TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 2, 2010

Mr. Charles Salsman
Christ Our King Anglican Church
111 W. San Antonio Street, Suite 250
New Braunfels, Texas 78130-5158

Re: Edwards Aquifer, Comal County
NAME OF PROJECT: Christ Our King Anglican Church, located on FM 1863, 0.75 miles southwest of State Highway 46, New Braunfels, Texas
TYPE OF PLAN: Request for Approval of a Water Pollution Abatement Plan (WPAP), 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer
Edwards Aquifer Protection Program San Antonio File No. 2935.00, Investigation No. 828713
Regulated Entity No. RN105933493

Dear Mr. Salsman:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP Application for the above-referenced project submitted to the San Antonio Regional Office by HMT Engineering & Surveying on behalf of Christ Our King Anglican Church on June 8, 2010. Final review of the WPAP was completed after additional material was received on August 10, and August 27, 2010. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

BACKGROUND

The site is presently ranch land. Two houses, a barn, garage, and a shed (0.42 acre of impervious cover) are located within the boundary of the proposed site. Three water wells are presently in use.

PROJECT DESCRIPTION

The proposed commercial project will be constructed in six phases and will have an area of approximately 22.11 acres. The existing 0.42 acre of impervious cover will be removed. The impervious cover to be constructed will be 9.61 acres (43 percent). The project will include a youth building, parking, drives, sidewalks, church, chapel, columbarium, fellowship hall, pavilion, administration building, school buildings, dormitory, and a community center. Three existing wells will provide water for the first few phases of development. The project will include a wastewater treatment facility. The first five phases of development will result in wastewater flows totaling less than 5,000 gallons per day. According to a letter dated June 10, 2010, signed by Robert Boyd, P.E., with Comal County, the site is acceptable for the use of on-site sewage facilities. The projected population for the completed project is about 4,000 people. Wastewater generated is projected to exceed 23,000 gallons per day. Before the wastewater flow exceeds 5,000 gallons per day, the facility will be connected to a public sewer.

PERMANENT POLLUTION ABATEMENT MEASURES

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, engineered vegetated filter strips and Vortechs hydrodynamic separators, designed using the TCEQ technical guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 8,249 pounds of TSS generated from the 9.61 acres of impervious cover. 9.48 acres of impervious cover is to be captured for treatment. About 0.13 acre will not be captured for treatment. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of two engineered vegetated filter strips and five Vortechs hydrodynamic separators. A total of about 8,684 pounds of suspended solids will be removed each year from stormwater runoff. Adequate overtreatment will therefore be provided to compensate for the lack of treatment of stormwater generated from the 0.13 acre of impervious cover that will not be captured.

Two engineered vegetative filter strips are to remove about 440 pounds of suspended solids annually.
Vegetated filter strip slopes will not exceed 20%;
The minimum dimension of the filter strips (in the direction of flow) will not be less than 15 feet;
The maximum width (in the flow direction) of the contributing impervious areas will not exceed 72 feet;
The minimum vegetated cover will be 80%;
The contributing areas to the filter strips will be relatively flat so that runoff will be distributed evenly to the vegetated area without the use of a level spreader;
The vegetated filter strips will be free of gullies or rills that can concentrate overland flow.

The five Vortechs units, two models Vx1421, one model Vx9000, and one model Vx16000, are to remove a total of about 8,244 pounds of suspended solids per year.

GEOLOGY

According to the geologic assessment included with the application, the site is on the Edwards Aquifer recharge zone. The geologic map provided shows Cretaceous Buda and Del Rio formations at the higher elevations and over most of the site. The Cretaceous Georgetown formation is mapped at the extreme southern and western parts of the site, and the Cretaceous Person formation is mapped at the extreme south corner of the site. An inferred fault (down to the east) is mapped in the southeast part of the site. No evidence of the fault was related found during the field investigation. Six features were noted. None were characterized as "sensitive". The features included the fault and three water wells. The San Antonio Regional Office did not conduct a site assessment.

SPECIAL CONDITIONS

I. For each phase of the development, permanent pollution abatement measures shall be operational prior to occupancy.

II. As the sewage collection system for the facility will eventually be connected to an off-site treatment plant, a sewage collection system plan application must be submitted in accordance with 30 TAC 213. The plan must be approved by the TCEQ prior to any construction of a collection system at the site.

III. All sediment and/or media removed from permanent pollution abatement measures during maintenance activities shall be properly disposed of according to 30 TAC 330 or 30 TAC 335, as applicable.

IV. Be advised that if any of the existing water wells on site are utilized for human consumption, compliance with the applicable 30 TAC 290 regulations relating to public water system permitting and operation may be required

STANDARD CONDITIONS

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

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

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

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed

records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.

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

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

7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.

8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

<u>During Construction</u>:

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

11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be

submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.

13. Three wells exist on site. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.

14. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.

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

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

17. 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.

<u>After Completion of Construction</u>:

18. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or

municipality) or the ownership of the property is transferred to the entity. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through the San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

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

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

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

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

Sincerely,

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

MRV/AGJ/eg

Enclosures: Deed Recordation Affidavit, Form TCEQ-0625
Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

cc: Mr. Jeffrey D. Moeller, P.E., HMT Engineering & Surveying
Mr. James C. Klein, P.E., City Engineer, City of New Braunfels
Mr. Tom Hornseth, P.E., Comal County
Mr. Karl J. Dreher, Edwards Aquifer Authority
TCEQ Central Records, Building F, MC 212

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 2, 2010

Mr. Charles Salsman
Christ Our King Anglican Church
111 W. San Antonio Street, Suite 250
New Braunfels, Texas 78130-5158

Re: Edwards Aquifer, Comal County
NAME OF PROJECT: Christ Our King Anglican Church, located on FM 1863, 0.75 miles southwest of State Highway 46, New Braunfels, Texas
TYPE OF PLAN: Request for Approval of a Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer
Edwards Aquifer Protection Program San Antonio File No. 2935.00, Investigation No. 828713
Regulated Entity No. RN105933493

Dear Mr. Salsman:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP Application for the above-referenced project submitted to the San Antonio Regional Office by HMT Engineering & Surveying on behalf of Christ Our King Anglican Church on June 8, 2010. Final review of the WPAP was completed after additional material was received on August 10, and August 27, 2010. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

BACKGROUND

The site is presently ranch land. Two houses, a barn, garage, and a shed (0.42 acre of impervious cover) are located within the boundary of the proposed site. Three water wells are presently in use.

PROJECT DESCRIPTION

The proposed commercial project will be constructed in six phases and will have an area of approximately 22.11 acres. The existing 0.42 acre of impervious cover will be removed. The impervious cover to be constructed will be 9.61 acres (43 percent). The project will include a youth building, parking, drives, sidewalks, church, chapel, columbarium, fellowship hall, pavilion, administration building, school buildings, dormitory, and a community center. Three existing wells will provide water for the first few phases of development. The project will include a wastewater treatment facility. The first five phases of development will result in wastewater flows totaling less than 5,000 gallons per day. According to a letter dated June 10, 2010, signed by Robert Boyd, P.E., with Comal County, the site is acceptable for the use of on-site sewage facilities. The projected population for the completed project is about 4,000 people. Wastewater generated is projected to exceed 23,000 gallons per day. Before the wastewater flow exceeds 5,000 gallons per day, the facility will be connected to a public sewer.

PERMANENT POLLUTION ABATEMENT MEASURES

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, engineered vegetated filter strips and Vortechs hydrodynamic separators, designed using the TCEQ technical guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 8,249 pounds of TSS generated from the 9.61 acres of impervious cover. 9.48 acres of impervious cover is to be captured for treatment. About 0.13 acre will not be captured for treatment. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of two engineered vegetated filter strips and five Vortechs hydrodynamic separators. A total of about 8,684 pounds of suspended solids will be removed each year from stormwater runoff. Adequate overtreatment will therefore be provided to compensate for the lack of treatment of stormwater generated from the 0.13 acre of impervious cover that will not be captured.

Two engineered vegetative filter strips are to remove about 440 pounds of suspended solids annually.
Vegetated filter strip slopes will not exceed 20%;
The minimum dimension of the filter strips (in the direction of flow) will not be less than 15 feet;
The maximum width (in the flow direction) of the contributing impervious areas will not exceed 72 feet;
The minimum vegetated cover will be 80%;
The contributing areas to the filter strips will be relatively flat so that runoff will be distributed evenly to the vegetated area without the use of a level spreader;
The vegetated filter strips will be free of gullies or rills that can concentrate overland flow.

The five Vortechs units, two models Vx1421, one model Vx9000, and one model Vx16000, are to remove a total of about 8,244 pounds of suspended solids per year.

GEOLOGY

According to the geologic assessment included with the application, the site is on the Edwards Aquifer recharge zone. The geologic map provided shows Cretaceous Buda and Del Rio formations at the higher elevations and over most of the site. The Cretaceous Georgetown formation is mapped at the extreme southern and western parts of the site, and the Cretaceous Person formation is mapped at the extreme south corner of the site. An inferred fault (down to the east) is mapped in the southeast part of the site. No evidence of the fault was related found during the field investigation. Six features were noted. None were characterized as "sensitive". The features included the fault and three water wells. The San Antonio Regional Office did not conduct a site assessment.

SPECIAL CONDITIONS

I. For each phase of the development, permanent pollution abatement measures shall be operational prior to occupancy.

II. As the sewage collection system for the facility will eventually be connected to an off-site treatment plant, a sewage collection system plan application must be submitted in accordance with 30 TAC 213. The plan must be approved by the TCEQ prior to any construction of a collection system at the site.

III. All sediment and/or media removed from permanent pollution abatement measures during maintenance activities shall be properly disposed of according to 30 TAC 330 or 30 TAC 335, as applicable.

IV. Be advised that if any of the existing water wells on site are utilized for human consumption, compliance with the applicable 30 TAC 290 regulations relating to public water system permitting and operation may be required

STANDARD CONDITIONS

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

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

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

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed

records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.

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

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

7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.

8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

<u>During Construction</u>:

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

11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be

submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.

13. Three wells exist on site. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.

14. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.

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

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

17. 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.

<u>After Completion of Construction</u>:

18. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or

municipality) or the ownership of the property is transferred to the entity. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through the San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

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

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

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

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

Sincerely,

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

MRV/AGJ/eg

Enclosures: Deed Recordation Affidavit, Form TCEQ-0625
Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

cc: Mr. Jeffrey D. Moeller, P.E., HMT Engineering & Surveying
Mr. James C. Klein, P.E., City Engineer, City of New Braunfels
Mr. Tom Hornseth, P.E., Comal County
Mr. Karl J. Dreher, Edwards Aquifer Authority
TCEQ Central Records, Building F, MC 212

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 2, 2010

Mr. Charles Salsman
Christ Our King Anglican Church
111 W. San Antonio Street, Suite 250
New Braunfels, Texas 78130-5158

Re: Edwards Aquifer, Comal County
NAME OF PROJECT: Christ Our King Anglican Church, located on FM 1863, 0.75 miles southwest of State Highway 46, New Braunfels, Texas
TYPE OF PLAN: Request for Approval of a Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer
Edwards Aquifer Protection Program San Antonio File No. 2935.00, Investigation No. 828713
Regulated Entity No. RN105933493

Dear Mr. Salsman:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP Application for the above-referenced project submitted to the San Antonio Regional Office by HMT Engineering & Surveying on behalf of Christ Our King Anglican Church on June 8, 2010. Final review of the WPAP was completed after additional material was received on August 10, and August 27, 2010. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

BACKGROUND

The site is presently ranch land. Two houses, a barn, garage, and a shed (0.42 acre of impervious cover) are located within the boundary of the proposed site. Three water wells are presently in use.

PROJECT DESCRIPTION

The proposed commercial project will be constructed in six phases and will have an area of approximately 22.11 acres. The existing 0.42 acre of impervious cover will be removed. The impervious cover to be constructed will be 9.61 acres (43 percent). The project will include a youth building, parking, drives, sidewalks, church, chapel, columbarium, fellowship hall, pavilion, administration building, school buildings, dormitory, and a community center. Three existing wells will provide water for the first few phases of development. The project will include a wastewater treatment facility. The first five phases of development will result in wastewater flows totaling less than 5,000 gallons per day. According to a letter dated June 10, 2010, signed by Robert Boyd, P.E., with Comal County, the site is acceptable for the use of on-site sewage facilities. The projected population for the completed project is about 4,000 people. Wastewater generated is projected to exceed 23,000 gallons per day. Before the wastewater flow exceeds 5,000 gallons per day, the facility will be connected to a public sewer.

PERMANENT POLLUTION ABATEMENT MEASURES

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, engineered vegetated filter strips and Vortechs hydrodynamic separators, designed using the TCEQ technical guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 8,249 pounds of TSS generated from the 9.61 acres of impervious cover. 9.48 acres of impervious cover is to be captured for treatment. About 0.13 acre will not be captured for treatment. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

The individual treatment measures will consist of two engineered vegetated filter strips and five Vortechs hydrodynamic separators. A total of about 8,684 pounds of suspended solids will be removed each year from stormwater runoff. Adequate overtreatment will therefore be provided to compensate for the lack of treatment of stormwater generated from the 0.13 acre of impervious cover that will not be captured.

Two engineered vegetative filter strips are to remove about 440 pounds of suspended solids annually.
Vegetated filter strip slopes will not exceed 20%;
The minimum dimension of the filter strips (in the direction of flow) will not be less than 15 feet;
The maximum width (in the flow direction) of the contributing impervious areas will not exceed 72 feet;
The minimum vegetated cover will be 80%;
The contributing areas to the filter strips will be relatively flat so that runoff will be distributed evenly to the vegetated area without the use of a level spreader;
The vegetated filter strips will be free of gullies or rills that can concentrate overland flow.

The five Vortechs units, two models Vx1421, one model Vx9000, and one model Vx16000, are to remove a total of about 8,244 pounds of suspended solids per year.

GEOLOGY

According to the geologic assessment included with the application, the site is on the Edwards Aquifer recharge zone. The geologic map provided shows Cretaceous Buda and Del Rio formations at the higher elevations and over most of the site. The Cretaceous Georgetown formation is mapped at the extreme southern and western parts of the site, and the Cretaceous Person formation is mapped at the extreme south corner of the site. An inferred fault (down to the east) is mapped in the southeast part of the site. No evidence of the fault was related found during the field investigation. Six features were noted. None were characterized as "sensitive". The features included the fault and three water wells. The San Antonio Regional Office did not conduct a site assessment.

SPECIAL CONDITIONS

I. For each phase of the development, permanent pollution abatement measures shall be operational prior to occupancy.

II. As the sewage collection system for the facility will eventually be connected to an off-site treatment plant, a sewage collection system plan application must be submitted in accordance with 30 TAC 213. The plan must be approved by the TCEQ prior to any construction of a collection system at the site.

III. All sediment and/or media removed from permanent pollution abatement measures during maintenance activities shall be properly disposed of according to 30 TAC 330 or 30 TAC 335, as applicable.

IV. Be advised that if any of the existing water wells on site are utilized for human consumption, compliance with the applicable 30 TAC 290 regulations relating to public water system permitting and operation may be required

STANDARD CONDITIONS

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

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

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

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed

records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.

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

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

7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.

8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

<u>During Construction</u>:

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

11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be

submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.

13. Three wells exist on site. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.

14. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.

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

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

17. 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.

<u>After Completion of Construction</u>:

18. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the San Antonio Regional Office within 30 days of site completion.

19. The applicant shall be responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or

municipality) or the ownership of the property is transferred to the entity. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through the San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

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

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

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

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

Sincerely,

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

MRV/AGJ/eg

Enclosures: Deed Recordation Affidavit, Form TCEQ-0625
Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

cc: Mr. Jeffrey D. Moeller, P.E., HMT Engineering & Surveying
Mr. James C. Klein, P.E., City Engineer, City of New Braunfels
Mr. Tom Hornseth, P.E., Comal County
Mr. Karl J. Dreher, Edwards Aquifer Authority
TCEQ Central Records, Building F, MC 212

Comal Co.

HMT
ENGINEERING & SURVEYING
HOLLMIG ▪ MOELLER ▪ THORNHILL

RECEIVED
OCT 11 2010
COUNTY ENGINEER

RECEIVED TCEQ
2010 AUG 27 PM 4:30
SAN ANTONIO REGION

August 27, 2010

Mr. Alan Jones
Field Operations Division, Region 13 (San Antonio)
Texas Commission on Environmental Quality
14250 Judson Road
San Antonio, TX 78233-4480

RE: Christ Our King Anglican Church Water Pollution Abatement Plan Application

This letter is in response to the fax received 08/13/2010 TCEQ as it pertains to the Christ Our King Anglican Church Water Pollution Abatement Plan Application. The comments received are in italics and our responses are in bold.

1. *Descriptions of Permanent BMPs – Treatment methods and areas treated.*
   a. *TCEQ-0587, Item No. 7, Attachment C, Project Description, and TCEQ-0600, Item No. 7 Attachment c, BMPs for On-Site Stormwater. In both attachments, please relate the area of existing impervious cover (square feet/acres) to be removed, the impervious cover to be treated by both types of BMPs, the impervious cover not captured (including areas of driveways on the highway right-of-way) and how the uncaptured impervious cover will be compensated for. Also relate annuals pounds to be removed be each kind of permanent MP and specify how treatment will exceed the required treatment.*

      See attached Project Description and BMPs for On-Site Stormwater.

   b. *The table on Sheet 1, Drainage Area Map, gives a total of 9.36 acres of impervious cover in the 24 drainage areas. (Vegetated filter strips are shown treating 0.86 acres and Vortechs systems are shown treating 8.5 acres) The total impervious area shown above the table (and in the impervious cover table in the WPAP Application, Item No. 4) is 9.11 acres. The total of the impervious cover shown treated by the five Vortechs systems (the calculations) is 9.33 acres. Please explain the different numbers. Do the larger figures include off-site impervious cover?*

The total impervious cover for the project is 9.61 ac. The Drainage Area Map, WPAP Application, and TCEQ Calculations have been revised to accurately show the impervious areas.

c. *In the table on sheet 1, Drainage Area Map, the impervious area is shown larger than the total area in Drainage Area 4. Drainage Area 9 looks to contain a significant amount of roof, but is shown with no impervious area. Also, the total impervious area shown treated by the Vortechs system is 0.62 acres, whereas the calculations show 1.42 acres of impervious area treated. Please explain or revise as needed.*

The table has been corrected to accurately show the areas for Drainage Area 4. The table has been revised to accurately show the impervious cover for Drainage Area 9. The calculations have been updated to show a captured area of 1.9 acres (0.77 impervious, and 0.08 uncaptured).

d. *Sheet 1, Drainage Area Map and Sheet 2, Phase 2 Map. At the northeast corner of the site most of the Drainage Area 4 looks to be down gradient of the (uncaptured by) Vortechs Systen #3. Also part of the parking lot which is shown in the Drainage Area 3 looks to drain to Drainage Area 4 (see Attachment). Also, much of the north end of the drainage area 1 does not look to drain to the vegetated filter strip. Please explain or revise as necessary. Please show any areas where runoff is not captured on the Drainage Area Map.*

The location of the Vortechs System #3 has been relocated to the northeast corner of the site, where a larger portion of the drainage area can be captured. Drainage Areas 1 and 4 have been revised to show the area uncaptured. The new drainage areas are 1A, 1B, 4A, and, where 1B and 4B are the uncaptured areas. The drainage boundary between areas 3 and 4A have been revised to more accurately represent the drainage patterns. Drainage Area 3 remained 0.23 ac due to rounding of the acreage. Also, a landscaping inlet has been added for Drainage 8 to convey the runoff into the open area in Drainage Area 9 and ultimately be captured in Vortechs System #3.

HMT
ENGINEERING & SURVEYING
HOLLMIG ▪ MOELLER ▪ THORNHILL

Please accept these comments and revisions to the WPAP for the referenced project. If you need additional information or have any questions, please do not hesitate to contact myself or James Ingalls.

Sincerely,

James Ingalls on behalf of Jeff Moeller, P.E.
Attachments

410 N. Seguin St. ▪ New Braunfels, Texas 78130 ▪ Phone 830.625.8555 ▪ Fax 830.625.8556 ▪ hmtnb.com

Comal Co.

Water Pollution Abatement Plan Application
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b), Effective June 1, 1999

REGULATED ENTITY NAME: **Christ Our King Anglican Church**

REGULATED ENTITY INFORMATION

1. The type of project is:
   - ___ Residential: # of Lots: _____
   - ___ Residential: # of Living Unit Equivalents: _____
   - X Commercial
   - ___ Industrial
   - ___ Other: _____

2. Total site acreage (size of property): **22.11**

3. Projected population: **4000**

4. The amount and type of impervious cover expected after construction are shown below:

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	**123,606**	÷ 43,560 =	**2.84**
Parking (Driveway)	**252,381**	÷ 43,560 =	**5.79**
Other paved surfaces (Sidewalk)	**42,625**	÷ 43,560 =	**0.98**
Total Impervious Cover	**305,420**	÷ 43,560 =	**9.61**
Total Impervious Cover ÷ Total Acreage x 100 =			**43%**

5. X **ATTACHMENT A - Factors Affecting Water Quality.** A description of any factors that could affect surface water and groundwater quality is provided at the end of this form.

