCTION

MALCOLM PIRNIE

GBRA

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS

SITE PLAN

TEMPORARY BMPS

DATE	NOVEMBER 2003
SCALE	1" = 60'
FILE NAME	GBRA-VEG-FILTER.DWG

ATTACHMENT F

SECTION 02921

SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Seeding work encompasses areas disturbed by construction operations not indicated to be sodded.

B. Finish Grade Elevations: Work to establish finish grades is not specified in this section. Refer to Section - Soil Preparation.

1.2 SITE CONDITIONS

A. Verification of Dimensions: Refer to Section 02900, Soil Preparation.

B. Existing Conditions: Refer to Section 02900, Soil Preparation.

C. Obstructions: Refer to Section 02900, Soil Preparation.

D. Underground Utilities: Refer to Section 02900, Soil Preparation.

E. Existing Vegetation: Refer to Section 02900, Soil Preparation.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Landscape Irrigation System	Section 02442
Soil Preparation	Section 02900
Sodding	Section 02925
Exterior Plants	Section 02930
Landscape Maintenance	Section 02935
Treatment of Existing Trees	Section 02940

1.4 QUALITY ASSURANCE

A. Seeding installation or maintenance must be supervised by a staff member of the Contractor who possesses the current certification:

1. Certified Landscape Professional Contractor (CLPC) as administered by Texas Nursery and Landscape Association (TNLA).

B. It is the obligation of the Contractor to provide the Owner or Landscape Architect with documentation that the above qualification is met.

C. Source Quality Control:

1. General: Seeding materials shall meet or exceed the Specifications of Federal, State and local laws requiring inspection for plant disease and insect control.
2. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
3. Inspections: All necessary state, federal, and other inspection certificates shall accompany the invoice for each shipment or order for seeding materials as may be required by law. The Landscape Architect reserves the right to reject, at any time or place, prior to final acceptance of the work, any or all of the seeding materials which fail to meet requirements of these specifications.

D. The Landscape Architect reserves the right to inspect seeded areas from time of installation to Final Acceptance. The time of inspection shall be after the grass has gone unmowed for a minimum of two weeks. Any evidence of non-specified grasses or weeds will be cause for rejection and replacement of the unacceptable seeded areas.

1.5 SUBMITTALS

A. Furnish at Landscape Architect's office, prior to installation, the following samples:

1. Seed: Submit seed supplier's certification of grass species. Identify source location.
2. BioStimulant: Label from container or manufacturer's brochure.
3. Fertilizer: Label from bag or supplier's brochure and fertilizer analysis for seeded lawn areas.
4. Herbicide: Label from container or Supplier's brochure.
5. Mulching Agent: Label from bag and 1-ounce sample.

B. After completion of the project, submit the following:

1. Maintenance Instructions: See Section 02935- Landscape Maintenance for requirements.
2. Watering Schedule: See Section 02935- Landscape Maintenance for requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.7 ABBREVIATIONS

S.Y. Square Yard
S.F. Square Feet

1.8 JOB CONDITIONS

A. Basic Regulations: Seeding operations shall be conducted under favorable weather conditions during the seasons which are normal for such work as determined by acceptable practice in the locality. Contractor is hereby notified of active utilities and caution shall be exercised to avoid interruption of services. The Contractor is responsible for replacement of any buried utilities, irrigation lines, etc., if they are broken during the seeding operations. It is recommended that he contact the appropriate utility to get the locations of underground utilities. The replacement costs are at the Contractor's expense. When it is necessary to cross paved areas, curbing or walks, protection against damage shall be provided by the Contractor.

1. When conditions detrimental to grass growth are encountered during seeding , such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before seeding.

B. Planting Sequence: Seeding operations shall be conducted after final grades are established and after trees and shrubs are planted, unless otherwise acceptable to Landscape Architect. If planting of trees and shrubs occurs after seeding, protect seeded areas and promptly repair any damage resulting from planting operations

C. Plant trees and shrubs after final grades are established and prior to planting of grass areas, unless otherwise acceptable to Landscape Architect. If planting of trees and shrubs occurs after grass work, protect grass areas and promptly repair damage to grass areas resulting from planting operations.

D. Time Period of Seeding Operation: seeding of grass areas shall occur within the period of March 30 through September 1. Any additional work required, e.g. repair of erosion, weed control, temporary winter seeding, reseeding and any other work associated with the installation and germination/establishment of the grass, due to not completing the grass planting in this time period shall be fully borne by the Contractor.

1.9 WARRANTY & GUARANTEES

A. Contractor shall guarantee that at the end of the project warranty period, all lawn areas have established grass, are uniform in color and quality, and are reasonably free from visible imperfections. Any grass areas not in this condition will be replaced at no expense to the Owner.

B. The Contractor shall not be held responsible for damages to grass areas due to the Owner's neglect, the general building or other contractor's working on the site, application of fertilizers, pesticides or other materials not applied by him, or for damage caused by theft or vandalism.

C. Inspection to determine the condition of the grass areas prior to substantial completion of Project will be made by the Landscape Architect upon receiving such a request from the Contractor at a minimum of 30 days following acceptance of initial planting. Correction shall be as herein specified, and repeated until lawn is thoroughly established at all designated locations.

D. Repair: When any portion of the surface becomes gullied or otherwise damaged or treatment is destroyed, the affected portion shall be repaired to reestablish condition and grade of soil to as it was prior to injury as directed. Repair work required shall be performed without cost to the Owner. Repair shall be made within 10 days or as soon as weather conditions are satisfactory for planting.

PART 2 - PRODUCTS

2.1 SOIL ADDITIVES

A. Commercial Starter Fertilizers (Hydromulch Seeding): 13-13-13 or 15-15-15 water soluble fertilizer.

B. Lawn Fertilizer: 5-3-2 Soil Food manufactured by Gardenville (210)651-6115.

C. BioStimulant: Concentrated biostimulant liquid complex of vitamins, hormones, plant growth regulators, root growth stimulators with micronutrients and a non-phytotoxic wetting agent with analysis of poly-co-ferment liquid enzyme complexes (67.5%), kelp and fish extracts (9.00%), humic acid (2.00%), lignin polymers (1.5%), dimethylopyslioxone oxide and non-lonic surfactants (20.00%). Product Greenhouse Blend; manufactured by AgPro Systems, Inc. (800)946-5545.

D. Post-Emergence Herbicide: Round-Up by Monsanto Corp., or approved equal.

2.2 LAWN MATERIALS

A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and the Texas Seed Law.

1. Seed which has become wet, moldy or otherwise damaged in transition in storage will not be accepted. The seed shall not contain any objectionable foreign material that will hinder proper distribution. All seed shall have been treated with an approved fungicide by commercial or state laboratory not more than six months prior to date of planting.
2. All seeding rates to be Pure Live Seed (PLS). Minimum percent of PLS to be 85%. The seeds planted per acre shall be of the type specified with the mixture, rate and planting conditions as follows:
   a. Tall Native Grass Areas: Native grass mix consisting of Buffalograss, Sideoats Grama, Little Bluestem, Indian Grass, Tall Grama, Bushy Bluestem, Big Bluestem and Green Spangletop at a rate of 20#'s per acre. Distributed by Native American Seed, 127 N. 16Th St., Junction, Texas 76849, 1-800-728-4043. Time period March 1 thru September 1.
   b. Short Native Grass Areas: Native grass mix consisting of 66% buffalograss and 34% blue grama; seeding rate at 20#'s per acre. Time period March 1 thru September 1.

2.3 WILDFLOWER AREAS

A. Wildflower Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and the Texas Seed Law.

1. Seed which has become wet, moldy or otherwise damaged in transition in storage will not be accepted. The seed shall not contain any objectionable foreign material that will hinder proper distribution. All seed shall have been treated with an approved fungicide by commercial or state laboratory not more than six months prior to date of planting.
2. All seeding rates to be Pure Live Seed (PLS). Minimum percent of PLS to be 85%. The seeds planted per acre shall be of the type specified with the mixture, rate and planting conditions as follows:
   a. Wildflower Areas: Mix of wildflower seed consisting of Texas Bluebonnets, Drummond Phlox, Gayfeather, Indian Blanket, Lanceleaf Coreopsis, Purple Coneflower, Cutleaf Daisy, Huisache Daisy, Bush Sunflower, Lemon Mint, Lazy Daisy, Blackeyed Susan, Mexican Hat, Plains Coreopsis and Indian Paintbrush at a rate of ¼ #'s per 500 s.f.. Distributed by Native American Seed, 127 N. 16Th St., Junction, Texas 76849, 1-800-728-4043.

2.4 MISCELLANEOUS LANDSCAPE MATERIALS

A. Water: Furnished by the Contractor. Hose and other watering equipment to be provided by Contractor.

B. Mulching Agent: Provide Weyerhauser virgin wood fiber mulch, Silva-Fiber, distributed by James Lincoln Corp., Garland, Texas, 972/840-2440 or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Site Tolerances - Final grade of soil after seeding of grass areas is complete shall be one inch below top of adjacent pavement of any kind.

B. Broadcast Seeding - After grass areas are graded, sow seed with adequate equipment, by spreader or drill seeding machine, at time when wind velocity does not exceed 5 mph. Distribute seed evenly by sowing equal quantity in two directions at right angles to each other.

1. Top Dressing - After seeding, rake or broom seed in gently and roll area to firm in seed into top 1/8 inch of soil. After rolling, cover area evenly with top dressing of cellulose wood fiber at rate Per the following

   a. Mixture 1 (Standard Mix):
      1. 45#/1000 sq.ft. mulching agent
      2. 7.6#/1000 sq.ft. water soluble 13-13-13 fertilizer or 6.6#/1000 sq. ft. 15-15-15.

   b. Mixture 2 (for Slopes (over 6:1 or 17%) and Problem Areas)
      1. 50#/1000 sq.ft. mulching agent
      2. 7.6#/1000 sq.ft. water soluble 13-13-13 fertilizer or 6.6#/1000 sq. ft. 15-15-15.
      3. 1.5#/1000 sq.ft. glue agent

2. After Top Dressing - Thoroughly water seeded areas. Reseed areas that do not show prompt germination at 15 day intervals until an acceptable stand of grass is assured.

C. Wildflower Seed: after decomposed granite rings are compacted and graded to match final grading. Apply wildflower seed to decomposed granite rings by hand broadcast method.