6. X Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

FOR ROAD PROJECTS ONLY
Complete questions 7-12 if this application is exclusively for a road project.

7. 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.

8. Type of pavement or road surface to be used:
   - ___ Concrete
   - ___ Asphaltic concrete pavement
   - ___ Other: _____

ATTACHMENT "C"
Project Description

Christ Our King Anglican Church is located on the south side of FM 1863 approximately 0.75 miles southwest of the intersection with State Highway 46. (See Location Map) There are 2 existing houses on-site along with some storage buildings. The site is divided into two watersheds, one drains north to Blieders Creek, the second drains south and west to the Dry Comal Creek.According to the Flood Insurance Rate Map No. 48091C0430F there is no existing floodplain located within the property.

The project is proposed to be constructed in 6 Phases (See Phasing Exhibit), each phase will have its own temporary and permanent BMP's installed per TCEQ requirements.

The church campus infrastructure will include a water system, electricity, telephone, cable television, and an On-Site Sewerage Facility is proposed to treat the sanitary sewer from the development. There are three on-site wells that will provide water service for the first few phases of development.

The impervious cover for the ultimate development of the 22.11 acre site will be approximately 43%. The site will utilize a combination of vegetative filter strips and Vortechs® Stormwater treatment systems to treat stormwater runoff generated by the proposed improvements.

Due to the construction phasing of the project, there will not be more than 10 acres of disturbed soil in one common drainage area that will occur at one time. The site is divided into two drainage areas. (See Drainage Area Map)

The site current has 0.42 acres of impervious cover that will be removed upon construction of the proposed improvements. The total proposed impervious cover to be on site is 9.61 acres, of this total, 9.48 acres will be captured and treated using Vegetative Filter Strips and 5 Vortechs systems. A total of 0.13 acres will be uncaptured. According to TCEQ Rules, 8249 lbs of TSS are required to be removed each year using BMPs. The proposed Vegetative Filter Strips will remove 440 lbs and the Vortechs systems will remove 8244 lbs of TSS per year. The proposed BMPs are treating in excess of 435 lbs of TSS per year.

ATTACHMENT "A"
20% of Less Impervious Cover Waiver

The proposed development is a church campus and the 20% Impervious Cover Waiver does not apply. Permanent BMP's will be designed in accordance with TCEQ requirements for the removal of TSS generated by the proposed development.

ATTACHMENT "B"
BMP's for Upgradient Stormwater

The proposed site is at the top of the drainage area, thus no upgradient stormwater is accepted by the site.

ATTACHMENT "C"
BMP's for On-Site Stormwater

The permanent BMP's used to treat on-site stormwater runoff will be a combination of the Vortechs® system and vegetative filter strips. Please refer to the Drainage Area Map in the Temporary Stormwater Section for areas of treatment and BMP structures used.

The site current has 0.42 acres of impervious cover that will be removed upon construction of the proposed improvements. The total proposed impervious cover to be on site is 9.61 acres, of this total, 9.48 acres will be captured and treated using Vegetative Filter Strips and 5 Vortechs systems. A total of 0.13 acres will be uncaptured. According to TCEQ Rules, 8249 lbs of TSS are required to be removed each year using BMPs. The proposed Vegetative Filter Strips will remove 440 lbs and the Vortechs systems will remove 8244 lbs of TSS per year. The proposed BMPs are treating in excess of 435 lbs of TSS per year.

ATTACHMENT "D"
BMP's for Surface Streams

The vegetative filter strips and Vortechs® Storm water treatment system will be installed to prevent pollutants from entering surface streams and ultimately the aquifer. There were no sensitive features identified by the Geologic Assessment.

The natural vegetation located down gradient of proposed improvements will provide additional filtration to help prevent pollutant from entering streams, sensitive features, and the aquifer.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.11**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.61**	acres
Total post-development impervious cover fraction * =	**0.43**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**8249**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = **1**

Total drainage basin/outfall area =	**2.66**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.84**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.69**	
$L_{M\ THIS\ BASIN}$ =	**1652**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **4.14** acres
A_I = **2.88** acres
A_P = **1.26** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.50**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	
Irrigation Area Calculations:			
Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter = 40.62 feet

R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = 0.32 feet

n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA = 4.71 cfs

Manning's Equation Q = 0.76 cfs Error 1 = 3.95

Swale Width= 6.00 ft

Instructions are provided to the right (green comments).

Flow Velocity 0.36 ft/s

Minimum Length = 107.24 ft

Instructions are provided to the right (blue comments).

Design Width = 6 ft

Design Discharge = 0.76 cfs Error 2 = 3.95

Design Depth = 0.33 ft

To solve for bottom v
Excel can simultaneo
The required "Swale

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

The resulting "Swale
If the resulting "Swal

If there is not the opti
Click on "Tools" and
Then proceed as inst

If you would like to in
Excel can simultaneo
The required "Design

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.52		**C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity =	1.1	in/hour	
A = drainage area in acres =	1	acres	
Q = flow rate in cubic feet per second =	0.57	cubic feet/sec	

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.57	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 2859.74 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1651.58**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.68	EA
Calculated Model Size(s) =	Vx1319	
Actual Model Size (if choosing larger model size) =	Vx1421	Pick Model Size
Surface Area =	153.90	ft^2
Overflow Rate =	0.012012	V_{or}
Rounded Overflow Rate =	0.012500	V_{or}
BMP Efficiency % =	84.00	%
L_R Value =	1777.04	lbs
TSS Load Credit =	125.46	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1651.58	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.11**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.61**	acres
Total post-development impervious cover fraction * =	**0.43**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**8249**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 2

Total drainage basin/outfall area =	**3.90**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**2.76**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.71**	
$L_{M\ THIS\ BASIN}$ =	**2477**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **3.90** acres
A_I = **2.76** acres
A_P = **1.14** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.51**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	
Irrigation Area Calculations:			
Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

Design Q = CiA =	4.71 cfs		
Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

Instructions are provided to the right (green comments).

The resulting "Swale
If the resulting "Swal

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

If there is not the opti
Click on "Tools" and
Then proceed as inst

Instructions are provided to the right (blue comments).

If you would like to in
Excel can simultaneo
The required "Design

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.54	
i = design rainfall intensity =	1.1	in/hour
A = drainage area in acres =	1	acres
Q = flow rate in cubic feet per second =	0.59	cubic feet/sec

C = Runoff Coefficient = $0.546\ (IC)^2 + 0.328\ (IC) + 0.03$

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.59	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 2739.54 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs
BMP Sizing		
Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**2477.38**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	2.52	EA
Calculated Model Size(s) =	Area Too Large	
Actual Model Size (if choosing larger model size) =	Vx1421	Pick Model Size
Surface Area =	153.90	ft^2
Overflow Rate =	0.017999	V_{or}
Rounded Overflow Rate =	0.018300	V_{or}
BMP Efficiency % =	76.00	%
L_R Value =	2410.48	lbs
TSS Load Credit =	-66.90	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	No	
TSS Treatment by BMP (LM + TSS Uncapt.) =	NA	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.11**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.61**	acres
Total post-development impervious cover fraction * =	**0.43**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**8249**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 3

Total drainage basin/outfall area =	**1.98**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.12**	acres
Post-development impervious area within drainage basin/outfall area =	**0.85**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.43**	
$L_{M\ THIS\ BASIN}$ =	**655**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **4.14** acres
A_I = **2.88** acres
A_P = **1.26** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.50**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	
Irrigation Area Calculations:			
Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

Design Q = CiA =	4.71 cfs		
Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

Instructions are provided to the right (green comments).

The resulting "Swale
If the resulting "Swal

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

If there is not the opti
Click on "Tools" and
Then proceed as inst

Instructions are provided to the right (blue comments).

If you would like to in
Excel can simultaneo
The required "Design

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired I
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

First set the desired I
Highlight Cell F232.
Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.27		**C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity =	1.1	in/hour	
A = drainage area in acres =	1	acres	
Q = flow rate in cubic feet per second =	0.30	cubic feet/sec	

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.30	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 2859.74 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**655.25**	lbs
Impervious Cover Overtreatment=	0.0800	ac
TSS Removal for Uncaptured Area =	71.81	lbs

BMP Sizing

Effective Area =	0.80	EA
Calculated Model Size(s) =	Vx9000	
Actual Model Size (if choosing larger model size) =	Vx16000	Pick Model Size
Surface Area =	113.10	ft^2
Overflow Rate =	0.007770	V_{or}
Rounded Overflow Rate =	0.007800	V_{or}
BMP Efficiency % =	90.00	%
L_R Value =	891.60	lbs
TSS Load Credit =	236.35	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	727.06	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.10**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.61**	acres
Total post-development impervious cover fraction * =	**0.43**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**8249**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 4

Total drainage basin/outfall area =	**1.98**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.40**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.71**	
$L_{M\ THIS\ BASIN}$ =	**1257**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **1.98** acres
A_I = **1.40** acres
A_P = **0.58** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.51**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	
Irrigation Area Calculations:			
Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

Design Q = CiA = 4.71 cfs

First, highlight Cell F

Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

Then click on "Tools"
The value in the "Set
The value in the "By
Click on solve.

Instructions are provided to the right (green comments).

The resulting "Swale
If the resulting "Swal

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

If there is not the opti
Click on "Tools" and
Then proceed as inst

Instructions are provided to the right (blue comments).

If you would like to in

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

Excel can simultaneo
The required "Design

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.53		**C = Runoff Coefficient = $0.546\,(IC)^2 + 0.328\,(IC) + 0.03$**
i = design rainfall intensity =	1.1	in/hour	
A = drainage area in acres =	1	acres	
Q = flow rate in cubic feet per second =	0.59	cubic feet/sec	

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.59	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 1389.65 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs
BMP Sizing		
Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1256.64**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.28	EA
Calculated Model Size(s) =	Vx16000	
Actual Model Size (if choosing larger model size) =	Vx16000	Pick Model Size
Surface Area =	113.10	ft^2
Overflow Rate =	0.012424	V_{or}
Rounded Overflow Rate =	0.012500	V_{or}
BMP Efficiency % =	84.00	%
L_R Value =	1351.44	lbs
TSS Load Credit =	94.80	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1256.64	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.10**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.61**	acres
Total post-development impervious cover fraction * =	**0.43**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**8249**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 5

Total drainage basin/outfall area =	**2.59**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.88**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.73**	
$L_{M\ THIS\ BASIN}$ =	**1687**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **1.98** acres
A_I = **1.40** acres
A_P = **0.58** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.51**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	
Irrigation Area Calculations:			
Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet
Required capacity at WQV Elevation = **NA** cubic feet

Permanent Pool Capacity is 1.20 times the WQV
Total Capacity should be the Permanent Pool Capacity plus a second WQV.

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	4.71 cfs		
Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

Instructions are provided to the right (green comments).

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

Instructions are provided to the right (blue comments).

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

To solve for bottom v
Excel can simultaneo
The required "Swale

First, highlight Cell F
Then click on "Tools"
The value in the "Set
The value in the "By
Click on solve.

The resulting "Swale
If the resulting "Swal

If there is not the opti
Click on "Tools" and
Then proceed as inst

If you would like to in
Excel can simultaneo
The required "Design

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips Designed as Required in RG-348 Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

17. Wet Vaults Designed as Required in RG-348 Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 = **NA** lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.56		**C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity =	1.1	in/hour	
A = drainage area in acres =	1	acres	
Q = flow rate in cubic feet per second =	0.61	cubic feet/sec	

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.61	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi
First set the desired l
Highlight Cell F232.
Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 1389.65 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

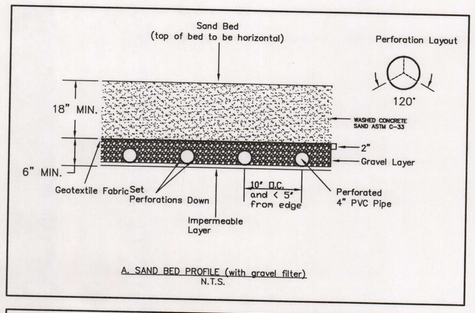
Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

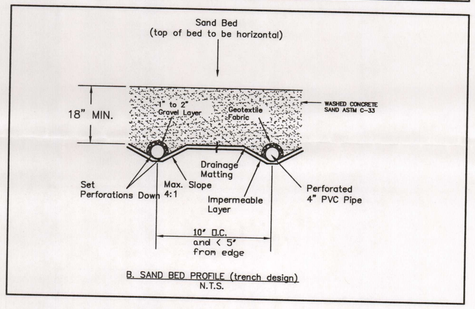
Required TSS Removal in BMP Drainage Area=	**1687.49**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.71	EA
Calculated Model Size(s) =	Vx1319	
Actual Model Size (if choosing larger model size) =	Vx1421	Pick Model Size
Surface Area =	153.90	ft^2
Overflow Rate =	0.012246	V_{or}
Rounded Overflow Rate =	0.012500	V_{or}
BMP Efficiency % =	84.00	%
L_R Value =	1813.76	lbs
TSS Load Credit =	126.27	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1687.49	



A. SAND BED PROFILE (with gravel filter)
N.T.S.



B. SAND BED PROFILE (trench design)
N.T.S.

Figure 3-1 Schematic of Sand Bed Profile

Table 3-1 Clay Liner Specifications (COA,2004)

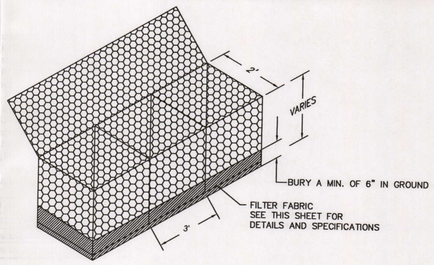
Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	1×10^{-6}
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM D-422	%	Not less than 30
Clay Compaction	ASTM D-2216	%	95% of Standard Proctor Density

CLAY LINER SHALL BE A MINIMUM OF 12" THICK.

Table 3-2 Fabric Specifications (COA,2004)

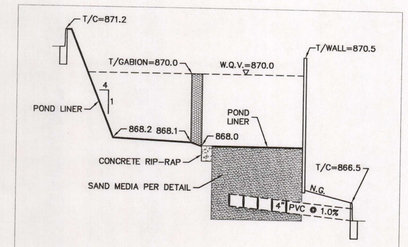
Property	Test Method	Unit	Specification
Unit Weight		oz/yd ^{2}	8
Filtration Rate		in/sec	0.08
Puncture Strength	ASTM D-751*	lb	125
Mullen Burst Strength	ASTM D-751	psi	400
Tensile Strength	ASTM D-1682	lb	200
Equiv. Opening Size *modified	US Standard Sieve	No.	80

NOTE: ALL CLEANOUTS TO BE SCREW TYPE.

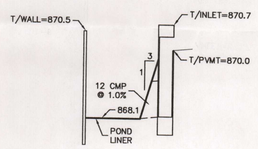


GABION BASKET DETAIL
SCALE: NTS

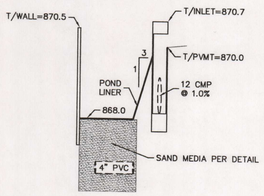
1. STONE
   STONE FILL MATERIAL SHALL CONSIST OF HARD, DURABLE, CLEAN STONE OF THE SIZE INDICATED, 6 TO 9 INCHES IN SIZE OR AS APPROVED BY THE ENGINEER AND RESISTANT TO THE ACTION OF AIR AND WATER AND SUITABLE IN ALL RESPECTS FOR THE PURPOSE INTENDED.
2. WIRE CONTAINERS
   WIRE MESH SHALL CONSIST OF PLASTIC COATED (P.V.C.) GALVANIZED WIRE 0.120 INCH IN DIAMETER MINIMUM AND SHALL EQUAL OR EXCEED FEDERAL SPECIFICATION QQ-W-461G, CLASS 3 UNLESS OTHERWISE INDICATED. OPENING OF THE MESH SHALL NOT EXCEED APPROXIMATELY 4 INCHES IN THE LONGEST DIMENSION. THE WIRE MESH IS TO BE FABRICATED IN SUCH MANNER AS TO BE NONRAVELING. TIE AND CONNECTING WIRE SHALL BE OF THE SAME TYPE AND SIZE AS THE BASKETS AND SHALL BE SUPPLIED IN SUFFICIENT QUANTITY FOR SECURELY FASTENING ALL EDGES OF THE GABION AND DIAPHRAGMS.
3. FILTER FABRIC
   FILTER FABRIC SHALL BE NON-BIODEGRADABLE ULTRAVIOLET STABILIZED, INERT TO MOST SOIL CHEMICALS, UNAFFECTED BY MOISTURE WHICH ALLOWS WATER TO PASS THROUGH WHILE RETAINING SOIL PARTICLES AND SHALL CONFORM TO ITEM NO. 620, "FILTER FABRIC".



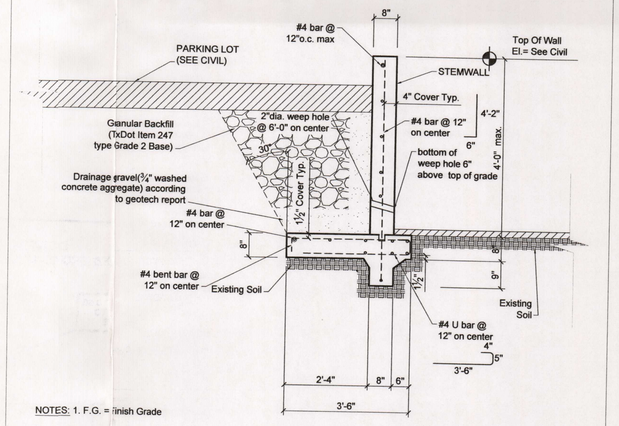
SECTION "A-A"
SCALE: HORZ: 1"=20'
VERT: 1"=2'



SECTION "B-B"
SCALE: HORZ: 1"=20'
VERT: 1"=2'



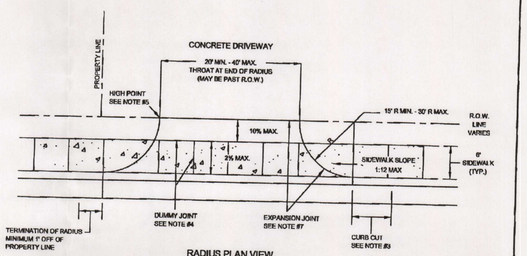
SECTION "C-C"
SCALE: HORZ: 1"=20'
VERT: 1"=2'



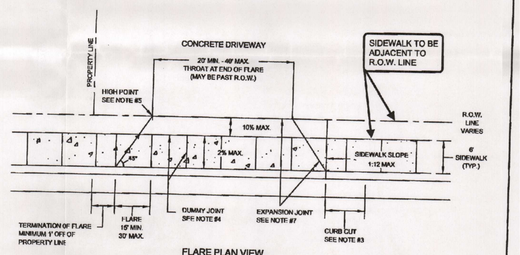
NOTES: 1. F.G. = finish Grade

1- RETAINING AT PARKING LOT
SCALE: 1/2" = 1'-0"

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)
(RADIAL/FLARED)



RADIUS PLAN VIEW

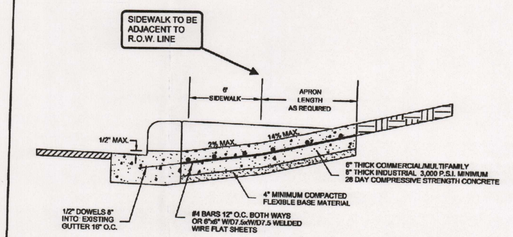


FLARE PLAN VIEW

DATE APPROVED: 4/06	DWG. NO: ST-017A.1	SCALE: N.T.S.
DRAWN BY: RAS	SHEET: 1 OF 2	
FILENAME: DRIVEWAY (Commercial - Multifamily - Industrial - Radial/Flared)		
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB PROPOSED CITY DETAILS\2006\		

CITY OF NEW BRAUNFELS
ENGINEERING DEPARTMENT

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)



STRUCTURAL SECTION

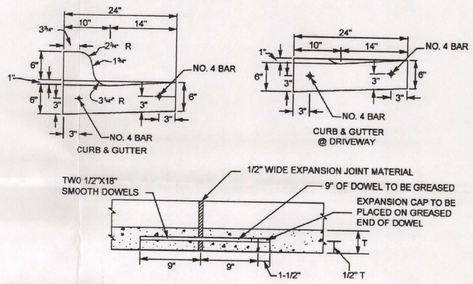
NOTES:

1. WHERE GUTTER DOES NOT EXIST DRIVEWAY APRON SHALL EXTEND TO EDGE OF ASPHALT AND SHALL HAVE A MINIMUM 6" WIDE 1' DEEP GRADE BEAM MONOLITHIC AND REINFORCED SIMILAR TO APRON.
2. PLACEMENT OF SIDEWALK SHOWN IS TYPICAL; HOWEVER, ALTERNATIVE SIDEWALK PLACEMENT COMMON TO DRIVEWAY APRON WILL BE CONSIDERED PROVIDED CROSS SLOPE OF SIDEWALK IS NO GREATER THAN 2%.
3. CURB CUT LENGTH NO GREATER THAN AS REQUIRED TO MATCH SLOPE OF ADJACENT SIDEWALK. MINIMUM 1' RADIUS FOR CURB CUTS.
4. DUMMY JOINTS TO BE PROVIDED A MINIMUM 4-FT. INTERVALS PERPENDICULAR TO THE CURB LINE WITHIN THE SIDEWALK AREA AND PARALLEL TO THE SIDEWALK AREA.
5. PROVIDE A MINIMUM 7" HIGH POINT. HIGH POINT HEIGHT SHALL BE MEASURED FROM THE GUTTER FLOW LINE TO THE DRIVEWAY APRON. NOTE HIGH POINT MAY OCCUR OUTSIDE OF ROW.
6. DRIVEWAY THROAT TRANSITION MAY OCCUR OUTSIDE OF ROW.
7. PROVIDE EXPANSION JOINTS AT ALL SIDEWALK AND DRIVEWAY THROAT JOINTS. EXPANSION JOINTS SHALL BE PLACED USING 1/2" ASPHALTIC MATERIAL WITH 1/2" DOWELS 16" O.C.