1. Apply seed at a rate of ¼ #'s per 500 s.f. Seed area by evenly distributing seed over entire area using hand spreader/broadcast method. (SEE PLAN FOR AREA DETAIL).
2. After seeding rake seed into top ¼ inch of decomposed granite using firm bow

type rake. Roll entire area with roller to firm in seed.

3. Throughly water seeded area. Maintain water schedule to apply a 1 inch per week rate accounting for rainfall amounts. Reseed areas that do not show prompt germination at 15-day intervals until even distribution of seed germination is assured.

D. Apply four (4) fluid ounces/1000 s.f. Biostimulant to newly hydromulched areas. Contractor's option to include in original hydromulch slurry application.

E. Seed indicated areas and any areas beyond the areas indicated which are disturbed as a result of construction operations.

3.2 MAINTENANCE

A. Begin maintenance immediately after seeding. Maintenance shall continue for a total period of 90 days from the date of final acceptance of the project.

B. Three (3) weeks following completion of seeding, Contractor shall complete one additional application of BioStimulant as per manufacturer's recommendations.

C. Fertilization: 30 days following establishment of grass seed, fertilize the grass with lawn fertilizer at the rate of 10 pounds per 1000 square feet.

3.3 CLEANUP AND PROTECTION:

A. During seeding work, all debris shall be removed daily and the site kept neat at all times.

B. After seeding operations are finished, all paved areas, structures and etc. which may have become strewn with seeding materials shall be thoroughly cleaned by sweeping.

C. Protect other landscape work and materials from damage due to seeding operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged seeding work as directed.

3.4 INSPECTION AND ACCEPTANCE:

A. When seeding work is completed and established, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

1. A satisfactory stand of grass plants from the seeding operation for grass areas shall be a minimum 100 grass plants per square foot. Bare spots shall be a maximum 6 inches square. The total bare spots shall be a maximum 2 percent of the total seeded area.

B. Where inspected seeding work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by the Landscape Architect and found to be acceptable.

++END OF SECTION 02921++

SECTION 02935

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z60.1 (1990) Nursery Stock.
2. ANSI Z133.1 (1994) Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3. ANSI A300 (1995) Tree, Shrub and Other Woody Plant Maintenance- Standard Practices.

1.2 DESCRIPTION OF WORK

A. Maintenance of the landscape to be provided. Contractor shall provide maintenance for a period of 90 days after Final Acceptance.

B. Maintenance of vegetative filter strips.

1.3 SITE CONDITIONS

A. Verification of Dimensions: Refer to section 02900 - Soil Preparation.

1.4 RELATED WORK SPECIFIED ELSEWHERE

Landscape Irrigation System	Section 02442
Soil Preparation	Section 02900
Seeding	Section 02921
Sodding	Section 02925
Exterior Plants	Section 02930
Treatment of Existing Trees	Section 02940

1.5 QUALITY ASSURANCE

A. Landscape installation or maintenance must be supervised by a staff member of the Contractor who possesses the current certification:

Certified Landscape Professional Contractor (CLPC) as administered by Texas Nursery and Landscape Association (TNLA).

B. It is the obligation of the bidder to provide the Landscape Architect with documentation that the above qualification is met.

C. Source Quality Control:

1. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.

1.6 SUBMITTALS

A. After completion of the project, submit the following:

1. Maintenance Instructions
2. Watering Schedule

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.8 JOB CONDITIONS

A. Maintenance operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by acceptable practice in the locality.

PART 2 - PRODUCTS

2.1 MATERIALS - Refer to respective landscape sections for applicable materials.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

A. Maintain trees, shrubs and other plants by pruning removal of dead wood, cultivating, watering, weeding and mulching as required for normal, healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

B. Maintain grass areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable grass, free of eroded or bare areas (no one bare area greater than 6 inches square in seeded areas). Mowing shall be accomplished to maintain buffalograss at a 1-3/8- to 1½-inch height. Mowing shall not remove more than 1/3 height of the grass at each mowing.
   1. Do not mow native grass seeded areas.
   2. Water grass areas to provide an equivalent of 1 inch of water per week in consideration of natural rainfall received.

C. Fertilize all lawn areas within the project limits, including any renovated grass areas, 30 days following initial installation with lawn fertilizer at rate of 10 pounds per 1000 square feet.

D. Three (3) weeks following completion of landscaping/seeding/sodding, Contractor shall complete one additional application of Biostimulant. Apply Biostimulant at the rate of 4 fluid ounces per 1000 square feet as per manufacturer's instructions.

3.2 VEGETATIVE FILTER STRIP MAINTENANCE

A. Contractor is responsible for the following requirements concerning the maintenance of vegetative filter strips from initial planting through the 90 day period after Final Acceptance; thereafter, maintenance is responsibility of Owners.

B. Pest Management: Provide an Integrated Pest Management (IPM) Plan for vegetated areas. Specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

C. Seasonal Mowing and Grass Care: Mow as needed to limit vegetation height to 4 inches, using a mulching mower (or removal of clippings). For native grasses, mow a minimum of twice annually. Grass clippings and brush debris shall not be deposited on vegetated filter strip areas. Regular mowing shall include weed control practices; herbicide use kept to a minimum. Provide supplemental irrigation as required to assure a dense and healthy vegetative cover.

D. Inspection: Inspect filter strips at least twice annually for erosion or damage to vegetation; additional inspection after periods of heavy runoff is required. The strip shall be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. Provide frequent inspections of the grass cover during the first few years after establishment to determine if any problems are developing; plan for long-term restorative maintenance needs. Replant and restore bare spots and areas of erosion identified during semi-annual inspections to meet specifications.

E. Debris and Litter Removal: Filter strip structures shall be kept free of obstructions to reduce floatables being flushed downstream. Debris and litter

removal shall be performed no less than 4 times per year.

F. Sediment Removal: Excess sediment along the upstream boundary of the strip shall be removed by hand or with flat-bottomed shovels. Dispose of sediments off-site. Some sediment may be considered hazardous waste or toxic material; comply with restrictions for proper disposal off-site.

G. Grass Reseeding and Mulching: A healthy dense grass shall be maintained on the filter strip. Fill, compact and reseed so that the final grade is level. Grass damaged during the sediment removal process shall be promptly replaced using the same seed mix used during filter strip establishment. Flow shall be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections shall be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting shall be done more frequently in the first two to three years after installation to ensure stabilization. Provide supplementary irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

3.3 MAINTENANCE INSTRUCTIONS

A. Maintenance Instructions: Submit typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape areas and vegetative filter strips over the first year. Instructions shall present maintenance procedures/activities to be implemented over a one year period on a month by month basis.

B. Watering Schedule: The watering schedule is to include the duration and frequency each irrigation zone will run per week. This will be worked out jointly with the Landscape Irrigation Contractor and shall be programmed on to the controller after review by Landscape Architect. Program shall be submitted to the Owner as part of the final acceptance process.

3.4 CLEANUP AND PROTECTION

A. During maintenance period, all debris shall be removed daily and the site kept neat at all times.

B. After maintenance operations are finished, all paved areas which may have become strewn with soil or other material shall be thoroughly cleaned by sweeping, and if necessary, power washing.

C. Protect landscape work from damage due to maintenance operations, operations by other contractors and trades and trespassers. Treat, repair or replace damaged landscape work as directed.

3.5 INSPECTION AND ACCEPTANCE

A. When maintenance period is complete, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the Owner's Representative or Landscape Architect and found to be acceptable.

++END OF SECTION 02935++

SECTION 02940

TREATMENT OF EXISTING TREES

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z60.1 (1996) Nursery Stock.
2. ANSI Z133.1 (1994) Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3. ANSI A300 (1995) Tree, Shrub and Other Woody Plant Maintenance- Standard Practices.

1.2 DESCRIPTION OF WORK

A. The work covered by these Specifications consists of operation in connection with protection, pruning and feeding of existing trees to be saved within the limits of project and the installation of the tree protection barricade fence and tree armor.

1. Trees to be preserved are represented by a solid line. Trees to be removed are represented by a dashed or ghosted line. Trees to be planted are graphically differentiated from existing trees.

1.3 SITE CONDITIONS

A. Inspection: After layout of the improvements is accomplished, Contractor shall review impact of new construction and need for compensatory pruning. Report to Landscape Architect the extent of pruning required prior to initiating any work.

1.4 RELATED WORK SPECIFIED ELSE WHERE

Clearing	Section 02230
Exterior Plants	Section 02930

1.5 QUALITY CONTROL

A. Employ qualified certified Arborist for pruning and feeding as approved by the Landscape Architect. Arborist shall have the following minimum qualifications:

1. Membership in:
   a. NAA - National Arborist Association
   b. ISA - International Society of Arborists
2. Meet state requirements for insurance.
3. Licensed for application and use of pesticides.
4. Bonded.

1.6 SUBMITTALS

A. Furnish at Landscape Architect's office, prior to installation, the following samples:

1. Certification: Copy of Arborist qualifications.
2. Mulch: Label from bag (Supplier's statement of analysis if bulk), and 1-gallon container of mulch sample.
3. Fertilizer: Label from bag or Supplier's brochure.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fertilizer for Trees: Arbor Green 30-10-7 distributed by The Davey Company, San Antonio, Texas (210) 698-0515; Austin, Texas (512) 451-4986.

B. Tree Barricade Fencing: Fabric 11 to 12½ -gauge wire chain link 2-inch mesh with 1? inch minimum outside diameter galvanized steel pipe posts. (Contractor's option to utilize steel 'T' posts.) Fabric height at 6 feet. Annealed steel tie-wire at 16-gauge minimum. Provide posts of height to set in grade 12 – 18 inch depth.

C. Mulch: Mulch shall be free of deleterious material and shall be stored as to prevent inclusion of foreign material. Mulch shall be native shredded hardwood mulch, manufactured by Gardenville Horticultural Products, San Antonio, Texas, 210/651-6115. Mulch resulting from double shredding/grinding of trees removed from the site would be an acceptable alternative.

D. Tree Wound Paint: Bituminous based paint of standard manufacture specifically formulated for tree wounds.

E. Tree Armor:

1. Wood: SPFA utility grade, 2x4.
2. Wire: Annealed steel wire, 16 gage minimum.

PART 3 - EXECUTION

3.1 PROTECTION FOR EXISTING TREES TO BE PRESERVED

A. All trees to be preserved on the property shall be protected against damage from construction operations. Only those trees located within the limits of improvements to be constructed, or as indicated, are to be removed. All trees to be removed shall be flagged for review after the location of improvements to be constructed are staked in the field. Any tree to be removed shall be reviewed by the Landscape Architect and Owner for approval prior to removal.

B. Erect barricade fencing and armor protection prior to beginning any clearing, demolition or construction activity, and unless otherwise instructed, maintain in place until construction is completed.

1. Set posts to 12 – 18 inch depth at 10' maximum spacing set in packed earth or driven into undisturbed grade. Fasten fabric to posts with tie-wire at 18 inch on center.

C. Trees immediately adjacent to and within one hundred feet (100) of any construction activities are to be protected by barricade fencing; subject to approval of the Landscape Architect. Trees exposed to construction activity within the dripline are to have trunks protected with tree armor in addition to barricade fencing. The tree protection barricade shall be placed before any excavating or grading is begun and maintained in repair for the duration of the construction work unless otherwise directed. No material shall be stored or construction operation shall be carried on within the tree protection barricade. Tree protection barricade shall remain until all work is completed. Remove tree protection barricade at commencement of finish grading. Remove tree armor immediately prior to Substantial Completion.

D. Tree protection barricade shall be erected at the edge of the dripline where possible; in extreme circumstances and with the approval of the Landscape Architect, fencing may be located at the edge of the root protection zone. For trees 10 inch caliper and less, the minimum distance the barrier shall be erected is five (5) feet from the trunk of tree or clump of trees.

E. Protect tree trunk with tree armor to a height of 8' or to the limits of lower

branching (when exposed to construction activity within the drip line) with 2x4's butted side to side completely around trunk. Wire wrap do not nail, around trees.

F. Protect trees that are to remain, whether within barricade fencing or not, from the following:

1. Compaction of root area by equipment or material storage; construction materials shall not be stored closer to trees than the farthest extension of their limbs (dripline).
2. The proposed finished grade within the root protection zone of any preserved tree shall not be raised or lowered more than three (3) inches. Retaining methods can be used to protect and/or provide lateral support to the area outside the root protection zone.
3. Trunk damage by moving equipment, material storage, nailing or bolting.
4. Strangling by tying ropes or guy wires to trunks or large branches.
5. Poisoning by pouring solvents, gas, paint, etc., on or around trees and roots.
6. Cutting on roots by excavating, ditching, etc. Prior to excavation within the tree driplines or the removal of trees adjacent to other trees that are to remain, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment to minimize root damage. Refer to EXCAVATION AROUND TREES for additional information.
7. Damage of branches by improper pruning.
8. Drought from failure to water or by cutting or changing normal drainage pattern past roots. Contractor shall provide means as necessary to ensure positive drainage.
9. Changes of soil pH factor by disposal of lime base materials such as concrete, plaster, lime treatment at pavement subgrade, etc. When installing concrete adjacent to the root zone of a tree, use a minimum 6 mil. plastic vapor barrier behind the concrete to prohibit leaching of lime into the soil.
10. Do not cut roots 3/4" in diameter or over without approval of Owner's Representative. All excavation and earthwork within the drip line of trees shall be done by hand.
11. Protect all existing trees near areas to be stabilized from underground contaminations by placing a 6 mil. Plastic film barrier along exposed vertical cut extending a minimum 12" into undisturbed subgrade below depth of stabilization.
12. No vehicular traffic shall occur within the drip line of any tree.
13. No soil shall be spread, spoiled or otherwise disposed of under any tree within the drip line.

G. Any damage done to existing tree crowns or root systems shall be repaired by the Arborist to the satisfaction of the Landscape Architect. Broken branches shall be

cut cleanly. Any roots cut shall be cut cleanly with a saw other means approved by the Landscape Architect.

H. Repairs to the trees necessitated by damage caused through negligence of Contractor or his employees will be completed at the Contractor's expense. When trees other than those approved for removal are destroyed or killed, or badly damaged as a result of construction operations, the contract sum will be reduced by the value of the tree as determined by using the accepted International Society of Arboriculture's formula.

3.2 ROOT PROTECTION ZONE

A. The root protection zone (RPZ) is measured with a radius from the trunk of 1 foot for each caliper inch of trunk measured at four and one-half (4-1/2') feet above grade or at the point where the smallest diameter closest to the branching occurs. No disturbance shall occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater for trees 10 inch caliper or less.

3.3 ROOT PROTECTION ZONE IMPACTS

A. Those trees to remain which have some encroachment on their root protection zone shall have the following maximum allowable impacts:

1. Minimum Protection Criteria 'A': No disturbance of natural grade, e.g. trenching or excavation, can occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater in no more than 30 percent of the area of the RPZ.

2. Minimum Protection Criteria 'B': No cut or fill greater than three (3) inches will be located closer to the tree trunk than ½ the RPZ radius distance.

B. Trees impacted shall have a minimum of a six (6) inch layer of mulch placed and maintained over the root protection zone and the undisturbed area within the dripline. Immediate pruning and fertilization shall occur per the pruning and fertilization sections of this specification. Provide water in a slow drip manner to impacted trees as approved by the Landscape Architect. Provide water to apply equivalent to 1 inch once per week to deeply soak in over the area within the dripline of the tree during periods of hot, dry weather. Spray tree crowns periodically to reduce dust accumulation on the leaves.

3.4 EXCAVATING AROUND TREES

A. Excavate within the dripline of trees only where required and when absolutely

necessary. Refer to ROOT PROTECTION ZONE.

B. When excavating for new construction is required within dripline of trees, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment.

1. All exposed roots two (2) inches in diameter or greater of a tree shall be cut cleanly. In the case of oak species, in order to prevent infection by oak wilt spores, wounds must be painted with an acceptable wound dressing within thirty (30) minutes.
2. Clean cut roots using sharp ax approximately three (3) inches back from new construction.

3.5 PRUNING

A. All trees that are to be preserved within the confines of the facility (e.g. area defined by the security fence) shall be pruned to improve overall natural character and openness of the canopies and to repair or provide work clearance. Refer to PRUNING SCHEDULE for specifics regarding pruning requirements. Pruning shall be completed to the satisfaction of the Landscape Architect.

B. Pruning shall include but is not limited to removal of dead and broken branches, correction of structural defects or whenever the following conditions exist. Remove diseased wood, or structurally weak limbs that may cause a safety hazard. Remove branches that extend over buildings endangering roofs (e.g. branches rubbing against or touching roof). Remove branches in front of windows and which obstruct traffic signs or street intersections. Provide clearance for emergency vehicles, buses, moving vans and similar vehicles along the streets (13'6" height). Prune trees according to their natural growth characteristics leaving trees well shaped and balanced.

3.6 GOVERNING STANDARDS

A. Work procedures will be guided by the current provisions of the American National Standard Institute. Complete detail of the provisions are to be found in the references listed. The two basic objectives of the pruning operation shall include:

1. Hazard Reduction Pruning: Hazard reduction pruning shall be completed to remove visible hazards in a tree. Hazard pruning shall consist of one or more of the maintenance pruning types.

2. Maintenance Pruning: Maintenance pruning shall be completed to maintain and improve tree health and structure and includes hazard

reduction pruning.

3.7 MAINTENANCE PRUNING TYPES:

A. Both hazard reduction pruning and maintenance pruning shall consist of one or more of the following pruning types:

1. Crown Cleaning: Crown cleaning shall consist of the selective removal of one or more of the following items: dead, dying, or diseased branches, weak branches, water sprouts and stubbed branches.
2. Crown Thinning: Crown thinning shall consist of the selective removal of branches to increase light penetration, air movement, and reduce weight.
3. Crown Raising: Crown raising shall consist of the removal of the lower branches of a tree to provide clearance.
4. Crown Reduction, or Crown Shaping: Crown reduction shall consist of decreasing the height and/or spread of a tree.
5. Vista Pruning: Vista pruning shall consist of selective thinning of framework limbs or specific areas of the crown.
6. Crown Restoration: Crown restoration pruning shall improve the structure, form and appearance of a tree which has been severely headed, vandalized, storm damaged or improperly pruned.

3.8 PRUNING SCHEDULE

A. All of the pruning type(s) as applicable are required at each tree. All pruning shall be completed to remove branches/laterals ? inch and greater.

3.9 CROWN IMPACTS

A. Trees impacted by construction shall be limited to a maximum of 30 percent of the viable portion of a tree's crown removed as approved by the Landscape Architect. Removal of more than 30 percent of the viable portion of a tree's crown will necessitate the tree's removal and replacement at the Contractor's expense. Replacement shall be governed at the ratio of 1 inch of new tree per inch of tree removed. Replacement trees are to have a one (1) year warranty. Refer to Section EXTERIOR PLANTS.

3.10 APPROVAL: No major limbs or structure will be cut or removed without prior approval of the Landscape Architect.

3.11 STERILIZATION: All tools used will be sterilized with Clorox bleach prior to use and between each tree. Residue from sterilization operation shall be diluted so as not to damage any vegetation. At trees known to be diseased and where there is danger of transmitting that disease, tools are to be disinfected after each cut.

3.12 PAINT CUTS: Paint cuts more than 1 inch in diameter with an approved tree wound paint on trees of oak species.

3.13 FERTILIZATION OF PRESERVED TREES

A. All existing trees impacted by construction activities taking place within the dripline, including but not limited to trenching and grading, shall be fertilized. Feeding of existing trees to be impacted by construction shall be accomplished in accordance with the following specifications:

1. Feeding shall be completed prior to construction of permanent improvements adjacent to all trees including site fill or paving including trenching operations.
2. Liquid tree fertilizer applied with a standard hydrant sprayer at a pressure of 100 to 200 psi shall be injected in slightly slanted holes approximately twelve (12) inches in depth.
3. Concentration of suspension to be forty (40) pounds of fertilizer for trees in each 100 gallons of water. Application rate: six (6) pounds of actual nitrogen per 1,000 square feet of area under drip-line.
4. Holes are to be made in concentric circles and 3' on center around the tree with the last ring located at the dripline of the foliage of the trees.
5. Area beneath the dripline of the trees is to be well watered after the fertilization is placed.

3.14 MULCH

A. Mulch base of all existing trees four (4') feet radius/distance of the tree RPZ with 6" deep mulch layer. If existing trees are grouped, the entire area is to be mulched in between the trees.

3.15 CLEANUP

A. Wood and debris shall become property of the Contractor and shall be removed from the site. Cost of disposal to be paid by Contractor.

B. If acceptable to Owner, wood from tree removal and pruning activities can be double shredded/grinded and used on site as mulch at locations as approved by Landscape Architect.