DATE APPROVED: 4/06	DWG. NO: ST-017A.2	SCALE: N.T.S.
DRAWN BY: RAS	SHEET: 2 OF 2	
FILENAME: DRIVEWAY (Commercial - Multifamily - Industrial)		
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB PROPOSED CITY DETAILS\2006\		

CITY OF NEW BRAUNFELS
ENGINEERING DEPARTMENT

CURB AND GUTTER



LONGITUDINAL SECTION THRU CURB AND GUTTER
SHOWING TYPICAL EXPANSION JOINT DETAILS.
REINFORCING STEEL SHALL NOT CROSS EXPANSION JOINTS.
STEEL SHALL BE TERMINATED 3" ± 1" FROM FACE OF THE JOINT.

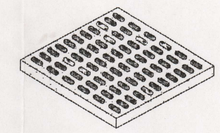
NOTES:

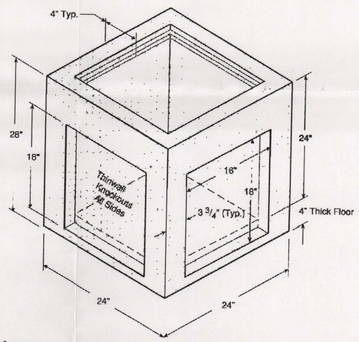
1. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 18".
2. CURB AND GUTTER SHALL HAVE FORMED TOOLED OR SAWED CONTRACTION JOINTS AT ± 10'. THE DEPTH OF THESE JOINTS SHALL BE SUFFICIENT TO ENSURE CRACKING AT THE JOINTS.
3. CURB OR CURB AND GUTTER SHALL HAVE EXPANSION JOINTS AT POINTS OF CURVATURE, AT INTERVALS NO GREATER THAN 120' AND AT ALL ADJACENT STRUCTURES.
4. UNLESS OTHERWISE SHOWN, TRANSITIONS BETWEEN CURBS OR CURBS AND GUTTER OF DIFFERING CROSS SECTION SHALL BE ACCOMPLISHED OVER A 10' LENGTH OR AS APPROVED BY THE CITY ENGINEER.
5. ALL CONCRETE TO BE CLASS "A" 3000 PSI CONCRETE.
6. ALL EXPOSED CONCRETE SURFACES TO BE BRUSHED SMOOTH AND UNIFORM.

APPROVED DATE: 3/03	DWG NO: ST-010	SCALE: N.T.S.
DRAWN BY: RAS	SHEET: 1 OF 1	
FILENAME: ST-010 CURB AND GUTTER		
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB CITY DETAILS AND SECTIONS\DWG		

CITY OF NEW BRAUNFELS
ENGINEERING DEPARTMENT

Precast Drainage Structures





Materials & Features

MAXIMUM PIPE SIZE: 16" PVC
CONCRETE: 5,000 PSI.
REINFORCED TO H20 LOADING.
MAXIMUM RCP: 12".
RISER SECTIONS AVAILABLE.
GRATE: 18" x 18" CAST IRON. 1 ft^2 clear opening.
WEIGHT: 675 LBS.

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION/PAGE	DATE
#18 Catch Basin (Surface Grate Inlet) City of Austin	Austin	TX	8.3	08-15-06

Hanson

"RECEIVED TCEQ" SAN ANTONIO REGION
2008 MAR -5 PM 2:56

RECEIVED
APR 23 2008
COUNTY ENGINEER

HOLLMIG
S. CRAIG HOLLMIG, INC.
CONSULTING ENGINEERS - SURVEYORS
410 N. SEGUIN STREET
NEW BRAUNFELS, TX
78130-5085
PH: (830)625-8555
FAX: (830)625-8556
engr@hollmiginc.com

CENTRAL TEXAS PAIN CENTER
213 HUNTERS VILLAGE
NEW BRAUNFELS, TEXAS

CONSTRUCTION DETAILS

Shawn Kaarlsen and Associates
Architecture & Construction Services
12274 Bandera Road
Suite 215
Helotes, TX 78023
Ph: 210.695.5714
Fx: 210.695.5714
Em: SKA@Stxarch.com

Project No.:	0709024
Drwn. By:	NVA
Chkd By:	SAK
Date Issued:	12/19/2007
Revisions:	

C5

Table 3-1 Clay Liner Specifications (COA,2004)

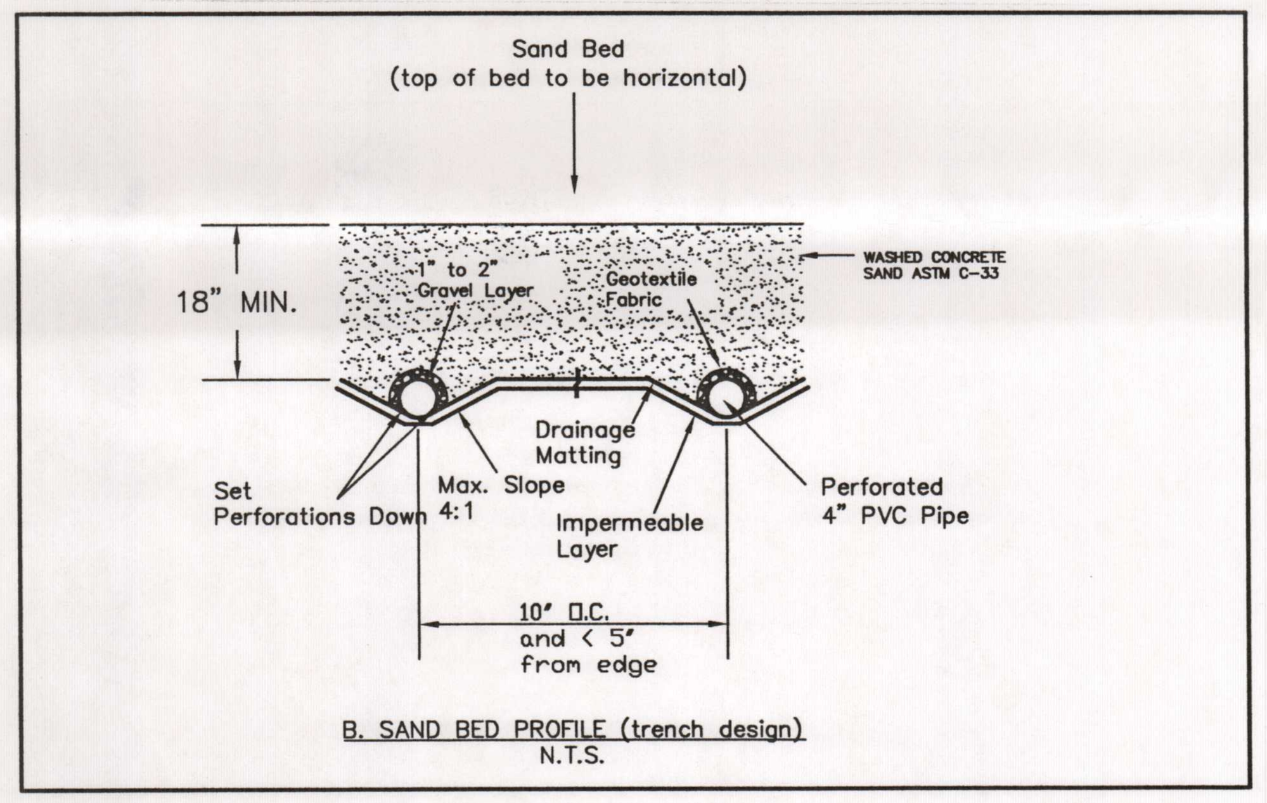
Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	1 x 10 $^{-6}$
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM D-422	%	Not less than 30
Clay Compaction	ASTM D-2216	%	95% of Standard Proctor Density

CLAY LINER SHALL BE A MINIMUM OF 12" THICK.

Table 3-2 Fabric Specifications (COA,2004)

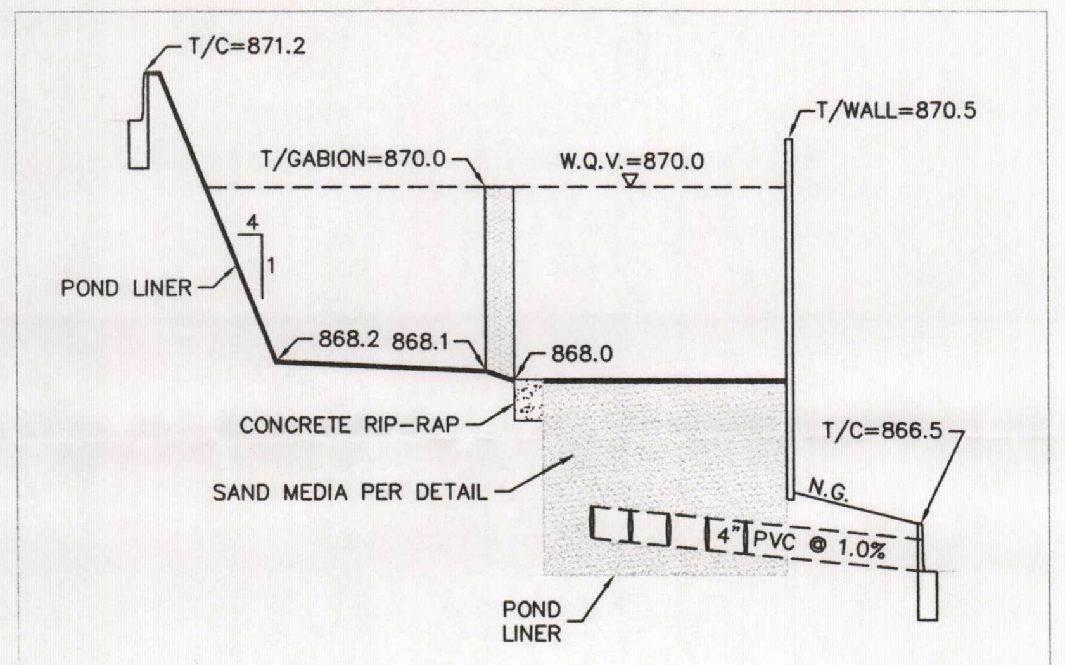
Property	Test Method	Unit	Specification
Unit Weight		oz/yd ^{2}	8
Filtration Rate		in/sec	0.08
Puncture Strength	ASTM D-751*	lb	125
Mullen Burst Strength	ASTM D-751	psi	400
Tensile Strength	ASTM D-1682	lb	200
Equiv. Opening Size *modified	US Standard Sieve	No.	80

NOTE: ALL CLEANOUTS TO BE SCREW TYPE.

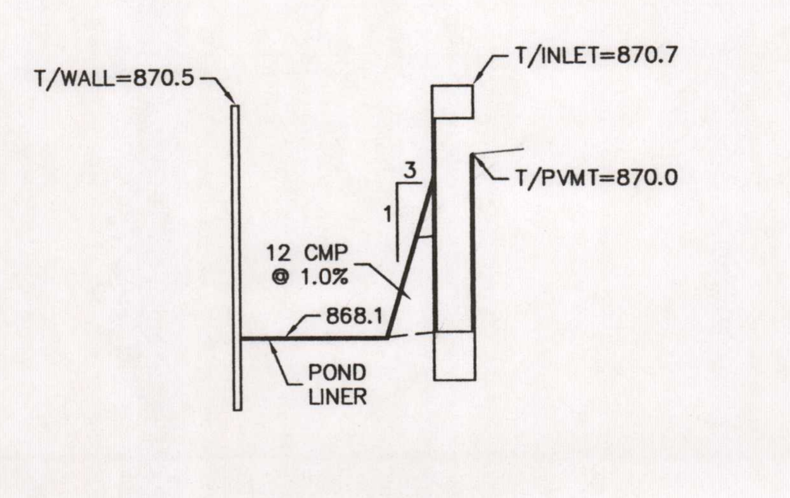


B. SAND BED PROFILE (trench design)
N.T.S.

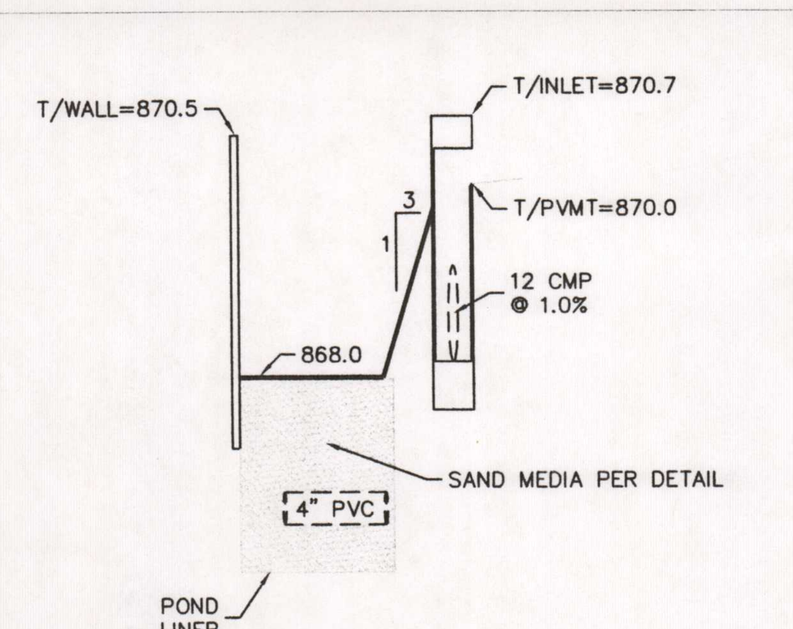
Figure 3-1 Schematic of Sand Bed Profile



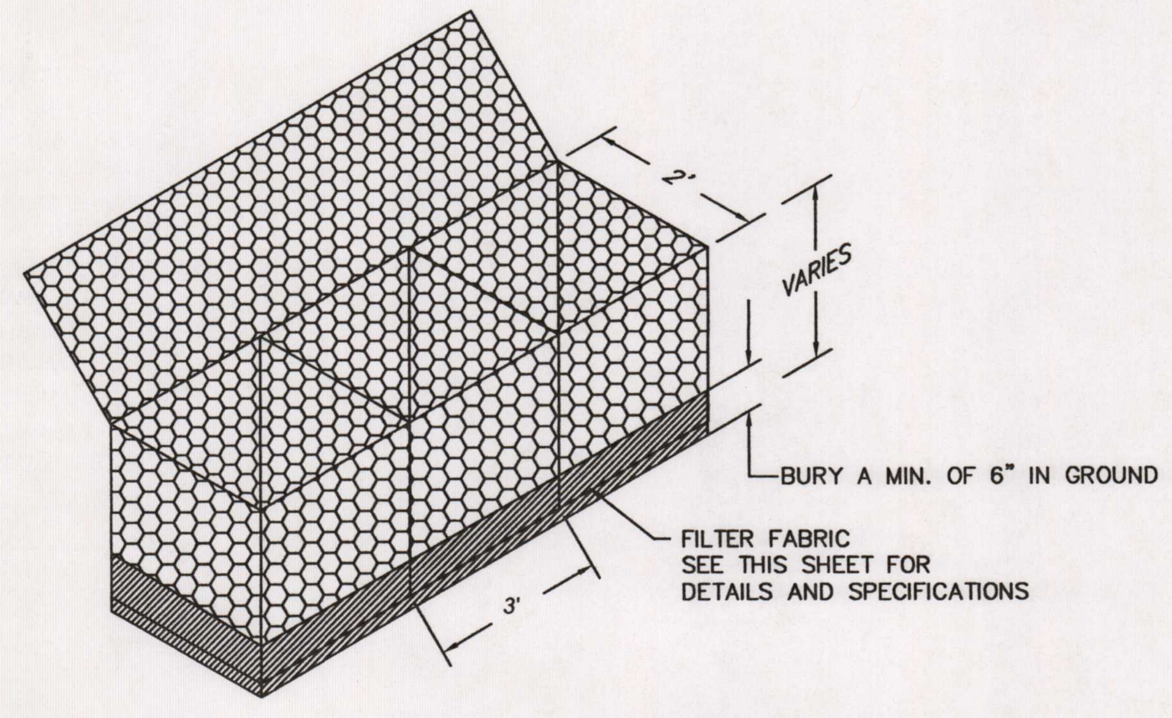
SECTION "A-A"
SCALE: HORZ: 1"=20' VERT: 1"=2'



SECTION "B-B"
SCALE: HORZ: 1"=20' VERT: 1"=2'

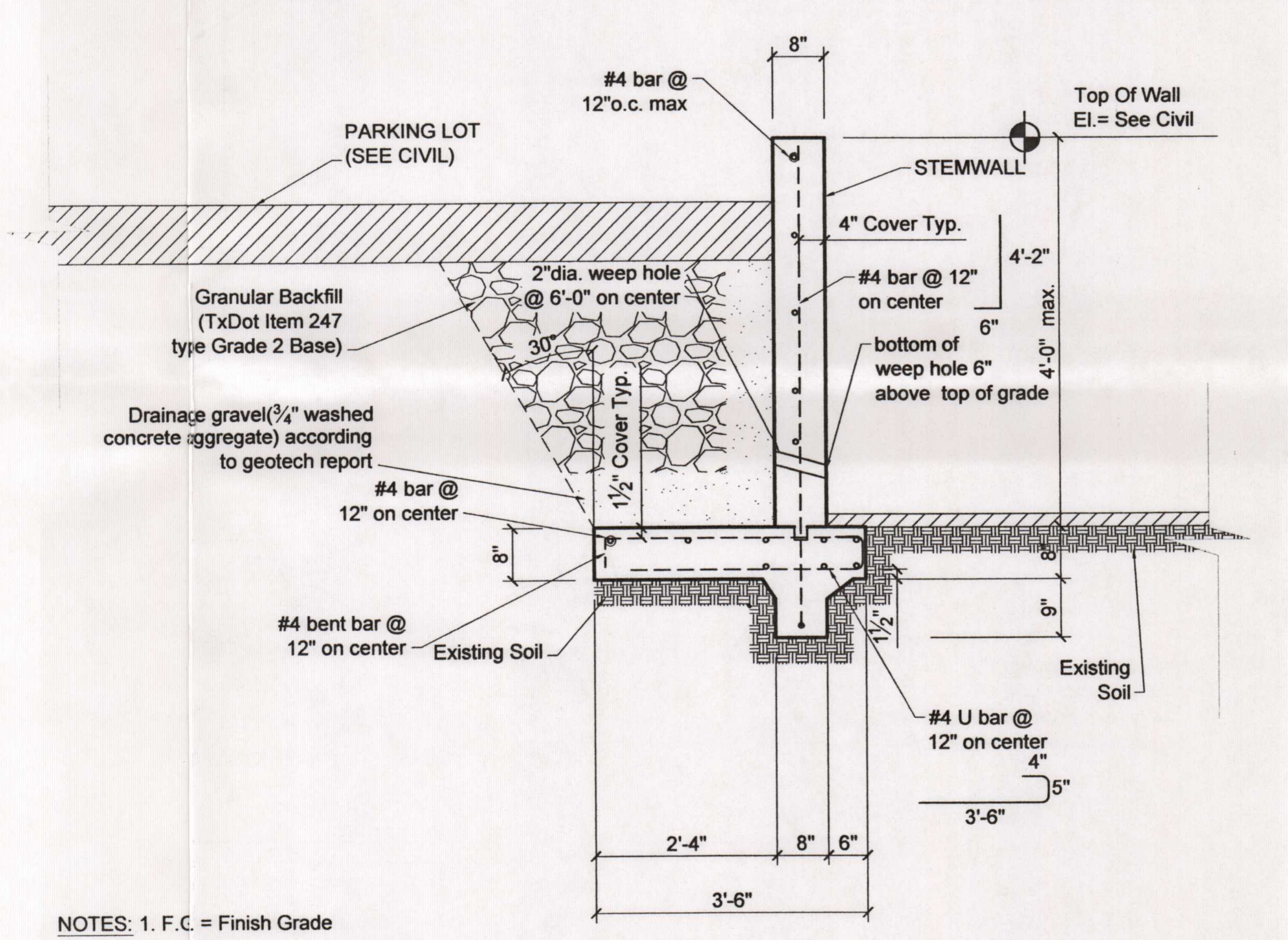


SECTION "C-C"
SCALE: HORZ: 1"=20' VERT: 1"=2'