++END OF SECTION ++

SECTION 02442
LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

A. The work consists of installing a complete automatic underground irrigation system as shown on the drawings as hereinafter specified, including the furnishing of all labor, equipment, appliances and materials and in performing all operations in connection with the construction adjustment to ensure coverage and proper operations of the irrigation system. Irrigation work shall also include temporary irrigation in areas not covered by the automatic system.

B. The irrigation system shall be constructed using the sprinklers, valves, piping, fittings, etc., of sizes and types as shown on the drawings and as called for in these specifications. Spacing of the sprinkler heads is shown on the drawings and shall be exceeded only with the permission of the Landscape Architect.

C. Temporary irrigation shall be provided for the establishment of landscape areas not covered by the automatic irrigation system. Layout of the temporary system shall be coordinated with the requirements of the Landscape Contractor.

D. Closing-in Uninspected Work: This Contractor shall not allow or cause any of his work to be covered up or enclosed until it has been tested by the Contractor and observed and the system approved by the Landscape Architect. Should any of his work be enclosed or covered up before such inspection, and/or testing, he shall uncover his work. After it has been tested, observed and approved, backfill as required.

1.2 SITE CONDITIONS:

A. Verification of Dimensions: All scaled and figured dimensions are given for estimate purposes only. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and sizes, etc., and shall assume full responsibility for the correctness of all such items.

B. Existing Conditions: New work shall be tied to existing conditions and controls such as water lines and pipe. Finished grades shall bear proper relationship to such controls. The Contractor shall adjust new work as necessary and as directed to meet existing conditions and fulfill intent of the plans.

C. Point of Connection: For water supply to irrigation system, provide and install a dedicated irrigation water meter and backflow preventer.

D. Verification of Water Pressure: Prior to installing irrigation system, the Contractor shall verify actual on-site water pressure from the source. This pressure reading must exceed design static pressure by 10%. If on-site pressure does not meet this requirement, the Contractor shall notify the Landscape Architect for resolution. Do

not willfully proceed with construction as designed when it is obvious that pressure problems exist. The Irrigation Contractor shall assume full responsibility for all necessary revisions due to failure to give such notification.

E. Obstructions: If any unknown utilities and obstacles are encountered during the construction period, stop work and immediately contact the Owner's Representative and Landscape Architect before proceeding. Such obstructions shall be removed or relocated or the work adjusted as directed by the Landscape Architect. If work proceeds without contacting the Landscape Architect, the Contractor shall be held liable for any and all damages.

F. Underground Utilities: Prior to initiating any trenching, the Contractor shall contact the appropriate authorities in order that their personnel can locate underground utilities that may be encountered.

G. Applicable Codes: Install system according to applicable local and N.E.C. electrical codes, ordinances and regulations. Any permits required for inspection and installation shall be obtained and paid for by the Contractor. The Contractor will also arrange for any required inspections by local authorities during the course of the construction.

H. Permits: Any permits or approvals required for inspection and installation shall be obtained and paid for by the Contractor.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

Soil Preparation, Section 02900.
Seeding, Section 02921.
Sodding, Section 02925.
Exterior Plants, Section 02930.
Landscape Maintenance, Section 02935.
Treatment of Existing Trees, Section 02940.

1.4 SUBMISSION FOR APPROVAL:

A. The Contractor shall furnish the articles, equipment, materials or processes specified by name in the drawings and specifications. No substitutions will be allowed without prior approval by the Landscape Architect. If the Contractor desires consideration of "approved equal" material substitution, he shall furnish performance data and shop drawings for any changes required to the arrangement and spacing of the sprinkler heads or modification to any other component of the irrigation system.

B. The following procedures shall be used to obtain approval of a substitute sprinkler as an equal:

1. Actual samples of each type of sprinkler head proposed as a substitute.
2. Manufacturer's catalog sheet showing full specifications of each type

sprinkler proposed as a substitute, i.e., discharge in GPM, minimum allowable operating pressure at the sprinkler, maximum allowable spacing and distance of throw (coverage).

3. Detailed pressure loss computations based on the consumption of the proposed substitute sprinkler, if the manufacturer's specifications show than any one of the three characteristics in the above paragraph is a variance with the specified sprinklers. These pressure loss computations must prove that the proposed substitute sprinkler will perform in accordance with the intent of the designed sprinkler system either with the same piping and head layout design or with a change of either. (If design change is required, detailed drawings must accompany the request for approval of the substitute.) The detailed pressure loss computations must encompass the following:
   a. The total design pressure is defined as maximum pressure required to overcome all pressure losses and leave a residual pressure at the sprinkler not less than the manufacturer's minimum pressure requirement.
   b. Pressure loss computations must be based on an acceptable table of pressure losses for the type and size pipe to be used.
   c. All pressure loss tables are for straight pipe only, and an acceptable allowance must be made for the additional losses incurred in fittings.
   d. Allowance must be made for the pressure drop through all valves based on the specifications of the manufacturer of each type valve.
4. The decisions of approval or disapproval will be based on the comparative ability of the sprinkler to perform fully all purposes and functions of mechanics and general design and construction material considered to be possessed by the sprinkler.
5. Approval of a substitute sprinkler shall not relieve the Contractor of his responsibility to demonstrate that the final installed sprinkler system will operate according to the intent of the originally designed and specified system.

1.5 ADJUSTMENTS AND TESTS:

A. Before final acceptance of the installed system, the Contractor shall make the

1. Tests:
   a. The piping system from the point of connection to the zone valves shall be tested under normal working pressure for a period of 48 hours. If leaks occur, the joints shall be replaced and the tests repeated. The pressure test shall be completed prior to backfilling; however, sufficient backfill material may be placed between fittings to ensure stability of the line under pressure. In all cases, fittings and couplings shall be open to visual inspection for the duration of the test.
   b. After completion of grading, grass planting and rolling of grass areas, carefully adjust lawn sprinkler heads to be flush with or not more than 1/2-inch above the finish grade.

c. Each section of sprinkler shall be tested for 100% coverage of each area and designed overlap between sprinklers.

d. The operating pressure of each section of sprinklers shall be tested by the following method:

e. Install pressure gauge at the base of the sprinkler most distant from the zone valve, in terms of the length of piping through which the water must flow to reach the sprinkler. This sprinkler must operate during the test.

f. With the section of sprinklers operating, throttle the zone valve until the pressure gauge at the most distant sprinkler reads according to the following:

1.) Adjusted Design Static Pressure- 65.0 PSI
2.) Spray Zones- 30 PSI
3.) Rotary Zones- 50 PSI
4.) Bubbler Zones- 30 PSI

B. Adjust and balance the pressure throughout the entire system.

C. All tests shall be observed and approved by the Landscape Architect or designated representative.

D. Contractor shall provide written notice of request for observation to the Landscape Architect a minimum of forty-eight (48) hours prior to testing.

1.6 CONTROL OF WORK:

A. The Landscape Architect shall, during construction, decide all questions relative to the quality of workmanship and materials furnished.

B. The Landscape Architect shall decide all questions relative to the interpretation of the drawings and specifications and the acceptable fulfillment of the contract.

C. The Contractor shall proceed with the increased, decreased or altered work only upon duly prepared and executed Change Order by the Owner.

D. Provisions by Others: If some portion of the work is to be provided by others, such as sleeves or electrical power to controller, to locations as shown on plans, the Contractor shall coordinate the exact locations of such with the General Contractor and others as required.

E. On site observation: At any time during the installation of the irrigation system, the Landscape Architect may visit the site to observe work underway. Upon request, the Contractor shall be required to uncover specified work as directed by the Landscape Architect without compensation. Should the material, workmanship or method of installation not meet the standards specified herein, the Contractor shall replace the

work at his own expense.

F. Contractor Qualifications: All work shall be installed by skilled personnel, proficient in the trades required, in a neat, orderly and responsible manner with recognized standards of workmanship. The Contractor must be a current licensed irrigator of the State of Texas.

G. Explanation of Drawings:

1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and other construction on site.
2. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.
3. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in design. Such obstructions or differences should be brought to the attention of the Owner's authorized representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revisions necessary.
4. Contractor shall be responsible for all costs involved with work.

1.7 SUBMITTALS:

A. Furnish to the Landscape Architect, prior to installation, the following:

1. Pressure Verification Letter: Verification of on-site static water pressure on Company Letter Head.
2. Certification: Copy of Irrigator's License on Company Letter Head.
3. Equipment and materials - Manufacturer's catalog sheets, clearly identified to which product is to be used.
4. Layout of temporary irrigation.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Abbreviations:

1. P.V.C. Polyvinyl Chloride

2. N.S.F. National Sanitation
3. P.S.I. Pounds Per Square Inch
4. I.P.S. Iron Pipe Size
5. N.E.C. National Electrical Code

B. P.V.C. pipe: Lateral piping shall be ANSI/ASTM D1785. All P.V.C. pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, class or schedule, type and number established by commercial standards: Main supply line Schedule 40, PS21-70, ASTM D1785-68; lateral shall be Class 200 for 3/4-inch to 3-inch piping and class 315 for 1/2-inch piping. 4-inch and larger irrigation main line shall be belled-spigot type, Class 200, SDR21 PVC.

C. Metal Pipe: Galvanized steel pipe; ASTM A 120, Schedule 40.

D. Fittings:

1. PVC Fittings: Fittings shall be Schedule 40 when joining PVC to PVC and Schedule 80 when joining PVC to metal.
2. Ductile Iron: For mainline 4" and larger provide push on, deep socket joint, ductile iron fittings, ASTM Grade 70-50-05, as manufactured by Harco, Lynchburg, Va.
3. Steel Pipe: ANSI B16.3 galvanized malleable iron screwed fittings.

E. Flexible PVC Tubing: Flexible PVC tubing shall be I.P.S. heavy wall hose meeting or exceeding schedule 80 wall thickness in conformance with ASTM D2887 and tested in accordance with ASTM D1598 as manufactured by AG-Products, Winter Haven, Florida.

F. Swing Joints and Nipples: Provide threaded and gasketed schedule 80 PVC 3-way swing joints and nipples.

G. Manual Valves:

1. Three (3) inches and smaller: Manual cut-off/isolation valves where indicated on the drawings shall be gate valves made in the USA and constructed of highest grade cast bronze body with screw-in bonnet, non-rising stem, solid wedge disc, cast iron handwheel 200 lb. WOG.

2. Four (4) inches and larger: Shall be made in the USA and constructed of iron body, bronze mounted, double disc with parallel or inclined seats, non-rising stem type turning counter clockwise to open, 200 lb. WOG.