GABION BASKET DETAIL
SCALE: NTS

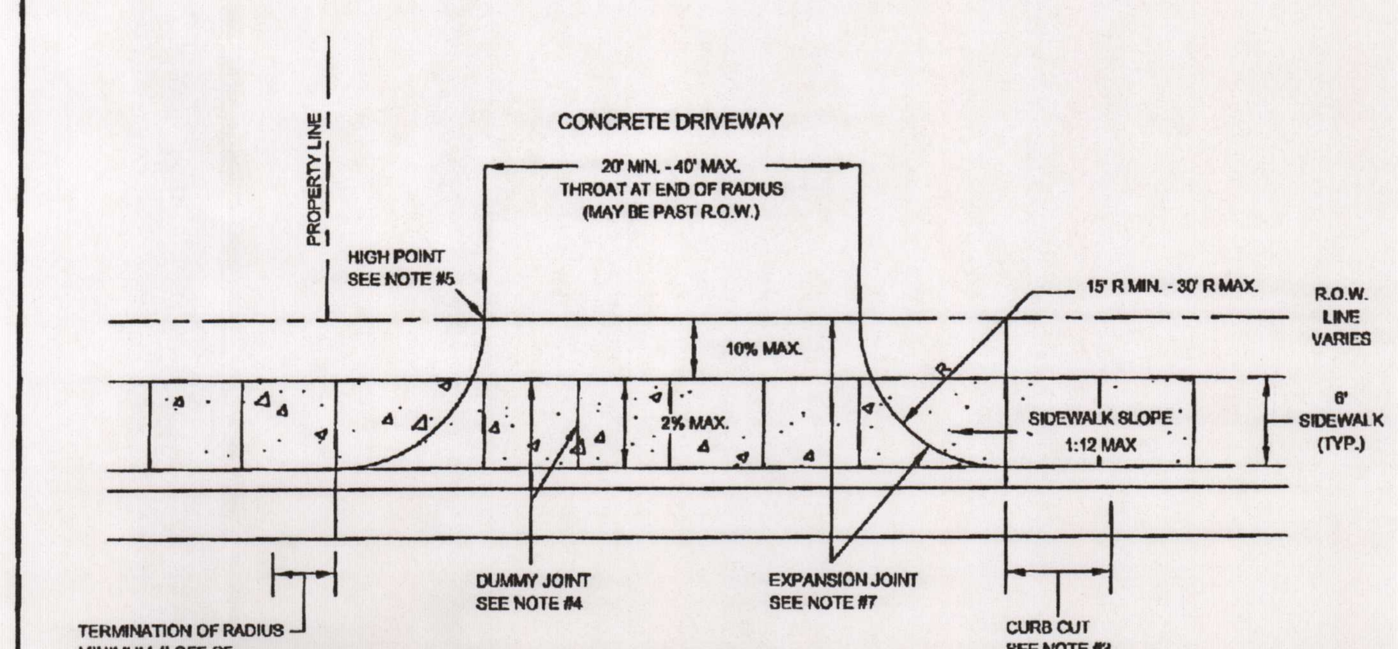
1. STONE
STONE FILL MATERIAL SHALL CONSIST OF HARD, DURABLE, CLEAN STONE OF THE SIZE INDICATED, 6 TO 9 INCHES IN SIZE OR AS APPROVED BY THE ENGINEER AND RESISTANT TO THE ACTION OF AIR AND WATER AND SUITABLE IN ALL RESPECTS FOR THE PURPOSE INTENDED.
2. WIRE CONTAINERS
WIRE MESH SHALL CONSIST OF PLASTIC COATED (P.V.C.) GALVANIZED WIRE 0.120 INCH IN DIAMETER MINIMUM AND SHALL EQUAL OR EXCEED FEDERAL SPECIFICATION QQ-W-461G, CLASS 3 UNLESS OTHERWISE INDICATED. OPENING OF THE MESH SHALL NOT EXCEED APPROXIMATELY 4 INCHES IN THE LONGEST DIMENSION. THE WIRE MESH IS TO BE FABRICATED IN SUCH MANNER AS TO BE NONRAVELING. TIE AND CONNECTING WIRE SHALL BE OF THE SAME TYPE AND SIZE AS THE BASKETS AND SHALL BE SUPPLIED IN SUFFICIENT QUANTITY FOR SECURELY FASTENING ALL EDGES OF THE GABION AND DIAPHRAGMS.
3. FILTER FABRIC
FILTER FABRIC SHALL BE NON-BIODEGRADABLE ULTRAVIOLET STABILIZED, INERT TO MOST SOIL CHEMICALS, UNAFFECTED BY MOSTURE WHICH ALLOWS WATER TO PASS THROUGH WHILE RETAINING SOIL PARTICLES AND SHALL CONFORM TO ITEM NO. 620, "FILTER FABRIC".



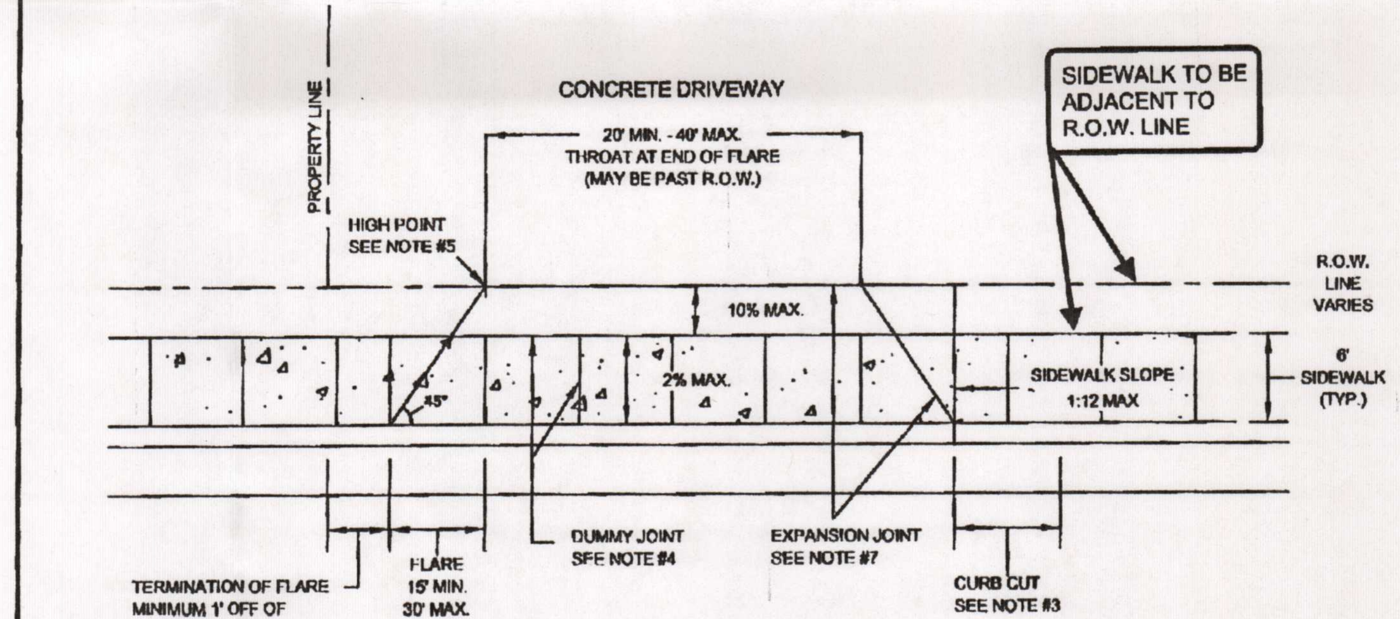
NOTES: 1. F.G. = Finish Grade

1- RETAINING AT PARKING LOT
SCALE: 1/2" = 1'-0"

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)
(RADIAL/FLARED)



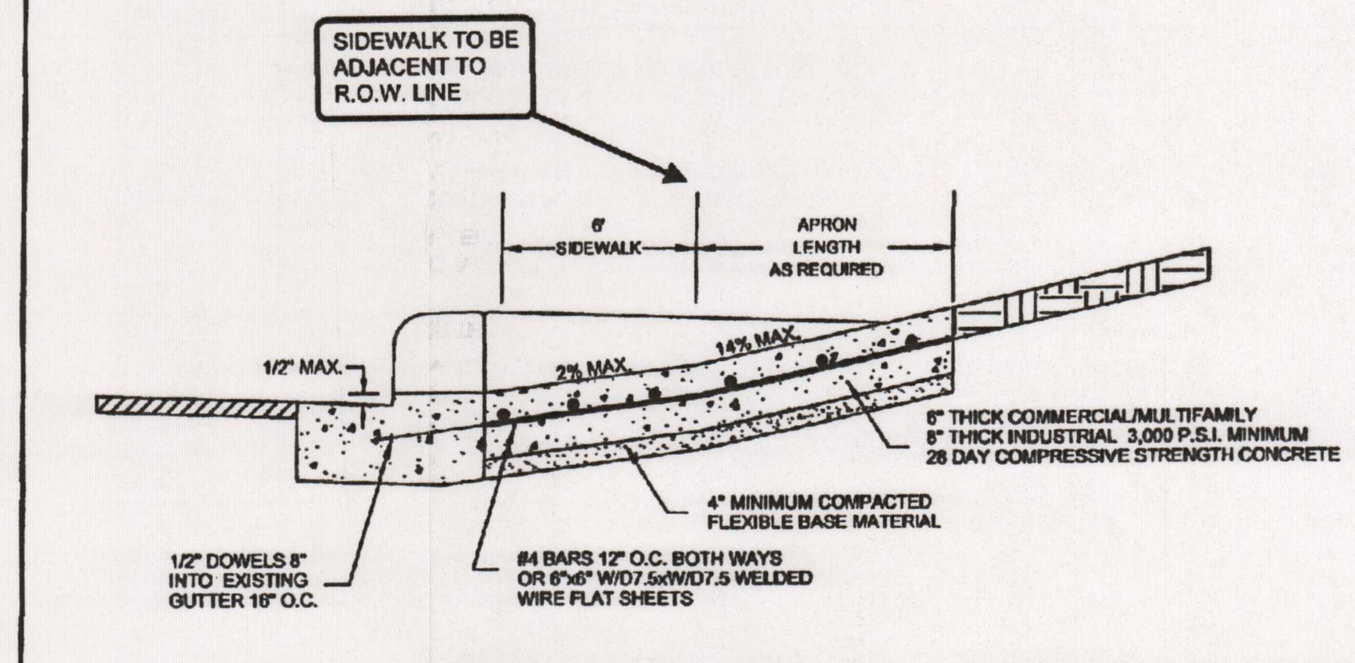
RADIUS PLAN VIEW



FLARE PLAN VIEW

DATE APPROVED: 4/06	DWG. NO: ST-017A.1	SCALE: N.T.S.	CITY OF NEW BRAUNFELS ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 2		
FILENAME: DRIVEWAY (Commercial - Multifamily - Industrial - Radial/Flared)			
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB PROPOSED CITY DETAILS\2006\			

DRIVEWAY APRON
(COMMERCIAL - MULTIFAMILY - INDUSTRIAL)



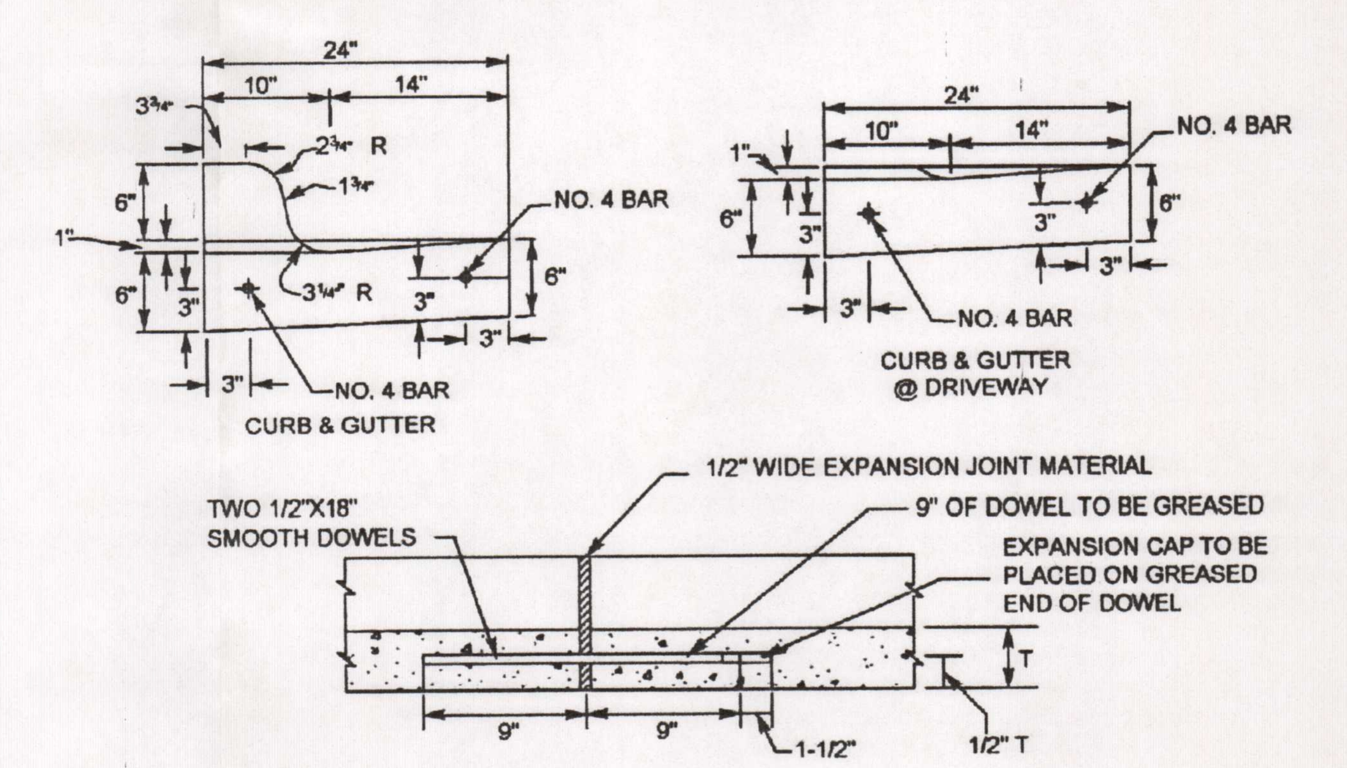
STRUCTURAL SECTION

NOTES:

1. WHERE GUTTER DOES NOT EXIST DRIVEWAY APRON SHALL EXTEND TO EDGE OF ASPHALT AND SHALL HAVE A MINIMUM 6" WIDE 1' DEEP GRADE BEAM MONOLITHIC AND REINFORCED SIMILAR TO APRON.
2. PLACEMENT OF SIDEWALK SHOWN IS TYPICAL; HOWEVER, ALTERNATIVE SIDEWALK PLACEMENT COMMON TO DRIVEWAY APRON WILL BE CONSIDERED PROVIDED CROSS SLOPE OF SIDEWALK IS NO GREATER THAN 2%.
3. CURB CUT LENGTH NO GREATER THAN AS REQUIRED TO MATCH SLOPE OF ADJACENT SIDEWALK. MINIMUM 1' RADIUS FOR CURB CUTS.
4. DUMMY JOINTS TO BE PROVIDED A MINIMUM 4-FT. INTERVALS PERPENDICULAR TO THE CURB LINE WITHIN THE SIDEWALK AREA AND PARALLEL TO THE SIDEWALK AREA.
5. PROVIDE A MINIMUM 7" HIGH POINT. HIGH POINT HEIGHT SHALL BE MEASURED FROM THE GUTTER FLOW LINE TO THE DRIVEWAY APRON. NOTE HIGH POINT MAY OCCUR OUTSIDE OF ROW.
6. DRIVEWAY THROAT TRANSITION MAY OCCUR OUTSIDE OF ROW.
7. PROVIDE EXPANSION JOINTS AT ALL SIDEWALK AND DRIVEWAY THROAT JOINTS. EXPANSION JOINTS SHALL BE PLACED USING 1/2" ASPHALTIC MATERIAL WITH 1/2" DOWELS 16" O.C.

DATE APPROVED: 4/06	DWG. NO: ST-017A.2	SCALE: N.T.S.	CITY OF NEW BRAUNFELS ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 2 OF 2		
FILENAME: DRIVEWAY (Commercial - Multifamily - Industrial)			
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB PROPOSED CITY DETAILS\2006\			

CURB AND GUTTER



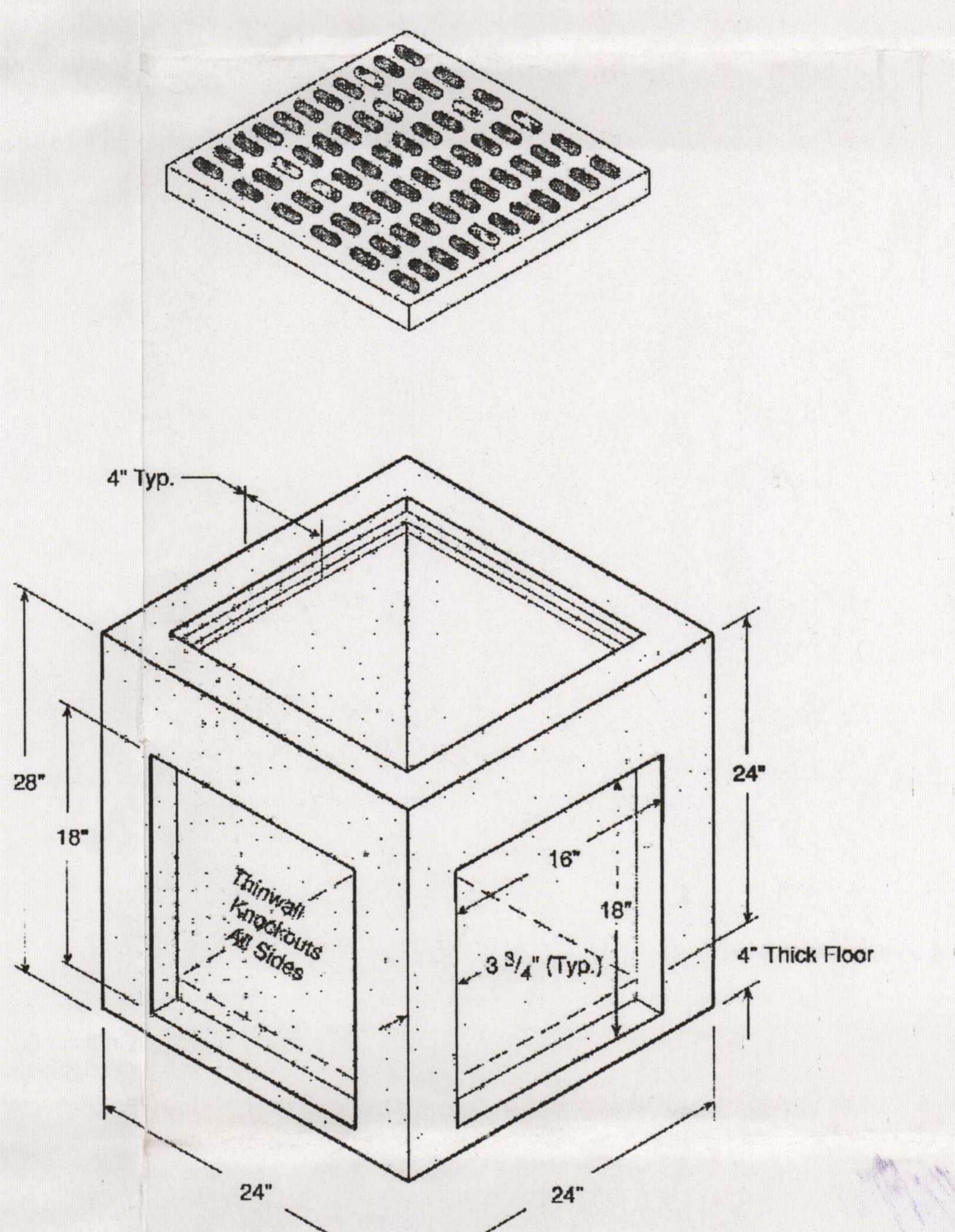
LONGITUDINAL SECTION THRU CURB AND GUTTER
SHOWING TYPICAL EXPANSION JOINT DETAILS.
REINFORCING STEEL SHALL NOT CROSS EXPANSION JOINTS.
STEEL SHALL BE TERMINATED 3" ± 1" FROM FACE OF THE JOINT.

NOTES:

1. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 18".
2. CURB AND GUTTER SHALL HAVE FORMED TOOLED OR SAWED CONTRACTION JOINTS AT ± 10'. THE DEPTH OF THESE JOINTS SHALL BE SUFFICIENT TO ENSURE CRACKING AT THE JOINTS.
3. CURB OR CURB AND GUTTER SHALL HAVE EXPANSION JOINTS AT POINTS OF CURVATURE, AT INTERVALS NO GREATER THAN 120' AND AT ALL ADJACENT STRUCTURES.
4. UNLESS OTHERWISE SHOWN, TRANSITIONS BETWEEN CURBS OR CURBS AND GUTTER OF DIFFERING CROSS SECTION SHALL BE ACCOMPLISHED OVER A 10' LENGTH OR AS APPROVED BY THE CITY ENGINEER.
5. ALL CONCRETE TO BE CLASS "A" 3000 PSI CONCRETE.
6. ALL EXPOSED CONCRETE SURFACES TO BE BRUSHED SMOOTH AND UNIFORM.

APPROVED DATE: 3/03	DWG NO: ST-010	SCALE: N.T.S.	CITY OF NEW BRAUNFELS ENGINEERING DEPARTMENT
DRAWN BY: RAS	SHEET: 1 OF 1		
FILENAME: ST-010 CURB AND GUTTER			
U:\ENGINEERING\R_SEWELL\MY DOCUMENTS\NB CITY DETAILS AND SECTIONS\DWG			

Precast Drainage Structures



Materials & Features

MAXIMUM PIPE SIZE: 16" PVC
CONCRETE: 5,000 PSI.
REINFORCED TO H20 LOADING.
MAXIMUM RCP: 12".
RISER SECTIONS AVAILABLE.
GRATE: 18" x 18" CAST IRON. 1 ft² clear opening.
WEIGHT: 675 LBS.

-No Scale-
All dimensions subject to allowable specification tolerances.

RECEIVED APR 23 2008 COUNTY ENGINEER

"RECEIVED TCEQ" SAN ANTONIO REGION 2008 MAR 10 PM 12: 52

TITLE	PLANT	STATE	SECTION-PAGE	DATE	
#18 Catch Basin (Surface Grate Inlet) City of Austin	Austin	TX	8.3	08-15-06	Hanson

S. CRAIG HOLLMIG, INC.
CONSULTING ENGINEERS - SURVEYORS
410 N. SEGUIN STREET
NEW BRAUNFELS, TX
78130-5085
PH:(830)625-8555
FAX:(830)625-8556
engr@hollmiginc.com

CENTRAL TEXAS PAIN CENTER
213 HUNTERS VILLAGE
NEW BRAUNFELS, TEXAS

CONSTRUCTION DETAILS

Shawn Kaarlsen and Associates
Architecture & Construction Services
12274 Bandera Road
Suite 215
Helotes, Tx. 78023
Ph: 210.695.5716
Fx: 210.695.5714
Em: SKA@sbcglobal.com

Project No.: 0709024
Drwn. By: NVA
Chkd By: SAK
Date Issued: 12/19/2007
Revisions:

C5

Comal Co.

HMT ENGINEERING & SURVEYING

RECEIVED
OCT 11 2010
COUNTY ENGINEER

LETTER OF TRANSMITTAL

ATTN: Alan Jones	**DATE: 8-10-10**
To: TCEQ	**RE: Christ Our King Anglican Church WPAP**

WE ARE SENDING YOU ■ attached ☐ under separate cover the following:

☐ shop drawings ☐ prints ☐ standards ☐ specifications

☐ plans ☐ copy of letter ☐ ordinance ☐ other:

COPIES	ITEM	DESCRIPTION
1	Original	Christ Our King Anglican Church WPAP Resubmittal
4	Copies	Christ Our King Anglican Church WPAP Resubmittal

THESE ARE TRANSMITTED AS CHECKED BELOW:

■ for approval ☐ approved as submitted ☐ resubmit ☐ copies for approval

☐ for your use ☐ approved as noted ☐ submit ☐ copies for distribution

☐ as requested ☐ returned for corrections ☐ return ☐ corrected prints

☐ for review and comment ☐ other:

Signed

James Ingalls

RECEIVED
2010 AUG 10 PM 4:47
TCEQ
SAN ANTONIO
REGION

HMT
ENGINEERING & SURVEYING
HOELMIG ■ MOELLER ■ THORNHILL

August 10, 2010

2010 AUG 10 PM 4:47
RECEIVED TCEQ
SAN ANTONIO
REGION

Mr. Alan Jones
Field Operations Division, Region 13 (San Antonio)
Texas Commission on Environmental Quality
14250 Judson Road
San Antonio, TX 78233-4480

RE: Christ Our King Anglican Church Water Pollution Abatement Plan Application

This letter is in response to the fax received 08/02/2010 TCEQ as it pertains to the Christ Our King Anglican Church Water Pollution Abatement Plan Application. The comments received are in italics and our responses are in bold.

1. *Water Wells – Information does not agree throughout the application.*
   a. *TCEQ-0585, Geologic Assessment- The well identified "S-6" in the Assessment Table is referred to as "S-3" in the Narrative Description. Please correct the typo.*

      The Narrative Description has been corrected, see attached.

   b. *TCEQ-0584, WPAP Application, Item#20, status of wells, and TCEQ-0585, Geologic Assessment, Item #11, status of wells. The response gives differing information on well statuses. Please make needed corrections. Please also relate whether the requirements noted in the June 21, 2010 letter from the Edwards Aquifer Authority have been addressed.*

      For the first phase of development (Construction of the Fellowship Hall), wells S-1, S-2, and S-6 will supply water to the new Fellowship Hall. The owner is aware of the TCEQ requirements for a public water system. In their opinion, they will not meet the threshold for a public water supply in the first phase of construction. Once the public water supply threshold is met, they will proceed to either abandon the three wells in accordance with 16 TAC Chapter 76 requirements and connect into NBU's public water system, or ensure that the existing wells meet the requirements of a public water system, according to TCEQ regulations.

HMT
ENGINEERING & SURVEYING
HOLLMIG ■ MOELLER ■ THORNHILL

2. *Wastewater Treatment- TCEQ-0584, WPAP Application, Item #5, any factors that could affect surface and groundwater quality, and Item #15, wastewater disposal. The facility is to generate more than 23,000 gallons of wastewater per day. By definition, on-site sewage facilities do not treat or dispose of more than 5,000 gallons of sewage each day. An individual wastewater permit is required for the anticipated amount of wastewater. Please contact TCEQ's Water Quality Division, Wastewater Permitting Section, about the proposed facility. Please find whether the prohibition noted by 30 TAC 213.6(a)(1) and 213.8(a)(6) apply. Please correct the response and relate the status of any permit application.*

   The first five phases of development will result in wastewater flows totaling less than 5,000 gallons per day. The assumption of the design was that by the time the final phase will be constructed (approximately 10-20 years) either public sewer would be available from NBU or the church will apply for an individual wastewater permit.

Please accept these comments and revisions to the WPAP for the referenced project. If you need additional information or have any questions, please do not hesitate to contact myself or James Ingalls.

Sincerely,

Jeff Moeller, P.E.
Attachments

Comal Co

TCEQ
Protecting Texas by Reducing and Preventing Pollution

FAX TRANSMITTAL

DATE: 8/2/2010 NUMBER OF PAGES *(including this cover sheet)*: 2

TO: Name **Mr. Jeffrey D. Moeller, P.E.**
Organization **HMT Engineering & Surveying**
FAX Number **(830) 625-8556**

TO: Name **Mr. Charles Salsman**
Organization **Christ Our King Anglican Church**
FAX Number **(830) 632-7779**

FROM: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Name **Alan G. Jones**
Division/Region **Field Operations Division, Region 13 (San Antonio)**
Telephone Number **(210) 403-4074**
FAX Number **(210) 545-4329**

Re: Edwards Aquifer, Comal County
NAME OF PROJECT: Christ Our King Anglican Church, located on FM 1863, 0.75 miles southwest of State Highway 46, New Braunfels, Texas
TYPE OF PLAN: Request for Approval of a Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer
Edwards Aquifer Protection Program San Antonio File ID No. 2935.00
Investigation No. 828713, Regulated Entity No. RN105933493

We are in the process of technically reviewing the WPAP application you submitted for the above-referenced project. Before we can proceed with our review, the following comments relating to the application must be addressed:

1. Water Wells – Information does not agree throughout the application.
a. TCEQ-0585, Geologic Assessment
The well identified "S-6" in the Assessment Table is referred to as "S-3" in the Narrative Description. Please correct the typo.
b. TCEQ-0584, WPAP application, Item #20, status of wells, and TCEQ-0585, Geologic Assessment, Item #11, status of wells.
The responses give differing information on well statuses. Please make needed corrections. Please also relate whether the requirements noted in the June 21, 2010 letter from the Edwards Aquifer Authority have been addressed.

2. Wastewater Treatment
TCEQ-0584, WPAP application, Item #5, any factors that could affect surface and groundwater quality, and Item #15, wastewater disposal.
The facility is to generate more than 23,000 gallons of wastewater per day. By definition, on-site sewage facilities do not treat or dispose of more than 5,000 gallons of sewage each day. An individual wastewater permit is required for the anticipated amount of wastewater. Please contact TCEQ's Water Quality Division, Wastewater Permitting Section, about the proposed facility. Please find whether the prohibition noted by 30 TAC 213.6(a)(1) and 213.8(a)(6) apply. Please correct the response and relate the status of any permit application.

We ask that you submit one original and three copies of the amended materials to supplement the WPAP application to this office by no later than **14 days from the date of this letter** to avoid denial of the plan. If the response to this notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, a second notice will be sent to you requiring a response within 14 days from the notice date. If the response to the second notice is not recieved, is incomplete or inadequate, or provides new information that is incomplete or inadaquate, the application will be denied unless you provide written notification that the application is being withdrawn. Please note that the application fee will be forfeited if the plan is not withdrawn. If you have any questions or require additional information, please contact Alan G. Jones the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4074.

FEATURE NARRATIVE

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

Five features found are described as follows:

Three man-made features in bedrock were observed on Site. Features S-1 and S-2 are existing water wells located on the hilltop and ridge in the north central portion of the Site. Feature S-6 is a water well casing and riser plug, not currently used as a well, with grout surrounding the casing at the ground surface. Features S-1 and S-2 were surrounded by concrete surface completion pads that are in good shape without any open pathways observed between the casing and native ground. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the features have a low probability of rapid infiltration and are considered not sensitive.

Two non-karst closed depressions were observed on Site. Feature S-3 is a manmade stock tank on the south portion of the Site in Del Rio Clay. Feature S-4 is a manmade stock tank on the west portion of the Site, near F.M. 1863, in Del Rio Clay. These features are lined with fine-grained sediment without any open pathways observed. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the features have a low probability of rapid infiltration and are considered not sensitive.

According to the literature (Collins, 1991), there is an inferred fault (Feature S-5) mapped on the southeastern portion of the Site. This fault appears to trend North 21° East, and forms the saddle between two hilltops along the eastern property boundary. No evidence of this fault was observed in the field. This fault is not extensive relative to similar faults in the area, appears to have limited offset, and juxtaposes like formations. There were no open pathways observed in the area of the fault. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the feature has a low probability of rapid infiltration and is considered not sensitive.

__ The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to executive director approval.

The sewage collection system will convey the wastewater to the Treatment Plant. The treatment facility is:

__ existing.
__ proposed.

16. X All private service laterals will be inspected as required in 30 TAC §213.5.

SITE PLAN REQUIREMENTS

Items 17 through 27 must be included on the Site Plan.

17. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = **100** '.

18. 100-year floodplain boundaries
__ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
X 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):
FEMA Panel Number 48091C0435F Dated 09/02/2009

19. X The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
__ The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
X There are **3** (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)
__ The wells are not in use and have been properly abandoned.
__ The wells are not in use and will be properly abandoned.
X The wells are in use and comply with 30 TAC §238.
__ There are no wells or test holes of any kind known to exist on the project site.

21. Geologic or manmade features which are on the site:
X All **sensitive and possibly sensitive** geologic or manmade features identified in the Geologic Assessment are shown and labeled.
__ No **sensitive and possibly sensitive** geologic or manmade features were identified in the Geologic Assessment.
__ **ATTACHMENT D - Exception to the Required Geologic Assessment.** An exception to the Geologic Assessment requirement is requested and explained in ATTACHMENT D provided at the end of this form. Geologic or manmade features were found and are shown and labeled.
__ **ATTACHMENT D - Exception to the Required Geologic Assessment.** An exception to the Geologic Assessment requirement is requested and explained in ATTACHMENT D provided at the end of this form. No geologic or manmade features were found.

6. Method of collecting positional data:
   X Global Positioning System (GPS) technology.
   ___ Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map.

8. X Surface geologic units are shown and labeled on the Site Geologic Map.

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
   ___ Geologic or manmade features were not discovered on the project site during the field investigation.

10. X The Recharge Zone boundary is shown and labeled, if appropriate.

11. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.):

   X There are 3 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
   ___ The wells are not in use and have been properly abandoned.
   X The wells are not in use and will be properly abandoned. ~~(S-2 and S-6)~~
   X The wells are in use and comply with 16 TAC Chapter 76. ~~(S-1)~~
   ___ There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

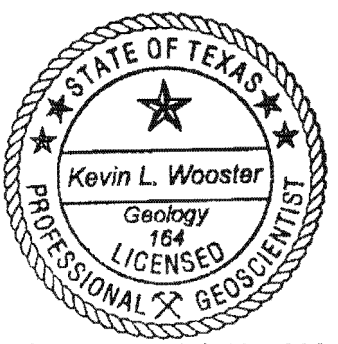
12. X One (1) original and three (3) copies of the completed assessment has been provided.

Date(s) Geologic Assessment was performed:

Date(s) April 30, 2009

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. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Kevin L. Wooster, P.G.
Print Name of Geologist



Telephone 210-308-5884

Fax 210-308-8731

Kevin L. Wooster
Signature of Geologist

June 4, 2010; revised Aug 10, 2010
Date

Representing: Arias & Associates, Inc., Job No.:2009-307
(Name of Company)

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

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

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 9, 2010

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

Re: Edwards Aquifer, Comal County
PROJECT NAME: Christ our King Anglican Church, located on FM1863 0.75 miles southwest of State Highway 46, New Braunfels, Texas
PLAN TYPE: Application for Approval of a Water Pollution Abatement Plan (WPAP) 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program
EAPP File No.: 2935.00

Dear Mr. Hornseth:

The referenced application administratively complete on June 8, 2010, is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval.

Please forward your comments to this office by July 7, 2010.

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

Sincerely

Todd Jones for

Lynn M. Bumguardner
Water Section Manager
San Antonio Regional Office

LMB/eg

№2935 00

WATER POLLUTION ABATEMENT PLAN

FOR

CHRIST OUR KING ANGLICAN CHURCH

PREPARED FOR

Texas Commission on Environmental Quality

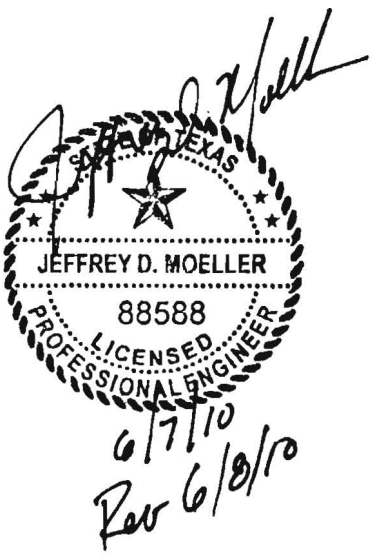
Region 13 – San Antonio
14250 Judson Road
San Antonio, Texas 78233
210-490-3096 (office)
210-545-4329 (fax)

PREPARED BY

HMT
ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
F-10961

Jeffrey D. Moeller, P.E.
410 N. Seguin St
New Braunfels, TX 78130

Prepared
June 7, 2010



6/7/10
Rev 6/8/10

RECEIVED
JUN 1 1 2010
COUNTY ENGINEER

General Information Form
For Regulated Activities on the
Edwards Aquifer Recharge and Transition Zones
and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B)
Effective June 1, 1999

REGULATED ENTITY NAME: **Christ Our King Anglican Church**
COUNTY: **Comal** STREAM BASIN: **Blieders Creek, Dry Comal Tributary**

EDWARDS AQUIFER: X RECHARGE ZONE
__ TRANSITION ZONE

PLAN TYPE: X WPAP __ AST __ EXCEPTION
__ SCS __ UST __ MODIFICATION

CUSTOMER INFORMATION

1. Customer (Applicant):

Contact Person: **Charles Salsman**
Entity: **Christ Our King Anglican Church**
Mailing Address: **111 W. San Antonio, St. Suite 250**
City, State: **New Braunfels, TX.** Zip: **78130-5158**
Telephone: **(830)632-7744** FAX: **(830)632-7779**

Agent/Representative (If any):

Contact Person: **Jeffrey D. Moeller, P.E.**
Entity: **HMT Engineering & Surveying**
Mailing Address: **410 N. Seguin Street**
City, State: **New Braunfels, Texas** Zip: **78130-5085**
Telephone: **(830) 625-8555** FAX: **(830) 625-8556**

2. __ This project is inside the city limits of _____.
X This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of **New Braunfels**.
__ This project is not located within any city's limits or ETJ.

3. The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

Christ Our King Anglican Church is located on FM 1863 approximately 0.75 miles southwest of the intersection with State Highway 46.

4. X **ATTACHMENT A - ROAD MAP**. A road map showing directions to and the location of the project site is attached at the end of this form.

5. X **ATTACHMENT B - USGS / EDWARDS RECHARGE ZONE MAP**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached behind this sheet. The map(s) should clearly show:

X Project site.
X USGS Quadrangle Name(s).
X Boundaries of the Recharge Zone (and Transition Zone, if applicable).
X Drainage path from the project to the boundary of the Recharge Zone.

6. X Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment. **The TCEQ must be able to inspect the project site or the application will be returned.**

7. X **ATTACHMENT C - PROJECT DESCRIPTION.** Attached at the end of this form is a detailed narrative description of the proposed project.

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

PROHIBITED ACTIVITIES

9. X I am aware that the following activities are prohibited on the **Recharge Zone** and are not proposed for this project:

   (1) waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
   (2) new feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
   (3) land disposal of Class I wastes, as defined in 30 TAC §335.1;
   (4) the use of sewage holding tanks as parts of organized collection systems; and
   (5) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

10. N/A I am aware that the following activities are prohibited on the **Transition Zone** and are not proposed for this project:

   (1) waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
   (2) land disposal of Class I wastes, as defined in 30 TAC §335.1; and
   (3) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

ADMINISTRATIVE INFORMATION

11. The fee for the plan(s) is based on:

   X For a Water Pollution Abatement Plan and Modifications, the total acreage of the site where regulated activities will occur.

___ For an Organized Sewage Collection System Plans and Modifications, the total linear footage of all collection system lines.
___ For a UST Facility Plan or an AST Facility Plan, the total number of tanks or piping systems.
___ A Contributing Zone Plan.
___ A request for an exception to any substantive portion of the regulations related to the protection of water quality.
___ A request for an extension to a previously approved plan.

12. Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

___ TCEQ cashier
___ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
X San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

13. X Submit one (1) original and three (3) copies of the completed application to the appropriate regional office for distribution by the TCEQ to the local municipality or county, groundwater conservation districts, and the TCEQ's Central Office.

14. X No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the executive director.
___ No person shall commence any regulated activity until the Contributing Zone Plan for the activity has been filed with the executive director.

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 **GENERAL INFORMATION FORM** is hereby submitted for TCEQ review. The application was prepared by:

Jeffrey D. Moeller, P.E.
Print Name of Customer/Agent

Jeffrey D Moell
Signature of Customer/Agent

6/7/10
Date

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

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

ATTACHMENT "C"
Project Description

Christ Our King Anglican Church is located on the south side of FM 1863 approximately 0.75 miles southwest of the intersection with State Highway 46. (See Location Map) There are 2 existing houses on-site along with some storage buildings. The site is divided into two watersheds, one drains north to Blieders Creek, the second drains south and west to the Dry Comal Creek.According to the Flood Insurance Rate Map No. 48091C0430F there is no existing floodplain located within the property.