3. Ball Valve: Manual cut-off/isolation valves where indicated on the drawings shall be schedule 80 PVC ball valves with union connection at both ends of valve sized same main line.

a. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Nibco Inc.
Dura Plastic Products, Inc.
Spears Mfg. Co.

H. Remote Control Valves: Refer to plans for size, model and location. Provide with pressure regulating module. Pressure at valve must be checked after installation and recorded on "as-built" drawings. Provide pressure hose gauge assembly Rain Bird PHG.

I. Backflow Preventer: Febco reduced pressure assembly with union end ball valves model 860 U-2" by CMB industries or approved equal.

J. Sprinkler Heads and Nozzles: Refer to plans for types, model, radius, arc, etc., and location of tree bubbler, lawn and shrub, spray and rotary sprinkler assemblies.

K. Valve Boxes:

1. Manual valve boxes, quick coupler shut-off valve boxes, and splice boxes shall be Ametek 10" circular series valve box with non-bolt cover and extension(s) as required or approved equal.
2. Remote control valves shall be Ametek standard rectangular control valve box with cover and extension(s) as required.

L. Drainage Backfill: Cleaned gravel or crushed stone, graded from 1-inch maximum to 3/8-inch minimum.

M. Filter Fabric: Continuous filament, non-woven needle punched, polypropylene, porous garden fabric such as Earth Felt by Soil-Tec, Inc. or approved equal.

N. Automatic Control System: ICC series controller with painted metal cabinet manufactured by Hunter Industries, Inc. refer to plan for model information and location. Provide the number of modules required to accommodate the number of zones indicated on plan. Install SmartPort connector within 50' of controller per manufacturer's recommendations utilizing SRR-SCWH shielded cable wiring harness.

O. Wire: Underwriters' Laboratories approved for direct underground burial on NEC Class II circuits 4/64 vinyl-insulated.

P. Valve Wire Hook-ups/Splice Connector: Valve wire hook-ups/splices shall be Wade Connectors WC10, WC-14R and WC-16; size as required for application by Wade Enterprises, San Antonio, Texas 210.694.0203.

Q. Pressure Reducing Valve: Bronze water pressure regulating valve with 300 lbs. max rating with adjustment within range required for performance of system within 10% of adjusted design static pressure; to be verified by Contractor.

R. Weather Sensors:

1. Rain Override Device: Hunter, Mini-Clik-C; refer to plan for location.
2. Freeze Sensor: Hunter, Freeze-Clik-REV; refer to plan for location.

S. Remote hose bib quick coupler:

1. Site: 44LRC quick coupling valve and 44K key by RainBird with SH-2 hose swivel or approved equal.

2. Vegetative Filter Strip: 44 RC quick coupling valve and 44 key with 65JADJ-TNT with 16 nozzle by RainBird or approved equal.

T. I.D. Tag: Christy's standard valve I.D. tag numbered to identify remote control valve sequence.

U. Remote Control Unit: Remote control unit complete ICR-KIT including transmitter, receiver, wiring harness and 4AA alkaline batteries manufactured by Hunter Industries, Inc.

2.2 SOLVENTS, CEMENTS, PRIMERS AND JOINT COMPOUNDS:

A. General: All solvents, cements, primers, and joint compounds shall be approved for use by the Uniform Plumbing Code; ASTM D 2564 for PVC pipe and fittings. Utilize appropriate type for application required.

1. Primer- Weld-On #P70 purple primer.
2. PVC- IPS Weld-On #721 solvent cement; color blue.
3. Flexible PVC- Weld-On #795 solvent cement; color gray or white.
4. Schedule 80 PVC- Weld-On #705

B. Connections for PVC and Metal Pipe and Metal Pipe to Metal Pipe: For all threaded connections use Heavy Duty Rectorseal thread sealing paste with virgin Teflon No. 100 as manufactured by Rectorseal Corp., Houston, Texas. Apply in accordance with manufacturer's instructions.

2.3 OTHER MATERIALS:

A. All other materials, not specifically described but required for a complete and proper irrigation system installation, shall be new, first quality and subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 TRENCHING AND BACKFILLING:

A. General: The Contractor shall verify on-site static water pressure and layout and verify all dimensions on the site prior to proceeding with work under this contract.

1. Contractor shall layout and flag locations of all heads. Locations shall be approved by Landscape Architect, upon being given a minimum forty-eight (48) hours notice as to when layout will be ready for review. If Contractor installs irrigation work without review of the head layout, any modification to the head locations requested by the Landscape Architect shall be done at the Contractor's expense.

a. Obtain coverage test approval from Landscape Architect prior to initiation of any landscape planting work.

2. Extreme care shall be exercised in excavating and working near existing utilities. Check mechanical, electrical and plumbing drawings for location of new and existing utilities.

B. No machine trenching is to be done within dripline of trees. Trenching is to be done by hand or by tunneling under root system by method approved by Landscape Architect. It is understood that the piping layout is diagrammatic and piping shall be routed around existing plant material in such a manner as to avoid damage to plants. Where tree roots are encountered, no root over 3/4-inch in diameter shall be cut. Any cuts made shall be clean cuts without frayed ends.

C. Property Line: Mainline pipe, wires and valves shall be trenched inside of property line.

D. Alignment: Trenches shall be dug straight, and pipe shall have the continuous support of the ditch bottom and shall be laid to an even grade. Trenching operations shall follow the layout indicated on the drawings. Deviations will be allowed to avoid obstructions.

E. Protection: Protect existing trees and other vegetation to be retained. Replace damaged plants with new to match existing.

F. Trench Depth: Excavate trenches to a depth of 3 inches below invert of pipe and to minimum cover over top of installed piping:

1. Main supply lines - 18 inches to top of pipe.
2. Lateral supply lines - 12 inches to top of pipe.
3. Lines under paving - 18 inches inside PVC sleeve unless indicated otherwise.

4. Maximum depth to all piping shall not exceed 24".

G. Backfill:

1. Initial backfill on all lines shall be a sand "envelope" 3 inches below, around and above pipe.
2. Complete backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than ½ inch diameter.
3. Backfill to be compacted to dry density equal to the adjacent grades, without dips, sunken areas, humps or other irregularities.
4. Under no circumstances shall trenches be compacted by wheel rolling the ditch line.
5. Contractor shall be responsible for all and any settling of trenches from his work following the site planting.

H. Sleeves: At new walkways, concrete and asphalt pavement (and elsewhere as required), provide PVC sleeves 18 inches minimum/24" maximum below bottom of paving materials; not all locations are indicated on plan.

1. Provide Schedule 40 PVC sleeves sized equal to twice the diameter of the pipe or combination of pipes enclosed within the sleeve. Extend sleeve 24 inches beyond edge of pavement at both ends.
2. Pipe with joints in sleeves shall be bell end only, no couplers, and all bells shall be oriented the same direction.
3. Dimensioned locations of all sleeves are to be shown on as-builts.

I. Sleeves in Pavement: At walks or other paved surfaces where sleeves have not been provided, bore beneath pavement if possible. Where existing pavement must be cut to install landscape irrigation system:

1. Saw cut pavement smoothly to straight lines 8 inches wider than trench (4 inches each side of trench).
2. Excavate trench to required depth and width.
3. Remove cut out pavement and excavated material from the site.
4. Backfill with flowable fill to bottom of existing aggregate base. Install and compact aggregate base to match the depth of the existing base.
5. Repair or replace pavement cuts with equivalent materials and finishes to be flush with adjacent surface.
6. In concrete paved areas, repairs shall be reinforced to match existing concrete pavement and doweled to the adjacent slab in a manner acceptable to the Landscape Architect.

J. Existing Grass Areas: Where trenching is required across existing grass areas:

1. Backfill trench and prepare the soil preparation per 02900 - SOIL PREPARATION.

2. Seed and establish grasses to restore area per 02921 - SEEDING.

3.2 INSTALLATION:

A. General: The Contractor shall, before starting work on the irrigation system, carefully check on-site static water pressure and all finish grades to satisfy himself that he may proceed with the work. Comply with requirements of the Uniform Plumbing Code and Texas Irrigators Advisory Council.

1. Provide all equipment as necessary and as appropriate for the installation. Contractor shall coordinate with other trades as required to accomplish the installation. Make adjustments as may be required to irrigation system to insure optimum operation of the system.

B. Connection to Main: Connect to existing water source at location indicated on the drawings. Maintain uninterrupted water service to surrounding existing facilities during normal working hours. Arrange for temporary water shut-off with appropriate authorities a minimum of 24 hours prior to work.

C. Piping Layout: Piping layout as indicated on the drawings is diagrammatic. Deviate where necessary to avoid obstacles. Install lines in such manner as to conform with the various details without altering the sequence of the various assemblies occurring along the pressure supply line.

D. Multiple Assemblies: No multiple assemblies shall be installed on plastic lines. Each assembly shall be provided with its own outlet.

E. Assemblies: All assemblies specified herein shall be installed in accordance with the respective details. In the absence of details, drawings or specifications pertaining to the specific items required to complete the work, the Contractor shall perform such work in accordance with the best standard practice and to the satisfaction of the Landscape Architect.

F. Backflow Preventer: Connect water supply of irrigation system to water source indicated on MEP drawings. Install backflow preventer as detailed and per applicable codes; provide clearances as required. Utilize metal pipe for piping exposed above grade. Provide dielectric fitting for connection of backflow preventer to piping. Provide protective plastic wrap for steel pipe below grade.

G. Pressure Reducing Valve: Install pressure reducing valve after backflow preventer and prior to master control valve in separate valve box when existing static pressure as to be verified by Contractor exceeds design static pressure by ten (10) percent.

H. Controller: Install automatic controller at location as indicated on plan. Coordinate provision of electrical requirements with others as required.

I. Remote Section Valves: Install in valve box, arranged for easy adjustment and removal. Provide 1" clearance between pipe and valve box (cut and sand smooth valve box as required).

1. Install with pressure regulator per manufacturer's requirements.
2. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
3. Install manual cut-off/isolation valve upstream of control valve and locate within valve box.
4. Install ID tags at solenoid wires to identify station.

J. Manual Valves: Install manual valves in valve box; set valve box flush with grade.

K. Quick Coupler Valves: Install quick coupler valves with manual shut-off valve within valve box as detailed.

L. Wire: Install with 6 curl expansion curls at all valves, at changes in direction of the pipe, at 150 foot intervals on long pipe runs, and at controllers. Wire is to be placed carefully in the controller box. Wires are to be snaked in the trench to allow for expansion and contraction.

1. Each valve is to have two wires. One wire shall be a station control valve power wire and shall not be smaller than No. 12, Type UF, and shall be a solid color (other than white). The second wire shall be a common neutral wire from each controller to each of the valves served by each particular controller. The common neutral wire shall not be smaller than No. 10 Type UF, with white insulation. Color coding is for identification purposes only.
   a. Wires for future use or for spare wires are to be different color than common and valve wires.

2. Install two (2) extra control wires from controller to the remote control valves located the greatest distances from the controller in all directions and label as spare wires. Spare wires shall be a different color than the common and valve wires. Provide a minimum 6' length of wire coiled up in valve box.

3. Wires installed for future use shall be placed in a separate valve box of the same type specified for remote valves at a location(s) indicated on the plan. Provide a minimum 6' length of wire coiled up in valve box.

4. Contractor shall clearly and permanently label each end of the wires for section identification at the controller and section valve box. Install I.D. tags within valve box.

5. Wire splices are to be made only at the valves. When repairs or other situations require wire splices, at location other than at valves, all additional splices shall be placed in the same type box specified for remote valves.

a. All splices must be brought to the attention of the Landscape Architect. Location to be recorded and dimensioned on as-built record drawing.

6. Secure wires together at 10-foot intervals maximum and place under main line; utilize nylon "TP-WRAPS".

7. Where control wire leaves main or lateral line, enclose wire in Class 200 PVC conduit.

8. Routing of all wiring is to be recorded on as-builts.

M. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions. Do not lay pipe in water or mud. Keep ends of pipe securely closed when work is not in operation to prevent water or other matter from entering lines.

1. Lay all pipe with material designations pointing up to accommodate visual verification.

2. Clean interior of pipe thoroughly and remove all dirt or foreign matter before lowering pipe into trench and keep clean during operation by plugs or other method. The ends of all pipe shall be reamed out full size. All off-sets shall be made with fittings. All water lines shall be thoroughly flushed out before the nozzles are installed.

3. Long runs of PVC pipe shall be slightly snaked in the trench to allow for contraction.

4. Replace any pipe that is found to be defective.

5. All sprinkler lines in a common trench shall have a minimum clearance of 4 inches from each other when parallel and 6 inches between sprinkler lines and supply main lines.

6. Install no more than two lines in a common trench.

N. Fittings: Install all fittings a minimum distance of four (4) times pipe size from other fittings or equipment.

O. Penetrations: At penetrations, through walls, building, foundation and etc., core drill for conduits size as required. Pack the opening around pipe with non-shrink grout. At exterior face, leave a perimeter slot approximately 1/2-inch wide by 3/4-inch deep. Fill this slot with backer rod and an acceptable elastomeric sealant. Repair below grade waterproofing disturbed by this work and make penetration watertight.

P. Temperature: Install PVC pipe in dry weather when temperature is above 40 degrees F (4 degrees C) in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40 degrees F (4 degrees C) before testing, unless otherwise recommended by manufacturer.

Q. Thrust Blocks: All main line pipe 4" and larger shall have thrust blocks installed at all fittings installed on the main line. Install per pipe manufacturer's requirements. Care shall be taken by the Contractor to keep all concrete on the fittings and from joints of pipe. Control, power and valve wires must be kept free of concrete by the Contractor and placed outside of the thrust. Thrust blocks shall be poured against undisturbed ground. No precast thrust blocks will be allowed.

R. Drain Pockets: Excavate to size required for valve box type or as indicated. Backfill with acceptable drainage backfill material. Create envelope completely around drainage backfill material with a sheet of filter fabric and backfill remainder with excavated material.

S. Part Circle Spray Heads: Locate part-circle heads to maintain a minimum distance of 6 inches from walls and 4 inches from walks and other boundaries, unless otherwise indicated.

T. Part Circle Rotary Heads: Locate part-circle rotary heads to maintain a minimum distance of 12 inches from walls, walks and other boundaries, unless otherwise indicated, locate 12 inches from building walls.

U. Tree Bubbler Heads: Coordinate location of tree bubbler heads and laterals with Landscape Contractor. Make adjustments as may be required in field for installation of trees at no additional cost to Owner.

V. Dielectric Protection: Use dielectric fittings at connection where pipes and products of dissimilar metal are joined.

W. Remote Control Unit: Install remote control unit at controller per manufacturer's instructions.

X. Weather Sensors: Place weather sensors on weatherproof J-Box as detailed on plan. Utilize schedule 80 PVC conduit and fittings to extend rain sensor 12" minimum beyond fascia/gutter. Location is to be approved by Owner, Architect and Landscape Architect. Coordinate with other trades as required for installation of ½ inch diameter galvanized rigid metal conduit from controller to weather sensors. Securely fasten to conduit wall by means acceptable to Landscape Architect.

3.3 TEMPORARY IRRIGATION SYSTEM:

A. Provide a temporary irrigation system for the establishment of landscape areas/surface vegetation not covered by the automatic irrigation system. Coordinate

with the landscape contractor to provide and ensure the appropriate coverage for the establishment period of the landscape areas/surface vegetation. Submittal of shop drawing of design of temporary system for review by Landscape Architect is required. Provide the temporary irrigation system as per the following:

1. Utilize the new irrigation system distribution main line as the water source. Locate supply points for the temporary system as deemed appropriate. All supply points shall be controlled by schedule 80 PVC ball valves. The ball valves shall be below grade in the same valve boxes used for remote control valves. Ball valves at the supply points shall remain in place after temporary system is removed.
2. The system shall operate manually or automatically as per the Contractor's discretion. If manually operated, use schedule 40 PVC ball valves for the section manual control valves. Use of 9 volt activated control valves to operate sections is at discretion/option to Contractor.
3. Mainline and lateral piping shall be class 200 PVC. All piping is to be installed above grade. Stake and/or cap the pipes with an appropriate amount of concrete as to provide a stabilizer for the pipe and to prevent any physical movement of the pipe.
9. Utilize RainBird 2045 PJ Maxi-Bird impact rotary heads or equal at a spacing not to exceed the performance of the standard nozzle installed. At smaller areas, utilize RainBird PA-8S shrub adapter with appropriate nozzle or equal on a PVC riser. Maximum size of each section shall be determined by the Contractor; zones shall not exceed total GPM flow of largest zone or total combined flow of linked sections as identified on plan.
10. Install the system so as not to throw any water onto the paved areas of roadways or parking lots. Minimum water throwing into native areas will be acceptable.
11. Operation of the temporary irrigation system shall be coordinated with the scheduling of the automatic irrigation system so as not to impede the performance of the automatic system.

3.4 CLEAN UP:

A. All ground surfaces where trenches have been cut will be leveled, debris removed; rubbish, materials of construction and equipment at the site shall be removed at the time of Final Inspection.

3.5 FINAL INSPECTION:

A. Notify the Landscape Architect, in writing, upon completion of the work and arrange for date of Final Inspection. Provide notice a minimum of 48 hours in advance of desired date of inspection.

B. Demonstrate to the Landscape Architect that all components of the entire system are operating properly and that all work has been completed in accordance with the plans

and specifications. Refer to TESTS this section.

3.6 ITEMS TO BE FURNISHED:

A. The Contractor shall provide as part of the work of this Section, the following:

1. Watering Schedule: The watering schedule includes the duration and frequency each irrigation zone will run per week and the resulting precipitation rate to be expected. This will be worked out jointly with the Landscape Contractor and shall be programmed on to the controller after review by the Landscape Architect.
   a. Produce water schedule for landscape at a maximum of 80% ET (evapotranspiration) as determined by the local ET.
2. Two (2) sets of sprinkler wrenches for adjusting, cleaning or disassembling each type of sprinkler; two (2) each of any special tools required for any other equipment shall also be furnished.
3. Two (2) service manuals for all equipment used shall be furnished to the Owner. Manuals may be loose-leaf and should show drawings or exploded views of equipment and catalog number and prices. Operating instructions for all equipment shall also be furnished.
4. Two (2) valve keys each for operating gate valves, both cast iron and brass.
5. One (1) quick coupling key with hose swivel of the proper size for every three (3) quick coupler valves.
6. Four (4) pop-up spray heads each type (standard and high-pop) and four (4) nozzles of each type installed.
7. Four (4) rotary heads of each type installed.
8. Irrigation Installation Certification Letter: Letter of certification by Licensed Irrigator certifying the irrigation system was installed in accordance with the irrigation plan.
9. One (1) pressure hose gauge assembly.

3.7 RECORD DRAWINGS:

A. The Contractor shall keep up-to-date, a complete "as-built" record set of blueline prints, corrected daily, showing any changes from the original plans. Record shall indicate dimensioned locations and depths below grade of all buried lines and equipment.

1. Drawings are to indicate wire routing layout (active, spare and future wires).
2. Dimensioned locations of all sleeves.
3. Dimensioned locations of all wire splice boxes.
4. Dimensioned locations of all remote control valves.
5. Dimensioned locations of all quick couplers.

B. Upon completion of the Project, provide the Landscape Architect with the "As Built" record drawings of changes to the work. The changes shall be recorded in a legible

and workman-like manner on a reproducible mylar or vellum.

3.8 SYSTEM INSTRUCTIONS:

A. Zone Map: Provide and locate on the wall next to the Controller a plastic laminated wood framed drawing at 50 percent reduced scale of overall plan image and valve schedule of the installed system showing the areas controlled by the controller identifying the location of the valves and the station number assigned to each. Drawing shall indicate color coded area of coverage per each zone and location of supply main and taps; colors to be coordinated and shown on the valve schedule.

B. When completed and approved, chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils thick, and placed in an appropriate wood frame over a stiffened back. Charts must be completed and approved prior to final inspection of the irrigation system.

C. Instruction Session: After the system has been completed, inspected and approved, conduct a training session for the Owner's maintenance personnel in the operation and general maintenance of the irrigation system. This will also include a review of the manuals to be furnished to the Owner as called for elsewhere in these specifications and field demonstrations of system components assembly and maintenance.

3.8 GUARANTEE:

A. The entire sprinkler system shall be guaranteed by the Contractor as to materials and workmanship, including settling of backfilled areas below grade for a period of one (1) year following date of final acceptance of the work.

1. Should any operational difficulties in connection with the irrigation system develop within the specified guarantee period, which, in the opinion of the Landscape Architect or Owner may be due to inferior material and/or workmanship, said difficulties shall immediately be corrected by the Contractor to the satisfaction of the Owner, at no additional cost.