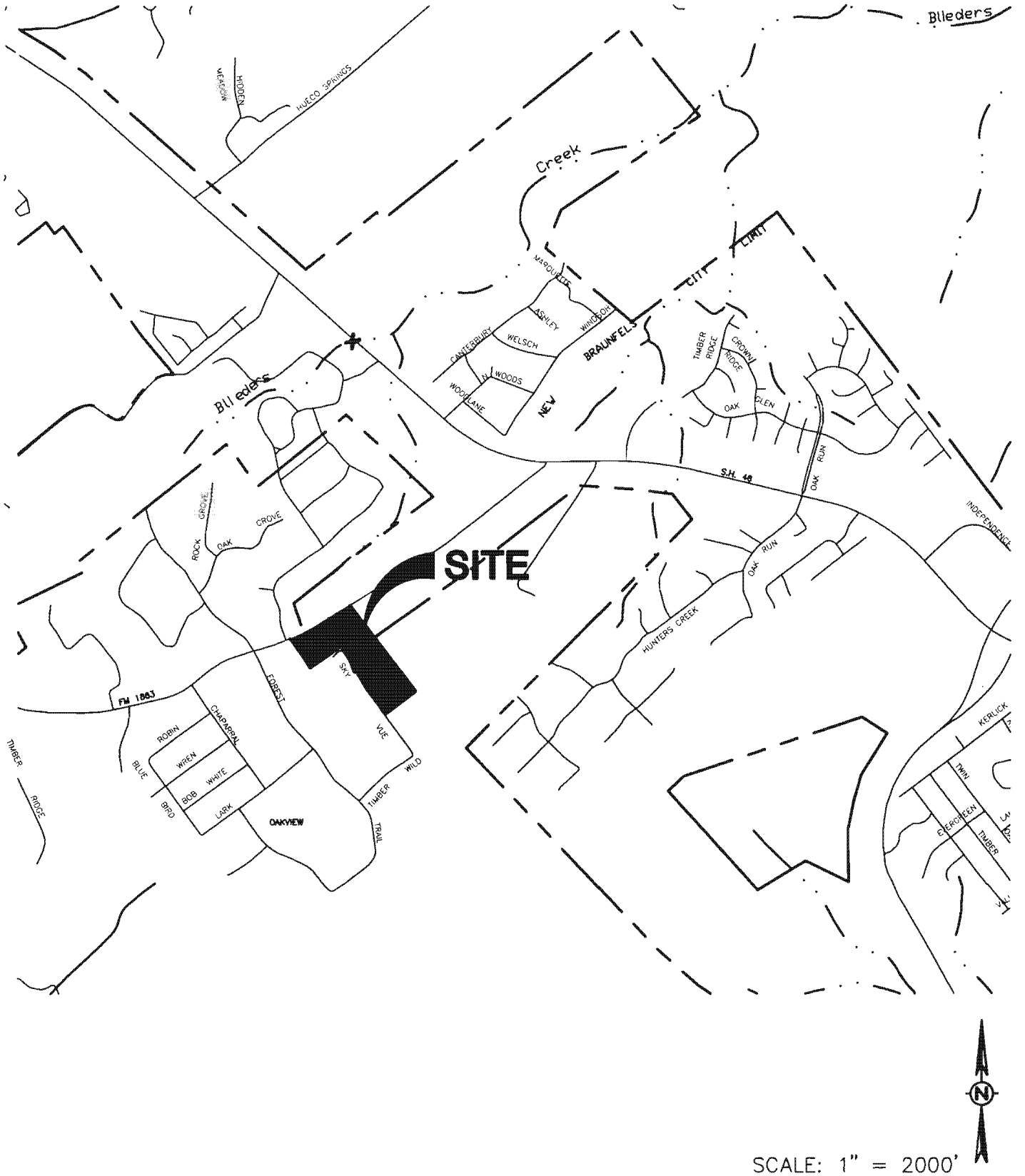
The project is proposed to be constructed in 6 Phases (See Phasing Exhibit), each phase will have its own temporary and permanent BMP's installed per TCEQ requirements.

The church campus infrastructure will include a water system, electricity, telephone, cable television, and an On-Site Sewerage Facility is proposed to treat the sanitary sewer from the development. There are three on-site wells that will provide water service for the first few phases of development.

The impervious cover for the ultimate development of the 22.11 acre site will be approximately 41.2%. The site will utilize a combination of vegetative filter strips and Vortechs® Stormwater treatment systems to treat stormwater runoff generated by the proposed improvements.

Due to the construction phasing of the project, there will not be more than 10 acres of disturbed soil in one common drainage area that will occur at one time. The site is divided into two drainage areas. (See Drainage Area Map)

ATTACHMENT A



SCALE: 1" = 2000'

HMT ENGINEERING & SURVEYING
F-10961
410 N. SEGUIN STREET
NEW BRAUNFELS, TEXAS 78130-5085
PH: (830)625-8555 FAX: (830)625-8556 www.HMTNB.com

LOCATION MAP
CHRIST OUR KING ANGLICAN CHURCH

DRAWN BY: SAK CHECKED BY: JDM

DATE: 5/24/2010

SHEET 1 OF 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NEW BRAUNFELS WEST QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

SITE

RECHARGE ZONE

TRANSITION ZONE

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route · U. S. Route · State Route

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

Control by USGS, NOS/NOAA, and USCE

Compiled by the Army Map Service by photogrammetric methods from aerial photographs taken 1956. Field checked 1958
Revised from aerial photographs taken 1986. Field checked 1987
Map edited 1988

Projection and 10,000-foot grid ticks: Texas coordinate system, south central zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 14
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 20 meters south and 28 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence and field lines generally visible on aerial photographs. This information is unchecked

UTM GRID AND 1988 MAGNETIC NORTH DECLINATION AT CENTER OF MAP DIAGRAM IS APPROXIMATE

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

2998-413

NEW BRAUNFELS WEST, TEX.
29098-F2-TF-024
1988
DMA 6343 II NW–SERIES V822

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NEW BRAUNFELS EAST QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

RECHARGE ZONE

TRANSITION ZONE

NEW BRAUNFELS
(BM 623)

NEW BRAUNFELS
MUNICIPAL AIRPORT

Thorn Hill
Gruene
Freiheit
Rock Hill
Barbarosa
Clear Springs
Camp Willow
Schumansville
Dunlap Powerhouse

Alligator Creek
Long Creek
DUNLAP LAKE
COMAL-GUADALUPE CO

Produced by the United States Geological Survey in cooperation with the Defense Mapping Agency

Control by USGS and NOS/NOAA and USCE

Compiled from aerial photographs taken 1956. Revisions in purple and woodland 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

MN
GN
0°28'
8 MILS
6½°
116 MILS

UTM GRID AND 1994 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 10 FEET
SUPPLEMENTARY CONTOUR INTERVAL 5 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

2998-414

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

NEW BRAUNFELS EAST, TEX.
29098-F1-TF-024

1958
REVISED 1994
DMA 6343 II NE-SERIES V882

GEOLOGIC ASSESSMENT

For:

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

ARIAS & ASSOCIATES
Geotechnical • Environmental • Testing

Prepared for:

Christ Our King Anglican Church
C/O Charles W. Salsman
1111 W. San Antonio Street
New Braunfels, Texas 78130

Job Number 2009-307
June 2010

Geologic Assessment
For Regulated Activities
on The Edwards Aquifer Recharge/transition Zones
and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

REGULATED ENTITY NAME: **Proposed Christ Our King Anglican Church, 467 F.M. 1863**

TYPE OF PROJECT: X WPAP __ AST __ SCS __ UST

LOCATION OF PROJECT: X Recharge Zone __ Transition Zone __ Contributing Zone within the Transition Zone

PROJECT INFORMATION

1. X Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE**.

2. Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (*Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A*, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Krum clay, 1 to 3% slopes (KrB)	D	1.0 - 1.5
Krum clay, 3 to 5% slopes (KrC)	D	0.5-1.0
Medlin-Eckrant association, 1 to 8% slopes	D	0.5-1.0
Rumple-Comfort association, undulating, 1 to 8% slopes	C	1.0 - 1.5

* Soil Group Definitions (Abbreviated)

A. Soils having a high infiltration rate when thoroughly wetted.

B. Soils having a moderate infiltration rate when thoroughly wetted.

C. Soils having a slow infiltration rate when thoroughly wetted.

D. Soils having a very slow infiltration rate when thoroughly wetted.

3. X A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. X A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. X Appropriate **SITE GEOLOGIC MAP(S)** are attached:

The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1" : 400'

Applicant's Site Plan Scale	1" = 100'
Site Geologic Map Scale	1" = 100'
Site Soils Map Scale (if more than 1 soil type)	1" = 400'

6. Method of collecting positional data:
   X Global Positioning System (GPS) technology.
   __ Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map.

8. X Surface geologic units are shown and labeled on the Site Geologic Map.

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
   __ Geologic or manmade features were not discovered on the project site during the field investigation.

10. X The Recharge Zone boundary is shown and labeled, if appropriate.

11. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.):

   X There are 3 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
   __ The wells are not in use and have been properly abandoned.
   X The wells are not in use and will be properly abandoned. ***(S-2 and S-6)***
   X The wells are in use and comply with 16 TAC Chapter 76. ***(S-1)***
   __ There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

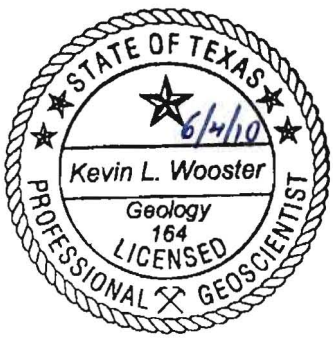
12. X One (1) original and three (3) copies of the completed assessment has been provided.

Date(s) Geologic Assessment was performed:

Date(s) April 30, 2009

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. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Kevin L. Wooster, P.G.
Print Name of Geologist



Telephone 210-308-5884

Fax 210-308-8731

Kevin L. Wooster
Signature of Geologist

June 4, 2010
Date

Representing: Arias & Associates, Inc., Job No.:2009-307
(Name of Company)

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

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

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Proposed Christ Our King Anglican Church, 467 F.M. 1863

LOCATION							FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *			1C*			2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE			LONGITUDE			FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds				X	Y	Z		10						<40	>40	<1.6	>1.6	
S-1	29	42	50.9	98	11	13.1	MB	30	Kbu	1.0	1.0	>200	Water well & concrete pad				X	5	35	X		X		Hilltop
S-2	29	42	52.3	98	11	14.8	MB	30	Kbu	1.0	1.0	>200	Water well & concrete pad				X	5	35	X		X		Hilltop
S-3	29	42	46.8	98	11	8.0	CD	5	Kdr	90	165	8					F	5	10	X			X	Hillside
S-4	29	42	51.4	98	11	20.7	CD	5	Kdr	70	120	6					F	5	10	X			X	Hillside
S-5	29	42	46.9	98	11	5.2	F	20	Kgt/Kep	>750			N 21 E				F	15	35	X			X	Hillside
S-6	29	42	49.8	98	11	16.6	MB	30	Kbu	1.0	1.0	>200	Water well casing and cap				X	5	35	X		X		Hilltop

* DATUM: NAD 83

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity h = Horizontal Feature	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

STATE OF TEXAS
6/4/10
Kevin L. Wooster
Geology
164
LICENSED
PROFESSIONAL GEOSCIENTIST

I have read, I understood, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field.

My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Kevin L. Wooster

Date: June 4, 2010

Sheet 1 of 1

TCEQ-0585-Table (Rev. 10-01-04)

FEATURE LOCATION TABLE

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

	Latitude			Longitude					
Feature No.	Deg	Min	Sec	Deg	Min	Sec	Type	Date	Measured By
S-1	29	42	50.9	98	11	13.1	MB	4/30/09	K.Wooster
S-2	29	42	52.3	98	11	14.8	MB	4/30/09	K.Wooster
S-3	29	42	46.8	98	11	8	CD	4/30/09	K.Wooster
S-4	29	42	51.4	98	11	20.7	CD	4/30/09	K.Wooster
S-5	29	42	46.9	98	11	5.2	F	4/30/09	K.Wooster
S-6	29	42	49.8	98	11	16.6	MB	6/10/2010	K.Wooster

SOIL NARRATIVE

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

Most of the site has been used as a small ranch and residence. There are several structures, and one gravel road. Native soils remaining at the site consist of black and brown calcareous stony clay. The clay includes rock fragments ranging up to pebbles in size. Although the clay content of the soils would tend to impede the downward flow of water, in areas where the rock fragments are more abundant, the water infiltration would increase. The soils on the site are typical of those found on the Edwards plateau and hill country. They range up to a maximum thickness of about one-half to one foot in some areas. Soils and vegetation cover most of the site. There are areas of rock outcrops on the west and south portions of the site. See the attached soil map for soil type distribution.

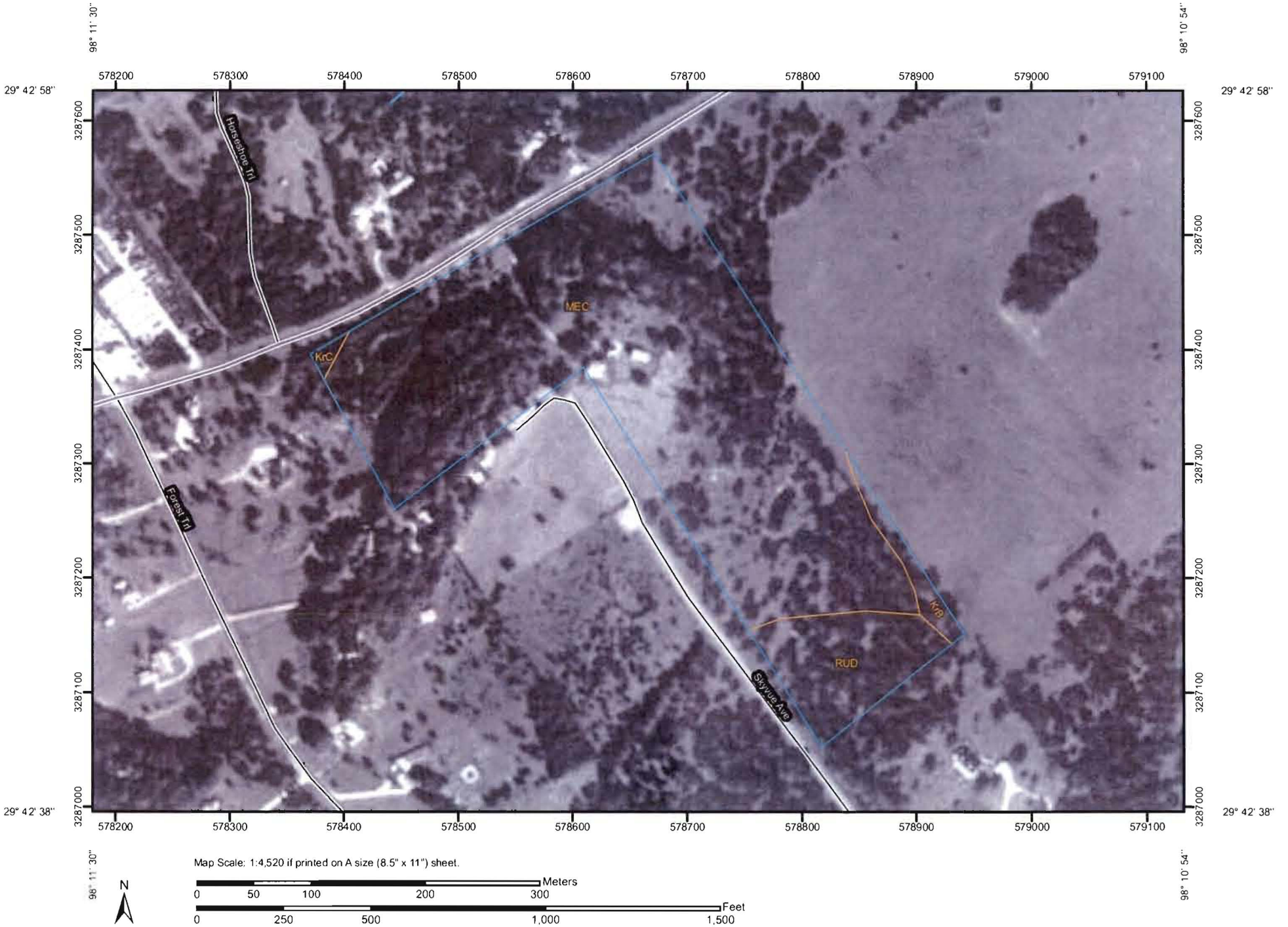
According to the U.S.D.A. Soil Survey of Comal and Hays Counties, Texas, dated 1984, the natural surface soils have been mapped as within four primary soil groups.

Krum clay, 1 to 3% slopes (KrB) soils are mapped within the east corner of the site. This is deep soil typically found on stream terraces and valley fills. The surface layer of Krum clay is a dark brown clay with some calcareous nodules to a depth of approximately 16 inches which overlies a lighter colored clay layer that ranges up to 80 inches thick or more. Permeability of this soil ranges from 0.2 to 0.57 inches per hour and surface runoff is slow.

Krum clay, 3 to 5% slopes (KrC) soils are mapped within the west corner of the site. This is a deep soil typically found on slightly sloping stream terraces. The surface layer of Krum clay is a dark brown clay with some calcareous nodules to a depth of approximately 19 inches which overlies a lighter colored clay layer that ranges up to 80 inches thick or more. Permeability of this soil ranges from 0.2 to 0.6 inches per hour and surface runoff is slow.

Medlin-Eckrant association, 1 to 8% slopes soils are mapped within the majority of the site, covering a hillside and ridge forming the central portion of the site. This shallow, well-drained, stony clay occurs on undulating to steep, hilly terrain. The permeability of Medlin-Eckrant soil ranges from less than 0.00 to 6.0 inches per hour, its shrink-swell potential is low to moderate, and its corrosivity potential is high for uncoated steel.

Rumple Comfort association (RUD) soils are mapped within the south portion of the site, at the base of the hillside sloping to the south property boundary. The RUD soils are typically shallow to moderately deep soils consisting of dark reddish brown very cherty clay loam with limestone fragments. Overall soil depth is typically 14 inches. RUD soils are well drained and moderately slow permeability with a very low available water capacity and shallow rooting depth. Runoff is moderate and the hazard of water erosion is moderate.