3.9 TEMPORARY REPAIRS:

A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibility under the terms of the guarantee as herein specified.

++END OF SECTION++

ATTACHMENT G

PERMANENT BMPS FOR ON-SITE STORMWATER

Permanent BMPs

Vegetative filter strips will be used on the WTP site to manage stormwater following the completion of construction. Existing vegetation consisting of grassland and forested will be used for the filter strips. Where disturbance is required during construction, filter strip areas will be regraded and seeded. Vegetative filter strip locations areas are shown in the attached figure 1C02-A. The areas delineated in Figure 1C02-A are the minimum filter strip areas required to conform to the design requirements of the TCEQ guidance manual. The areas outside the filter strip boundaries are also vegetated. Filter strips for each drainage area are located to receive even flow distribution in order to prevent flow channeling. Runoff from drainage area 3 is routed to an earthen distribution channel, from where it will overflow onto the filter strip for that area. The undisturbed land surrounding these designated areas will further reduce the TSS load exiting the site. The filter strips will be prepared and revegetated as described in specification Section 02935, Landscape Maintenance, Section 02921, Seeding, and Section 02442, Landscape Irrigation System. The areas of seeding at the WTP site will include but not be limited to the designated filter strip areas.

In addition to the Best Management Practices discussed above, additional landscaping and vegetative practices such as the preservation and protection of existing trees and sodding will be implemented at the site, as described in specification Sections 02935, and 02940.

FM 3159
(ROW VARIES - 120' ET. MIN.)

EXIST. FENCE

DRAINAGE AREA 1
0.47 AC.

12' CONC. DRWY (TYP)

FILTER STRIP AREA 1
0.29 AC.

MEMBRANE BUILDING
FF= 1372.00

FERRIC SULFATE STORAGE TANK

CHLORINE FEED VAULT

CONTROL VALVE VAULT

FLOW METER VAULT No. 1

RAPID MIX BASIN
FF= 1371.00

FLOCCULATION BASIN FF= 1371.00

DRAINAGE AREA 4
2.33 AC.

FILTER STRIP AREA 4
0.79 AC.

CIP LAGOON 2
FF= 1357.50

CIP LAGOON 1
FF= 1357.50

LAGOON DRAIN PUMP

CHLORINE BUILDING
FF= 1365.00

DRAINAGE AREA 2
2.14 AC.

FLOW METER VAULT No. 2

FUTURE GAC

OPERATIONS BUILDING
FF= 1371.50

BUS PARKING

DRAINAGE AREA 5A
0.28 AC.

DRAINAGE AREA 5B
0.42 AC.

FILTER STRIP AREA 5B
0.08 AC.

RECYCLE PUMPS

2 MG TREATED WATER TANK TWST-701
BASE EL 1354.50

TANK INLET VALVE VAULT

TANK OUTLET VALVE VAULT

FILTER STRIP AREA 2
1.18 AC.

RESIDUALS LAGOON 1
FF VARIES

FILTER STRIP AREA 5A
0.15 AC.

RESIDUALS LAGOON 2
FF VARIES

HYDROPNEUMATIC TANK SLAB

SITE DRAIN PUMP STATION

FLOW METER VAULT No. 3

TANK INLET VALVE VAULT MH

CONCRETE PAVEMENT

HIGH SERVICE PUMP STATION
FF= 1357.5

TANK OUTLET VALVE VAULT

FUTURE 2 MG TREATED WATER TANK TWST-702

CONC. RAMP

FILTER STRIP AREA 3
3.14 AC.

SEPTIC TANK

24" CATCH BASIN

HEADWALL

CHAIN LINK FENCE

CRANES MILL ROAD

EXIST. FENCE

DRAINAGE AREA 3
2.38 AC.

24' WIDE GATE SEE DETAIL

20' X 20' TURN AROUND

24" CATCH BASIN

HEADWALL

WAGNER RANCH

NOTES:

1. VEGETATIVE FILTER STRIP AREAS REPRESENT PERMANET BEST MANAGEMENT PRACTICES FOR CONTROL OF POLLUTION DISCHARGES AFTER COMPLETION OF CONSTRUCTION. PREPARE AND REVEGETATE FILTER STRIP AREAS AS DESCRIBED IN SEEDING, LANDSCAPE IRRIGATION AND LANDSCAPE MAINTENACE SPECIFICATIONS.
2. FILTER STRIP AREAS ARE DESIGNATED IN ACCORDANCE WITH THE EDWARDS AQUIFER CONTRIBUTING ZONE PLAN, AVAILABLE FOR REVIEW AT ISSUING OFFICE.

STATE OF TEXAS
KAREN R. PAPPA
88107
LICENSED
PROFESSIONAL ENGINEER
2-20-04

MALCOLM PIRNIE
HDR
HDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER: JCW
DESIGNED: KRP
DRAWN: JRM
CHECKED: KP

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

SITE WORK
CIVIL
DRAINAGE AREAS
AND VEGETATIVE STRIPS

DATE: FEBRUARY 2004
SCALE: 1" = 60'
FILE NAME: GBRA-4-1C02-A
SHEET No.: 1C02-A
ISSUE: 0

User:MARTINEZ, Spec:PIRNIE STANDARD, File:C:\ACAD\PROJ\392801A-ac-adl\acad\Civil\GBRA-4-1C02-A.DWG, Scale:1:1, Date:01/29/2004, Time:15:12, Layout:SITE PLAN

Date: 4-16-02

CONTRIBUTING ZONE PLAN NOTES

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION. CONTRIBUTING ZONE PLAN GENERAL CONSTRUCTION NOTES

1. WRITTEN CONSTRUCTION NOTIFICATION SHOULD BE PROVIDED TO THE APPROPRIATE TNRCC REGIONAL OFFICE NO LATER THAN 48 HOURS PRIOR TO COMMENCEMENT OF THE REGULATED ACTIVITY. INFORMATION SHOULD INCLUDE THE DATE ON WHICH THE REGULATED ACTIVITY WILL COMMENCE, THE NAME OF THE APPROVED PLAN FOR THE REGULATED ACTIVITY, AND THE NAME OF THE PRIME CONTRACTOR WITH THE NAME AND TELEPHONE NUMBER OF THE CONTACT PERSON.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT SHOULD BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED CONTRIBUTING ZONE PLAN AND THE TNRCC LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTOR(S) SHOULD KEEP COPIES OF THE APPROVED PLAN AND APPROVAL LETTER ON-SITE.

3. NO TEMPORARY ABOVEGROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM MAY BE INSTALLED WITHIN 150 FEET IF A DOMESTIC, INDUSTRIAL, IRRIGATION, OR PUBLIC WATER SUPPLY WELL.

4. PRIOR TO COMMENCING CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. CONTROLS SPECIFIED IN THE SWPPP SECTION OF THE APPROVED EDWARDS AQUIFER CONTRIBUTING ZONE PLAN ARE REQUIRED DURING CONSTRUCTION. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.

5. IF SEDIMENT ESCAPES THE CONSTRUCTION SITE, OFF-SITE ACCUMULATIONS OF 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).

6. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.

7. 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).

8. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE AND STORED ON-SITE MUST HAVE PROPER E&S CONTROLS INSTALLED.

9. 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.

10. THE FOLLOWING RECORDS SHOULD BE MAINTAINED AND MADE AVAILABLE TO THE TNRCC 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.

11. THE HOLDER OF ANY APPROVED CONTRIBUTING ZONE PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
    A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY BEST MANAGEMENT PRACTICES OR STRUCTURE(S), INCLUDING BUT NOT LIMITED TO TEMPORARY OR PERMANENT PONDS, DAMS, BERMS, SILT FENCES, AND DIVERSIONARY STRUCTURES;
    B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED;
    C. ANY CHANGE THAT WOULD SIGNIFICANTLY IMPACT THE ABILITY TO PREVENT POLLUTION OF THE EDWARDS AQUIFER AND HYDROLOGICALLY CONNECTED SURFACE WATER; OR
    D. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED IN A CONTRIBUTING ZONE PLAN AS UNDEVELOPED.

SAN ANTONIO REGIONAL OFFICE
14250 JUDSON ROAD
SAN ANTONIO, TEXAS 78233-4480
PHONE (210) 490-3096
FAX (210) 545-4329

STATE OF TEXAS
KAREM R. PAPPAS
88107
LICENSED
PROFESSIONAL ENGINEER
2-2-04

MALCOLM PIRNIE, INC.

LDR Engineering, Inc.

REVISIONS			
ISSUE	BY	DATE	REMARKS

PROJECT MANAGER: CW
DESIGNED: YW
DESIGNED:
CHECKED: RH/SH
DRAWN: AR

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

GUADALUPE-BLANCO RIVER AUTHORITY
WESTERN CANYON REGIONAL WATER SUPPLY PROJECT
CONTRACT No. 4
RAW WATER CONTROL TANKS
AND WATER TREATMENT PLANT

GENERAL

CONTRIBUTING ZONE PLAN NOTES

DATE: FEBRUARY 2004
SCALE: NOT TO SCALE
FILE NAME: GBRA-4-0210
SHEET NO.: 0G05
ISSUE: 0

ATTACHMENT H

WESTERN CANYON WATER TREATMENT PLANT
VEGETATIVE FILTER STRIP
INSPECTION & MAINTENANCE REPORT

Inspector:_____ Date:_____

Reason for Inspection/Maintenance:_____

_____

_____

Filter Strip Areas

(Y/N)

	1	2	3	4	5	6
1) Inspection:						
a. Evidence of pests in vegetated areas						
b. Evidence of erosion or vegetation damage						
c. Bare spots without grass and/or tree cover						
d. Removed debris and litter						
2) Seasonal Mowing and Lawn Care:						
a. Areas mowed						
b. Clippings removed						
3) Sediment Removal						
a. Accumulated sediment						
b. Sediment removal performed						
4) Grass Reseeding and Mulching						
a. Filter strip repairs required						
b. Describe type of repair below						

Additional Comments:_____

_____

_____

_____

Notice of Intent

The Notice of Intent form will be completed and submitted to the TCEQ by the construction contractor, prior to the start of construction.

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR150000)

For help completing this application, read the TXR150000 NOI Instructions (TCEQ-20022-Instructions).

TCEQ Office Use Only
TPDES Permit Number: TXR15••_••_••_••_••- NO
GIN Number: ••_••_••_••_••_••_••_••

A. Construction Site Operator ☐ New ☐ No Change Customer Reference Number: CN_____

Name: _____

Mailing Address: _____ City: _____ State: ____ Zip Code: _____

Country Mailing Information (*if outside USA*) Territory: _____ Country Code: _____ Postal Code: _____

Phone Number: _____ Extension: _____ Fax Number: _____

E-mail Address: _____

Type of Operator: ☐ Individual ☐ Sole Proprietorship - D.B.A. ☐ Partnership ☐ Corporation ☐ Federal Government ☐ State Government ☐ County Government ☐ City Government ☐ Other: _____

Independent Operator? ☐ Yes ☐ No Number of Employees: ☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 or higher

Federal Tax ID: _____ State Franchise Tax ID Number: _____ DUNS Number: _____

B. Billing Address

Name: _____

Mailing Address: _____ City: _____ State: ____ Zip Code: _____

Country Mailing Information (*if outside USA*) Territory: _____ Country Code: _____ Postal Code: _____

C. Project / Site Information ☒ New ☐ No Change Regulated Entity Reference Number: RN **102676814**

Name: **Western Canyon Regional Water Supply System - Contract 4**

Mailing Address: **TBD** City: _____ State: **TX** Zip Code: _____

Physical Address: **USACE Comal Park** City: _____ County: **COMAL** Zip Code: _____

Location Access Description: **USACE Comal Park, Canyon Lake**

Latitude: **29** ° **49** ' **0** " N Longitude: **98** ° **17** ' **30** " W Degrees (°), Minutes ('), and Seconds (")

Latitude: _____ Longitude: – _____ Decimal Form

Standard Industrial Classification (SIC) code: **4941** Also, describe the construction activity at this site *(do not repeat the SIC code)*:

_____

Has a storm water pollution prevention plan been prepared as specified in the general permit (TXR150000)? ☒ Yes ☐ No

Estimated area of land disturbed (to the nearest acre): _____ Is the project / site located on Indian Country Lands? ☐ Yes ☒ No

Does this project / site discharge storm water into a municipal separate storm sewer system (MS4)? ☐ Yes ☒ No

If yes, provide the name of the MS4 operator: _____

Provide the name or segment number of the water body that receives storm water from this project / site: _____

D. Contact - If the TCEQ needs additional information regarding this application, who should be contacted?

Name: _____ Title: _____

Phone Number: _____ Extension: _____ Fax Number: _____

E-mail Address: _____

E. Payment Information - Check / Money Order Number: _____ Name on Check / Money Order: _____

F. Certification

I certify under penalty of law that this document was 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.

Construction Site Operator:

Prefix: _____ First: _____ Middle: _____

Last: _____ Suffix: _____ Title: _____

Signature: _____ Date: _____

If you have questions on how to fill out this form or about the storm water program, please contact us at (512) 239-4671.
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.

The completed NOI must be mailed to the following address. Use the attached document to submit the $100 application fee. Please note that the NOI and application fee are submitted separately to different addresses.

Texas Commission on Environmental Quality
Storm Water & General Permits Team; MC - 228
P.O. Box 13087
Austin, Texas 78711-3087

Texas Commission on Environmental Quality
Payment Submittal Form

The storm water application fee shall be sent under separate cover to the Texas Commission on Environmental Quality.

This form must be used to submit your Storm Water Application Fee. Please complete the following information, staple your check in the space provided at the bottom of this document, and mail it to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, TX 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, TX 78753

Fee Code: GPA

Storm Water General Permit: TXR150000

Check / Money Order No: _____ Amount of Check/Money Order: _____

Date of Check or Money Order: _____

Name on Check or Money Order: _____

Facility / Site Name: _____

Facility / Site Physical Address: _____

City: _____ Zip Code: _____

Staple Check In This Space

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I Fred M. Blumberg,
Print Name

Deputy General Manager
Title - Owner/President/Other

of Guadalupe-Blanco River Authority
Corporation/Partnership/Entity Name

have authorized Karen Pappas, P.E.
Print Name of Agent/Engineer

of Malcolm Pirney, Inc.
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 Natural Resource Conservation Commission (TNRCC) 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 TNRCC's approval letter. The TNRCC is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and the forms must accompany the completed application.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TNRCC cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. For applicants who are not the property owner, but who have the right to control and possess and control the property, additional authorization is required from the owner.

Fred M. Blumberg — 11-14-03

Applicant's Signature — Date

THE STATE OF Texas §

County of Guadalupe §

BEFORE ME, the undersigned authority, on this day personally appeared Fred M. Blumberg 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 14 day of November 2003

Susan K. Cochran

NOTARY PUBLIC

Susan K. Cochran

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 10-10-2004

NOTARY PUBLIC STATE OF TEXAS

SUSAN K. COCHRAN
Notary Public
State of Texas
Comm. Exp. 10-10-2004

Texas Natural Resource Conservation Commission
Edwards Aquifer Protection Program
Contributing Zone Fee Application Form

NAME OF PROPOSED REGULATED ENTITY: WESTERN CANYON WATER TREATMENT PLANT
REGULATED ENTITY LOCATION: CANYON LAKE, TEXAS
NAME OF CUSTOMER: GUADALUPE - BLANCO RIVER AUTHORITY
CONTACT PERSON: GARY ASBURY, P.E. PHONE: (830) 379-5822
(Please Print)

Customer Reference Number (if issued): CN 601180565 (nine digits)
Regulated Entity Reference Number (if issued): RN 102676814 (nine digits)

AUSTIN REGIONAL OFFICE (3373)
- Hays
- Travis
- Williamson

SAN ANTONIO REGIONAL OFFICE (3362)
- Bexar
- Comal
- Kinney
- Medina
- Uvalde

APPLICATION FEES MUST BE PAID BY CHECK, CERTIFIED CHECK, OR MONEY ORDER, PAYABLE TO THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION. 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):**

✓ • **SAN ANTONIO REGIONAL OFFICE**

• **Mailed to TNRCC:**
TNRCC - Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

• **AUSTIN REGIONAL OFFICE**

• **Overnight Delivery to TNRCC:**
TNRCC - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Check one:

✓ • **Contributing Zone Plan - Fee Due $250**

• **Modification of a Previously Approved Contributing Zone Plan - Fee Due $250**

• **Extension of Time Request - Fee Due $100**

Kara R Pappas
Signature

12-5-03
Date

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.

TCEQ Core Data Form

TCEQ Use Only

If you have questions on how to fill out this form or about our Central Registry, please contact us at 512-239-5175.

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.

SECTION I: General Information

1. Reason for Submission *Example: new wastewater permit; IHW registration; change in customer information; etc.*

New raw water intake, pipeline, water treatment plant, and treated water transmission system

2. Attachments				Describe Any Attachments: *(ex: Title V Application, Waste Transporter Application, etc.)*
√	YES		~~NO~~	Edwards Aquifer Contributing Zone Plan

3. Customer Reference Number-*if issued*			4. Regulated Entity Reference Number-*if issued*		
CN	601180565	*(9 digits)*	RN	102676814	*(9 digits)*

SECTION II: Customer Information

5. Customer Role ***(Proposed or Actual)*** **-- As It Relates to the Regulated Entity Listed on This Form**

Please check one of the following:		Owner		Operator	X	Owner and Operator
	Occupational Licensee		Volunteer Cleanup Applicant			Other
TCEQ Use Only		**Superfund**		**PST**		**Respondent**

6. General Customer Information

	New Customer		Change to Customer Information
	Change in Regulated Entity Ownership	X	No Change *

***If ANo Change≅ and Section I is complete, skip to Section III - Regulated Entity Information.**

7. Type of Customer:					
	Individual		Sole Proprietorship - D.B.A.		
	Partnership		Corporation		Federal Government
	State Government		County Government		City Government
	Other Government		Other:		

8. Customer Name *(If an individual, please print last name first)*	*If new name, enter previous name:*

9. Mailing Address:				
City	State	ZIP	ZIP + 4	

10. Country Mailing Information *if outside USA*	11. E-Mail Address *if applicable*

12. Telephone Number	13. Extension or Code	14. Fax Number *if applicable*

15. Federal Tax ID *(9 digits)*	16. State Franchise Tax ID Number *if applicable*	17. DUNS Number *if applicable (9 digits)*

18. Number of Employees										19. Independently Owned and Operated?			
	0-20		21-100		101-250		251-500		501 and higher		Yes		No

SECTION III: Regulated Entity Information

20. General Regulated Entity Information

X	New Regulated Entity		Change to Regulated Entity Information		No Change*

*If "No Change" and Section I is complete, skip to Section IV - Preparer Information.

21. Regulated Entity Name *(If an individual, please print last name first)*				
Western Canyon Regional Water Supply System				
22. Street Address (No PO Boxes)				
	Cranes Mill Road			
	City	State	ZIP	ZIP + 4
	Canyon Lake	TX	78133	
23. Mailing Address	TBD			
	City	State	ZIP	ZIP + 4
24. E-Mail Address:	TBD			

25. Telephone Number	26. Extension or Code	27. Fax Number *if applicable*
TBD		TBD

28. Primary SIC Code (4 digits)	29. Secondary SIC Code (4 digits)	30. Primary NAICS Code (5 or 6 digits)	31. Secondary NAICS Code (5 or 6 digits)
4941		221310	

32. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description)

Treat water from Canyon Lake and distribute it to wholesale customers.

Questions 33 - 37 address geographic location. Please refer to the instructions for applicability.

33. County	Comal

34. Description of Physical Location

Plant is south east of the intersection of FM 3159 and Cranes Mill Road. Entrance is from Cranes Mill Road.

35. Nearest City	State	Nearest Zip
anyon Lake	TX	78133

36. Latitude (N)			*37. Longitude (W)*		
Degrees	*Minutes*	*Seconds*	*Degrees*	*Minutes*	*Seconds*
29°	49'	00"	98°	17'	30"

38. TCEQ Programs In Which This Regulated Entity Participates *Not all programs have been listed. Please add to this list as needed. If you don't know or are unsure, please mark "Unknown".* If you know a permit or registration # for this entity, please write it below the program."

	Animal Feeding Operation		Petroleum Storage Tank	×	Water Rights (through customer)
	Title V - Air		Wastewater Permit		
	Industrial & Hazardous Waste		Water Districts		
	Municipal Solid Waste	×	Water Utilities		Unknown
	New Source Review - Air		Licensing - TYPE(s)		

Section IV: Preparer Information

39. Name	40. Title
Karen Pappas	Project Engineer

41. Telephone Number	42. Extension or Code	43. Fax Number *if applicable*
210) 366-8747		(210) 366-8748

44. E-mail Address:	kpappas@pirnie.com