98° 11' 30"
98° 10' 54"
29° 42' 58"
29° 42' 38"
578200
578300
578400
578500
578600
578700
578800
578900
579000
579100
3287600
3287500
3287400
3287300
3287200
3287100
3287000
Horseshoe Trl
Forest Trl
Skyview Ave
MEC
KnC
KnB
RUD
Map Scale: 1:4,520 if printed on A size (8.5" x 11") sheet.
N
Meters
0
50
100
200
300
Feet
0
250
500
1,000
1,500

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:4,520 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 6, Apr 10, 2008

Date(s) aerial images were photographed: 1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Comal and Hays Counties, Texas (TX604)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
KrB	Krum clay, 1 to 3 percent slopes	0.6	2.4%
KrC	Krum clay, 3 to 5 percent slopes	0.1	0.4%
MEC	Medlin-Eckrant association, 1 to 8 percent slopes	23.0	86.4%
RUD	Rumple-Comfort association, 1 to 8 percent slopes	2.9	10.8%
Totals for Area of Interest		**26.6**	**100.0%**

STRATIGRAPHIC COLUMN

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

Hydrogeologic subdivision			Group formation or member			Hydrologic fuction	Thickness (feet)	Lithology	Cavern development	Porosity / permeability type
Quaternary			Terrace Deposits			CU	0-30	Gravel and sand	None	High porosity / high permeability
Upper Cretaceous			Austin Group			CU	130-150	White to gray limestone	None	Low porosity / low permeability
			Eagle Ford Group			CU	30-50	Buff, light gray, dense mudstone	None	Low porosity / low permeability
	Upper Confining Unit		Buda Limestone			CU	40-50	Brown flaggy shale and argillaceous limestone	None	Low porosity / low permeability
			Del Rio Clay			CU	40-50	Blue-green to yellow-brown clay	None	None / primary upper confining unit
Lower Cretaceous	I	Edwards aquifer	Georgetown Formation			CU	10	Reddish-brown, gray to light tan marly limestone	None	Low porosity / low permeability
	II		Edwards Group	Person Fm.	Cyclic & marine members undivided	AQ	80-100	Mudstone to packstone; miliolid grainstone; chert	Many subsurface	Laterally extensive; water yielding
	III				Leached & collapsed members	AQ	80-100	Crystalline limestone; mudstone to grainstone; chert collapsed breccia	Extensive lateral development; large rooms	Majority not fabric / one of the most permeable
	IV				Regional dense member	CU	20-24	Dense, argillaceous mudstone	Very few; only vertical fracture enlargement	Not fabric / low permeability; vertical barrier
	V			Kainer Fm.	Grainstone member	AQ	50-60	Miliolid grainstone; mudstone to wackestone; chert	Few	Not fabric / recrystallization reduces permeability
	VI				Kirschberg evaporite member	AQ	50-60	Highly altered crystalline limestone; chalky mudstone; chert	Probably extensive cave devel.	Majority fabric / one of the most permeable
	VII				Dolomitic member	AQ	110-130	Mudstone to grainstone; crystalline limestone; chert	Caves related to structure or bedding planes	Mostly not fabric; some bedding plane fabric / water-yielding
	VIII				Basal nodular member	Karst AQ; not karst CU	50-60	Shaly, nodular limestone; mudstone and miliolid grainstone	Large lateral caves at surface	Fabric; stratigraphically controlled / large conduit flow at surface; no permeability in subsurface
	Lower confining unit		Upper member of the Glen Rose Limestone			CU; evaporite beds AQ	350-500	Yellowish tan, thinly bedded limestone and marl	Some surface cave development	Some water production at evaporite beds / relatively impermeable

Reference: U.S.G.S. Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, Texas; Water-Resources Investigations Report 94-4117

Note: CU = Confining Unit; AQ = Aquifer

▬ ▬ Indicates Upper Most Surface Bedrock Formation

GEOLOGY NARRATIVE

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

The site lies along FM 1863 and forms the crest of a hilltop and ridge with sloping north and south flanks. No portion of the site lies within the 100-year floodplain. The outcropping geologic formations mapped at the Site consists of the Buda Limestone, Del Rio Clay, Georgetown Formation, and Edwards Person Formation, according to the San Antonio Sheet of the Geologic Atlas of Texas (BEG, 1983). The outcropping surface geologic units observed at the Site by the project geologist are as described below:

Buda Limestone (Kbu) The Buda Limestone formation is fine grained, bioclastic, commonly glauconitic, pyritiferous, hard, massive, poorly bedded to nodular, thinner bedded and argillaceous limestone near the upper contact; light gray to pale orange; weathers dark gray to brown; burrows filled with chalky marl, abundant pelecypods; thickness 60-100 feet, thickens westward. This formation was observed to cover the hilltop and ridge top of the central and north portions of the Site.

Del Rio Clay (Kdr) The Del Rio Clay formation is calcareous and gypsiferous, becoming less calcareous and more gypsiferous upward, with pyrite common; blocky, medium gray, weathers light gray to yellowish gray; some thin lenticular beds of highly calcareous siltstone; marine megafossils include abundant Exogyra arietina and other pelecypods; thickness 60-120 feet, thickens westward. This formation was observed to cover the southern slope of the central portion of the Site, and the northern slope adjacent to F.M. 1863.

Georgetown Formation (Kgt) The Georgetown Formation is reddish brown, gray to light tan marly limestone, with low porosity and low permeability. This formation was observed to cover the north property boundary, and part of the southern portion of the Site.

Edwards Person Limestone (Kep) This formation is generally up to 200 feet thick or more, consists of limestone and marlstone, and forms the upper portions of the Edwards Group. According to Small and Hanson, the outcropping unit is the Cyclic and Marine member, of the Person Formation. The outcropping surface geologic unit observed at the Site by the project geologist is the Cyclic and Marine member, of the Edwards Person Formation, in the south portion of the Site. This member consists of mudstone, grainstone, and chert, and is medium gray to grayish brown.

Most of the site was covered with soil, with a few rock outcrops visible. Much of the visible rock at the site was float, or weathered bedrock laying on ground surface. Some of the float rock showed varying signs of mostly weathered appearance, along with iron-stained mudstone.

There was no evidence of structural faulting or fracturing observed in the field. There were no solution features found. There were no open vugs observed. No karst features were noted during the site reconnaissance. Potential for fluid movement to the aquifer is low due to absence of karst and structural features, along with very low permeability soil cover.

FEATURE NARRATIVE

WPAP GEOLOGIC ASSESSMENT
PROPOSED CHRIST OUR KING ANGLICAN CHURCH
467 F.M. 1863
NEW BRAUNFELS, TEXAS

Five features found are described as follows:

Three man-made features in bedrock were observed on Site. Features S-1 and S-2 are existing water wells located on the hilltop and ridge in the north central portion of the Site. Feature S-3 is a water well casing and riser plug, not currently used as a well, with grout surrounding the casing at the ground surface. Features S-1 and S-2 were surrounded by concrete surface completion pads that are in good shape without any open pathways observed between the casing and native ground. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the features have a low probability of rapid infiltration and are considered not sensitive.

Two non-karst closed depressions were observed on Site. Feature S-3 is a manmade stock tank on the south portion of the Site in Del Rio Clay. Feature S-4 is a manmade stock tank on the west portion of the Site, near F.M. 1863, in Del Rio Clay. These features are lined with fine-grained sediment without any open pathways observed. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the features have a low probability of rapid infiltration and are considered not sensitive.

According to the literature (Collins, 1991), there is an inferred fault (Feature S-5) mapped on the southeastern portion of the Site. This fault appears to trend North 21° East, and forms the saddle between two hilltops along the eastern property boundary. No evidence of this fault was observed in the field. This fault is not extensive relative to similar faults in the area, appears to have limited offset, and juxtaposes like formations. There were no open pathways observed in the area of the fault. Based on the point values in the geologic assessment table and criteria in the Rapid Infiltration Probability Flowchart of TCEQ-0585, the feature has a low probability of rapid infiltration and is considered not sensitive.

REFERENCES

Barnes V.L. 1983, Geologic Atlas of Texas, San Antonio, Sheet, Bureau of Economic Geology, The University of Texas at Austin, Texas.

Collins, E.W., 1991. Geology of New Braunfels West Quadrangle, Comal County, Texas, Open File Map. Bureau of Economic Geology, The University of Texas at Austin, Texas.

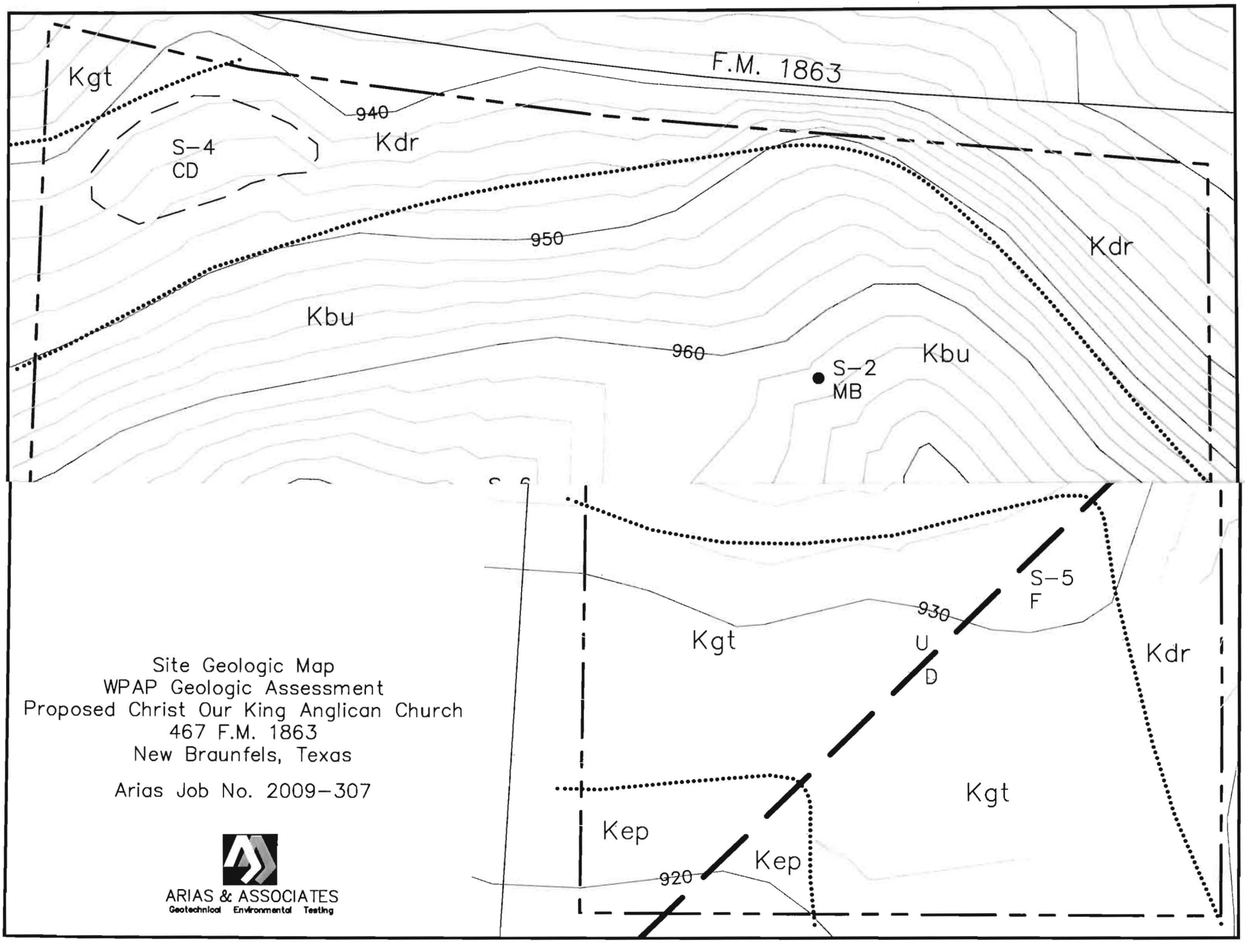
Small, T.A. and Hanson, J.A. 1994. Geologic Framework and Hydrogeologic Characteristics of the Edwards Aquifer Outcrop, Comal County, Texas. U.S. Geol. Survey, Water – Resources Investigations Report 94-4117. 8 pp., Plate, Fig., Table.

Texas Commission on Environmental Quality, (TCEQ), Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge Zone, TCEQ-0585-Instructions (Rev. 10-01-04).

United States Department of Agriculture. 1984 Soil Survey of Comal and Hays Counties, Texas, Natural Resource Conservation Service.

United States Department of Agriculture. Urban Hydrology for Small Watersheds, Technical Release No. 55.,Appendix A. Natural Resource Conservation Service, <http://www.info.usda.gov/CED/ftp/CED/tr55.pdf > July, 1986.

United Stated Geologic Survey, Rev. 1994. New Braunfels West Quadrangle. USGS, Denver, Colorado.



Site Geologic Map
WPAP Geologic Assessment
Proposed Christ Our King Anglican Church
467 F.M. 1863
New Braunfels, Texas

Arias Job No. 2009-307

ARIAS & ASSOCIATES
Geotechnical Environmental Testing

Water Pollution Abatement Plan Application
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b), Effective June 1, 1999

REGULATED ENTITY NAME: **Christ Our King Anglican Church**

REGULATED ENTITY INFORMATION

1. The type of project is:
   - ___ Residential: # of Lots: ____
   - ___ Residential: # of Living Unit Equivalents: ____
   - X Commercial
   - ___ Industrial
   - ___ Other: _____

2. Total site acreage (size of property): **22.11**

3. Projected population: **4000**

4. The amount and type of impervious cover expected after construction are shown below:

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	**123,606**	÷ 43,560 =	**2.84**
Parking (Driveway)	**230,500**	÷ 43,560 =	**5.29**
Other paved surfaces (Sidewalk)	**42,625**	÷ 43,560 =	**0.98**
Total Impervious Cover	**305,420**	÷ 43,560 =	**9.11**
Total Impervious Cover ÷ Total Acreage x 100 =			**41.2%**

5. X **ATTACHMENT A - Factors Affecting Water Quality.** A description of any factors that could affect surface water and groundwater quality is provided at the end of this form.

6. X Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

FOR ROAD PROJECTS ONLY
Complete questions 7-12 if this application is exclusively for a road project.

7. 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.

8. Type of pavement or road surface to be used:
   - ___ Concrete
   - ___ Asphaltic concrete pavement
   - ___ Other: _____

9. 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.

10. 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.

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

12. __ 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

13. **ATTACHMENT B - 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 provided at the end of this form. The estimates of stormwater runoff quality and quantity should be based on area and type of impervious cover. Include the runoff coefficient of the site for both pre-construction and post-construction conditions.

WASTEWATER TO BE GENERATED BY THE PROPOSED PROJECT

14. The character and volume of wastewater is shown below:

100 % Domestic	**23,320** gallons/day
__% Industrial	_____ gallons/day
__% Commingled	_____ gallons/day

TOTAL **23,320** gallons/day

15. Wastewater will be disposed of by:
X On-Site Sewage Facility (OSSF/Septic Tank):
ATTACHMENT C - Suitability Letter from Authorized Agent. An on-site sewage facility will be used to treat and dispose of the wastewater. The appropriate licensing authority's (authorized agent) written approval is provided at the end of this form. It states that the land is suitable for the use of an on-site sewage facility or identifies areas that are not suitable.
__ Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.

__ Sewage Collection System (Sewer Lines):
__ Private service laterals from the wastewater generating facilities will be connected to an existing SCS.
__ Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.
__ The SCS was previously submitted on _____.
__ The SCS was submitted with this application.

__ The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to executive director approval.

The sewage collection system will convey the wastewater to the Treatment Plant. The treatment facility is:

__ existing.
__ proposed.

16. X All private service laterals will be inspected as required in 30 TAC §213.5.

SITE PLAN REQUIREMENTS

Items 17 through 27 must be included on the Site Plan.

17. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = **100**'.

18. 100-year floodplain boundaries
__ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
X 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):
FEMA Panel Number 48091C0435F Dated 09/02/2009

19. X The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
__ The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.

20. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
X There are **3** (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)
__ The wells are not in use and have been properly abandoned.
__ The wells are not in use and will be properly abandoned.
X The wells are in use and comply with 30 TAC §238.
__ There are no wells or test holes of any kind known to exist on the project site.

21. Geologic or manmade features which are on the site:
X All **sensitive and possibly sensitive** geologic or manmade features identified in the Geologic Assessment are shown and labeled.
__ No **sensitive and possibly sensitive** geologic or manmade features were identified in the Geologic Assessment.
__ **ATTACHMENT D - Exception to the Required Geologic Assessment.** An exception to the Geologic Assessment requirement is requested and explained in ATTACHMENT D provided at the end of this form. Geologic or manmade features were found and are shown and labeled.
__ **ATTACHMENT D - Exception to the Required Geologic Assessment.** An exception to the Geologic Assessment requirement is requested and explained in ATTACHMENT D provided at the end of this form. No geologic or manmade features were found.

22. X The drainage patterns and approximate slopes anticipated after major grading activities.

23. X Areas of soil disturbance and areas which will not be disturbed.

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

25. X Locations where soil stabilization practices are expected to occur.

26. X Surface waters (including wetlands).

27. ~~X~~ Locations where stormwater discharges to surface water or sensitive features.
X There will be no discharges to surface water or sensitive features.

ADMINISTRATIVE INFORMATION

28. X One (1) original and three (3) copies of the completed application have been provided.

29. X Any modification of this WPAP will require TCEQ executive director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

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 **WATER POLLUTION ABATEMENT PLAN APPLICATION FORM** is hereby submitted for TCEQ review and executive director approval. The form was prepared by:

Jeffrey D. Moeller, P.E.
Print Name of Customer/Agent

Signature of Customer/Agent — Date: 6/7/10

ATTACHMENT "A"
Factors Affecting Water Quality

The development will consist of an asphalt parking lot and multiple structures varying in size from 1,250 to 44,900 square feet. This will result in minimal to no pollution from the site. Some pollution may originate from the asphalt streets, automobile wastes, and cleaning chemicals, which may have an effect on surface water by sediments leaving the site after a rainfall event.

ATTACHMENT "B"
Volume and Character of Stormwater

The overall drainage patterns of the site will remain unchanged. There will be an increase in storm water runoff generated by the development. The hydrology calculations for the existing and proposed conditions are broken out in the tables below.

ATTACHMENT "C"
Suitability Letter from Authorized Agent

See attached Suitability Letter.

ATTACHMENT "D"
Exception to the Required Geologic Assessment

No exception will be requested.

Comal County

OFFICE OF COMAL COUNTY ENGINEER

June 7, 2010

Mr. James Ingalls
HMT Engineering & Surveying, Inc.
410 N. Seguin Avenue
New Braunfels, TX 78130

Re: Christ Our King Anglican Church On-Site Sewage Facility Suitability Letter, within Comal County, Texas

Dear Mr. Ingalls:

In accordance with TAC §213.5(b)(4)(F)(ii), Comal County has found that the entire referenced site (except for areas listed below) is suitable for the use of private sewage facilities and will meet the special requirements for on-site sewage facilities located on the Edwards Aquifer recharge zone as specified in TAC §285.40-42 based on the following information submitted to our office on June 3, 2010:

- The Geologic Assessment, prepared by Arias & Associates
- The Water Pollution Abatement Plan (WPAP), prepared by HMT Engineering & Surveying, Inc.

Areas that are not Suitable

There are three water wells located on the referenced site and detailed below:

Feature ID	Latitude	Longitude
S-1	29°42'50.9"	98°11'13.1"
S-2	29°42'52.3"	98°11'14.8"
S-3	29°42'49.8"	98°11'16.6"

According to the WPAP, there will be a 150' setback from these three features for all aspects of the OSSF.

Moreover, according to TAC §285.41(b), Christ the King Anglican Church, the owner of the referenced site, must inform, in writing, each prospective purchaser, lessee, or renter of the following:

- A Permit to Construct is required from Comal County before an OSSF can be constructed on the Christ the King Anglican Church land;
- A License to Operate is required from Comal County before an OSSF can be operated on the Christ the King Anglican Church land;
- That an application for a water pollution abatement plan, as defined in TAC §213, has been made, whether it has been approved, and if any restrictions or conditions have been placed on that approval; and

- Minimum separation distances, as outlined in Table 10 of TAC §285.

Furthermore, according to TAC §285.42(a), if any recharge feature, not listed above, is discovered during construction of an OSSF, all regulated activities near the feature shall be suspended immediately. The owner shall immediately notify the TCEQ San Antonio office of the discovery of the feature. All activities regulated under TAC §213 shall not proceed near the feature until Comal County, in conjunction with the TCEQ San Antonio office, has reviewed and approved a plan proposed to protect the feature, the structural integrity of the OSSF, and the water quality of the aquifer. The plan shall be sealed, signed, and dated by a professional engineer.

Finally, on a separate matter, if, in the future, a residential subdivision, a manufactured housing community, a multi-unit residential development, a business park, or another similar structure that uses OSSFs for sewage disposal is proposed for this property, TAC §285.4(c) requires the submittal of planning materials for these developments. The planning materials shall be prepared by a professional engineer or professional sanitarian and shall include an overall site plan, topographic map, 100-year floodplain map, soil survey, location of water wells, locations of easements as identified in TAC §285.91(10) (relating to Tables), a comprehensive drainage plan, a complete report detailing the types of OSSFs to be considered and their compatibility with area-wide drainage and groundwater, and Edwards Aquifer requirements that are pertinent to the proposed OSSF. We have included Comal County's *Application for Licensing Authority Recommendation for Private Sewerage Facilities for a Proposed Subdivision* for your use if necessary.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

Robert Boyd, P.E.
Comal County Assistant Engineer

cc: Jay Millikin, Comal County Commissioner, Precinct No. 2

Greg W. Johnson, P.E., R.S.

170 Hollow Oak
New Braunfels, Texas 78132
830/905-2778

June 3, 2010

Jeff Moeller, P.E.
Hollmig Moeller Thornhill, Inc.
410 North Seguin St.
New Braunfels, Texas 78130

RE: Soil survey & OSSF compatibility
Christ Our King Anglican Church
FM 1863, Comal County

TYPE SOILS AND DRAINAGE

The referenced location was surveyed for the type soils and their compatibility with development and installation of individual septic systems for a church and associated facilities. Soil observations made throughout the property indicate shallow soil depths with restrictive rock layers being found. The soils have a moderate clay content and are a part of the Medlin-Eckrant association, undulating, (MEC), and the Krum Clay, (KrB) gently sloping one to five percent slopes and moderately well drained According to F.E.M.A. Map 48091C0430F/48091C0435C the site is not located within the 100 year floodplain. The soil profile consists of a dark grayish brown clay/ clay loam to 10-20" over a gray brown to yellow brown clay from 15-40" with blocky structure over limestone.

OSSF TYPES

Since the site contains Type III & IV soil having moderate to high clay content and poor soil absorption characteristics with shallow depth, a limited number of types of septic systems are suitable. The recommended On Site Sewage Facilities (OSSF) for this site is Aerobic Treatment with spray or drip irrigation. Future addition of a school and dormitory may increase waster use to a point at 5000 gallons per day that a state permitted sewage system may be required. This tract, is served by public water. Adequate space is available for the referenced OSSF and replacement area.

Respectfully yours,

F2585

Greg W. Johnson P.E.

OSSF Sizing

Water usage and field requirements:

Church w/ 500 members Qavg = 500 GPD
Church w/ Fellowship Hall Qavg = 800 GPD
Church w/ Fellowship Hall & Community Center Qavg = 1300 GPD

Aerobic Treatment Plant (Spray Irrigation)

A = Q / Ri Ri = 0.064 g/sf

Church A = 500/0.064 = 7813 sf.
Church + Fellowship Hall A = 800/0.064 = 12,500 sf.
Church + Fellowship + Community A = 1300/0.064 = 20,313 sf.

Drip Irrigation

A = Q/Ra Ra = 0.2 g/sf (Type III Soil)

Church A = 500/0.2 = 2500 sf.
Church + Fellowship A = 800/0.2 = 4000 sf.
Church + Fellowship + Community A = 1300/0.2 = 6500 sf.

A = Q/Ra Ra = 0.1 g/sf (Type IV Soil)

Church A = 500/0.1 = 5000 sf.
Church + Fellowship A = 800/0.1 = 8000 sf.
Church + Fellowship + Community A = 1300/0.1 = 13,000 sf.

ON-SITE SEWERAGE FACILITY
SOIL EVALUATION REPORT INFORMATION

Date Soil Survey Performed: **June 02, 2010**

Site Location: **Christ our King Anglican Church - FM 1863**

Proposed Excavation Depth: **10-20"**

Requirements:

At least two soil excavations must be performed on the site, at opposite ends of the proposed disposal area.
Locations of soil boring or dug pits must be shown on the site drawing.
For subsurface disposal, soil evaluations must be performed to a depth of at least two feet below the proposed excavation depth. For surface disposal, the surface horizon must be evaluated.
Describe each soil horizon and identify any restrictive features on the form. Indicate depths where features appear.

SOIL BORING NUMBER **1**

Depth (Feet)	Texture Class	Soil Texture	Gravel Analysis	Drainage (Mottles/ Water Table)	Restrictive Horizon	Observations
0 – 10"-20"	III/IV	CLAY/ CLAY LOAM				GRAY/BROWN
2 – 15"-40"	III/IV	CLAY/ CLAY LOAM	N/A	NO	LIMESTONE @ 30"-40"	YELLOW/ BROWN
5						

SOIL BORING NUMBER **2**

Depth (Feet)	Texture Class	Soil Texture	Gravel Analysis	Drainage (Mottles/ Water Table)	Restrictive Horizon	Observations
0	SAME	AS	ABOVE			
5						

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

Greg W. Johnson, P.E. 67587, S.E. 11561

06/02/2010
Date

Temporary Stormwater Section
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

REGULATED ENTITY NAME: **Christ Our King Anglican Church**

POTENTIAL SOURCES OF CONTAMINATION
Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.

1. Fuels for construction equipment and hazardous substances which will be used during construction:

__ Aboveground storage tanks with a cumulative storage capacity of less that 250 gallons will be stored on the site for less than one (1) year.
__ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
__ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An **Aboveground Storage Tank Facility Plan** application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
X Fuels and hazardous substances will not be stored on-site.

2. **X** **ATTACHMENT A - Spill Response Actions**. A description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is provided at the end of this form.

3. **N/A** Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. **X** **ATTACHMENT B - Potential Sources of Contamination.** Describe in an attachment at the end of this form any other activities or processes which may be a potential source of contamination.
__ There are no other potential sources of contamination.

SEQUENCE OF CONSTRUCTION

5. **X** **ATTACHMENT C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is provided at the end of this form. For each activity described, an estimate of the total area of the site to be disturbed by each activity is given.

6. **X** Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: **Blieders Creek and Unnamed Tributary of Dry Comal Creek**

TEMPORARY BEST MANAGEMENT PRACTICES (TBMPs)
Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the

Technical Guidance Manual for guidelines and specifications. **All structural BMPs must be shown on the site plan.**

7. X **ATTACHMENT D - Temporary Best Management Practices and Measures.** A description of the TBMPs and measures that will be used during and after construction are provided at the end of this form. For each activity listed in the sequence of construction, include appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

   X TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information has been provided in the attachment at the end of this form

   a. A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.

   b. A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.

   c. A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.

   d. A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.

8. The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

   — **ATTACHMENT E - Request to Temporarily Seal a Feature.** A request to temporarily seal a feature is provided at the end of this form. The request includes justification as to why no reasonable and practicable alternative exists for each feature.

   X There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. X **ATTACHMENT F - Structural Practices.** Describe the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site. Placement of structural practices in floodplains has been avoided.

10. X **ATTACHMENT G - Drainage Area Map.** A drainage area map is provided at the end of this form to support the following requirements.

    — For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.

    — For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.

    — For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to

protect down slope and side slope boundaries of the construction area.

X There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

11. N/A **ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure has been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are provided as at the end of this form.

12. X **ATTACHMENT I - Inspection and Maintenance for BMPs.** A plan for the inspection of temporary BMPs and measures and for their timely maintenance, repairs, and, if necessary, retrofit is provided at the end of this form. A description of documentation procedures and recordkeeping practices is included in the plan.

13. X All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. X 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).

15. N/A Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. X 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).

SOIL STABILIZATION PRACTICES

Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.

17. X **ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached at the end of this form.

18. X Records must be kept at the site of 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.

19. X Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

ADMINISTRATIVE INFORMATION

20. X All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.

21. X If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. X Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

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 **TEMPORARY STORMWATER SECTION** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Jeffrey D. Moeller, P.E.
Print Name of Customer/Agent

Signature of Customer/Agent

6/7/10
Date

ATTACHMENT "A"
Spill Response Actions

Spill Prevention and Control

The objective of this section is to describe measures to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4.

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum products, and substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill cleanup materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

(8) Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMP's.

(9) Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

(1) Clean up leaks and spills immediately.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMP's in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:

(5) Contain the spread of the spill.

(6) Recover spilled materials.

(7) Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

(1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM.
After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

(5) Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

More information on spill rules and appropriate responses is available on the TCEQ website at: http://www.tnrcc.state.tx.us/enforcement/emergency_response.html

Vehicle and Equipment Maintenance

(1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.

(2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under paving equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non- leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tanks.

(3) Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

ATTACHMENT "B"
Potential Sources of Contamination

The only potential sources of contamination are construction equipment leaks, re-fueling spills, as well as potential from port-o-lets, and the total suspended solids (TSS) due to the construction activities on-site. There are no other anticipated potential sources of contamination.

ATTACHMENT "C"
Sequence of Major Activities

Stages of construction:

1. Install temporary BMP's.
2. Phase 1 Construction
    a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 3.05 acres.
    b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 3.05 acres.
    c. Vortechs® System #1 & #2 Installation: Vortechs® System #1 will be installed at the southwest corner of the parking area. Vortechs® System #2 will be installed at the southeast corner of the parking area. See Permanent Storm water Section.
    d. Utility Installation: Water service will be provided by the existing well, and sewer service will be provided by a septic system that will be designed and constructed in this phase. Small sewer, water, and electric services will be installed at this time.
    e. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 3.05 acres.
    f. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.

3. Phase 2 Construction
    a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 2.23 acres.
    b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 2.23 acres.
    c. Vortechs® System #3 Installation: Vortechs® System #3 will be installed at the northeast corner of the parking area. See Permanent Storm water Section.
    d. Utility Installation: Primary utility have were constructed in Phase 1. Small sewer, water, and electric services will be installed at this time.
    e. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 2.23 acres.

   f. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.

4. Phase 3 Construction
   a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 0.65 acres.
   b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 0.65 acres.
   c. Utility Installation: Primary utility have were constructed in earlier phases. Small sewer, water, and electric services will be installed at this time.
   d. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 0.65 acres.
   e. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.
5. Phase 4 Construction
   a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 1.88 acres.
   b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 1.88 acres.
   c. Utility Installation: Primary utility have were constructed in earlier phases. Small sewer, water, and electric services will be installed at this time.
   d. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 1.88 acres.
   e. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.
6. Phase 5 Construction
   a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 1.08 acres.
   b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 1.08 acres.
   c. Utility Installation: Primary utility have were constructed in earlier phases. Small sewer, water, and electric services will be installed at this time.
   d. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 1.08 acres.
   e. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.
7. Phase 6 Construction
   a. Minor site grading: This includes the removal of organic material and other debris within the proposed parking and building site. Approximate disturbed area 4.57 acres.

b. Grading: Cutting and filling of the proposed site to prepare the site for parking and foundation construction. Approximate disturbed area 4.57 acres.
c. Vortechs® System #4 & #5 Installation: Vortechs® System #4 will be installed at the southwest corner of the parking area. Vortechs® System #5 will be installed at the southeast corner of the parking area. See Permanent Storm water Section.
d. Utility Installation: Primary utility have were constructed in earlier phases. Small sewer, water, and electric services will be installed at this time.
e. Finished Grading: Final landscaping, asphalt parking, and building infrastructure are installed. Approximate disturbed area 4.57 acres.
f. Vegetative Filter Strip Installation: Upon completion of the paved areas and final grading, the vegetative filter strips are installed, See Permanent Storm water Section.

ATTACHMENT "D"
Temporary BMP's and Measures

The following sequence will be followed for installing temporary BMP's:
1. Silt fence will be constructed on the downgradient side of proposed site.
2. A stabilized construction exit will be installed prior to any site work.
3. A rock berm will be installed at the southernmost downstream.

A. There is no upgradient stormwater, since the site is at the top of the watershed. All stormwater affecting this site is generated on site and described is section B below.

B. Silt fence will be placed on the downgradient side of each proposed improvement to contain pollutants generated from onsite runoff. Soil disturbance will be limited to a minimal distance outside the proposed pavement and building pads. Disturbed areas will be seeded to replace destroyed vegetation. The existing vegetation located downgradient of each proposed improvement will work in conjunction with the silt fence, rock berms, and stabilized construction entrance to prevent pollution of water originating onsite and/or flowing offsite.

C. The proposed silt fences, rock berm, and stabilized construction entrances constructed upgradient of the existing streams will prevent pollutants from entering them as well as the aquifer. According to the Geologic Assessment, there are no sensitive features with the project boundary.

D. There were no sensitive features identified in the Geologic Assessment.

ATTACHMENT "E"
Request to Temporarily Seal a Feature

There will be no request to temporarily seal a feature.

ATTACHMENT "F"
Structural Practices

Rock berms and silt fence will be used to protect disturbed soils and to prevent contamination from leaving the project site.

ATTACHMENT "G"
Drainage Area Map

See Drainage Area Map at the end of this section.

ATTACHMENT "H"
Temporary Sediment Pond Plans and Calculations

There will not be more than 10 acres of disturbed soil in one common drainage area that will occur at one time. Silt fence will be used for small drainage areas. No sediment ponds will be constructed due to the minimal amount of soil disturbance.

ATTACHMENT "I"
Inspection and Maintenance for BMP's

Inspection and Maintenance Plan

The contractor is required to inspect the control and fences at weekly intervals and after any rainfall events to insure that they are functioning properly. The person(s) responsible for maintenance controls and fences shall immediately make any necessary repairs to damaged areas.

Temporary Construction Entrance/Exit: The entrance should be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way should be removed immediately by contractor. When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin. All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

Silt Fence: Remove sediment when buildup reaches 6 inches. Replace any torn fabric or install a second line of fencing parallel to the torn section. Replace or repair any sections crushed or

collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points. When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

Rock Berms: For installation in streambeds, additional daily inspections shall be made. Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt in an approved manner that will not cause any additional siltation. Repair any loose wire sheathing. The berm shall be reshaped as needed during inspection. The berm shall be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc. The rock berm shall be left in place until all upstream areas are stabilized and accumulated silt removed.

TCEQ staff will be allowed full access to the property during construction of the project for inspecting controls and fences and to verify that the accepted plan is being utilized in the field. TCEQ staff has the right to speak with the contractor to verify plan changes and modifications.

Documentation: All scheduled inspection and maintenance measures made to the temporary BMPs must be documented clearly on the WPAP Site Plan showing inspection/maintenance measures performed, date, and person responsible for inspection and maintenance. Any changes made to the location or type of controls shown on the accepted plans, due to onsite conditions, shall be documented on the site plan that is part of this Water Pollution Abatement Plan. No other changes shall be made unless approved by TCEQ and the Design Engineer. Documentation shall clearly show changes made, date, and person responsible and reason change was made.

Owner's Information:

Owner:	Christ Our King Anglican Church
Contact:	Charles Salsman
Phone:	(830) 632-7744
Address:	111 W. San Antonio St, Suite 250 New Braunfels, TX 78130

Design Engineer:

Company:	HMT Engineering & Surveying
Contact:	Jeffrey D. Moeller, P.E.
Phone:	(830) 625-8555
Address:	410 N. Seguin Street New Braunfels, Texas 78130

Person or Firm Responsible for Erosion/Sedimentation Control Maintenance:

Company: _____
Contact: _____
Phone: _____
Address: _____

Signature of Responsible Party: _____

This portion of the form shall be filled out and signed by the responsible party prior to construction.

ATTACHMENT "J"
Schedule of Interim and Permanent Soil Stabilization Practices

Areas which are disturbed by construction staging and storage areas will be hydro mulched with the appropriate seed mixture. Areas between the edge of pavement and property line will also be hydro mulched. There will be no fill slopes exceeding a 3:1 slope and all fill slopes will be hydro mulched. All disturbed soils should be seeded or otherwise stabilized within 14 calendar days after final grading or where construction activity has temporarily ceased for more than 21 days. Installation and acceptable mixtures of hydro mulch are as follows:

Materials:

Hydraulic Mulches: Wood fiber mulch can be applied alone or as a component of hydraulic matrices. Wood fiber applied alone is typically applied at the rate of 2,000 to 4,000 lb/acre. Wood fiber mulch is manufactured from wood or wood waste from lumber mills or from urban sources.

Hydraulic Matrices: Hydraulic matrices include a mixture of wood fiber and acrylic polymer or other tackifier as binder. Apply as a liquid slurry using a hydraulic application machine (i.e., hydro seeder) at the following minimum rates, or as specified by the manufacturer to achieve complete coverage of the target area: 2,000 to 4,000 lb/acre wood fiber mulch, and 5 to 10% (by weight) of tackifier (acrylic copolymer, guar, psyllium, etc.)

Bonded Fiber Matrix: Bonded fiber matrix (BFM) is a hydraulically applied system of fibers and adhesives that upon drying forms an erosion resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,000 lb/acre to 4,000 lb/acre based on the manufacturer's recommendation. A biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Seed Mixtures:

Dates	Climate	Species	(lb/ac.)
Sept. 1 to Nov. 30	Temporary Cool Season	Tall Fescue	4.0
		Oats	21.0
		Wheats	30.0
		Total	**55.0**
Sept. 1 to Nov. 30	Cool Season Legume	Hairy Vetch	8.0
May 1 to Aug. 31	Temporary Warm Season	Foxtail Millet	30.0

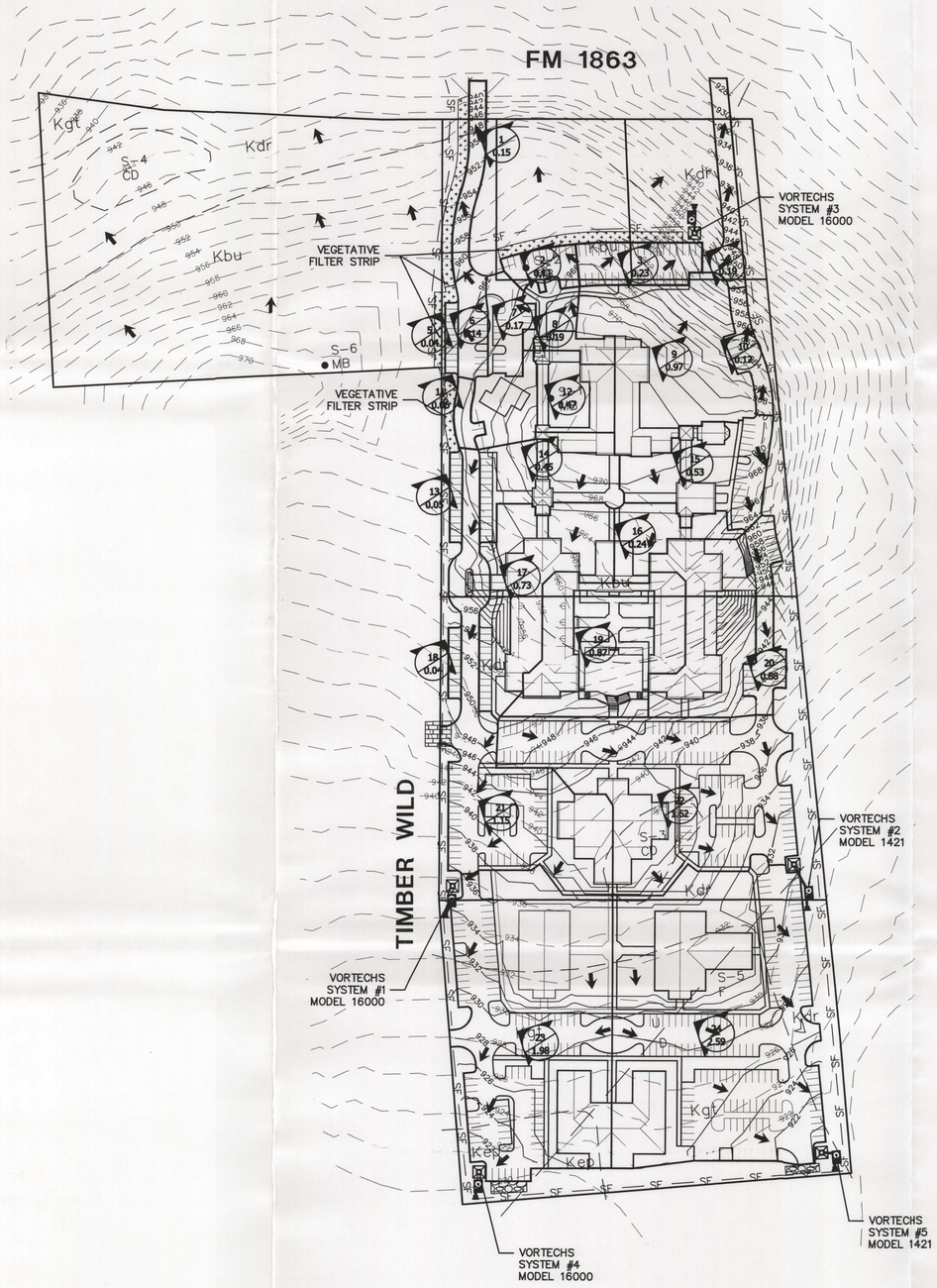
Fertilizer: Fertilizer should be applied at the rate of 40 pounds of nitrogen and 40 pounds of phosphorus per acre, which is equivalent to about 1.0 pounds of nitrogen and phosphorus per 1000 square feet.

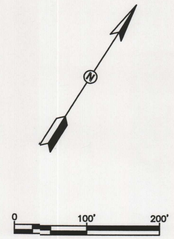
Installation:

(1) Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.

(2) To be effective, hydraulic matrices require 24 hours to dry before rainfall occurs.

(3) Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.





LEGEND

- LEGAL BOUNDARY
- LIMITS OF DRAINAGE AREA
- ROCK BERM
- SF — SF — SILT FENCE
- STABILIZED CONSTRUCTION ENTRANCE
- VEGETATIVE FILTER STRIP

TOTAL LAND AREA	=	22.11 AC
TOTAL DISTURBED AREA	=	13.94 AC
TOTAL IMPERVIOUS AREA	=	9.11 AC
% IMPERVIOUS	=	41.2%

Drainage Area ID	Phase	Total Area	Impervious Area	Treatment System
1	1	0.15	0.15	Vegetative Filter Strips
2	2	0.11	0.11	Vegetative Filter Strips
3	2	0.23	0.23	Vegetative Filter Strips
4	2	0.16	0.19	Vortechs System #3
5	2	0.04	0.04	Vegetative Filter Strips
6	1	0.14	0.13	Vegetative Filter Strips
7	2	0.17	0.14	Vegetative Filter Strips
8	2	0.19	0.11	Vortechs System #3
9	2	0.97	0.00	Vortechs System #3
10	3	0.12	0.12	Vortechs System #3
11	1	0.06	0.06	Vegetative Filter Strips
12	2	0.47	0.20	Vortechs System #3
13	2	0.05	0.05	Vortechs System #1
14	2	0.45	0.26	Vortechs System #1
15	3	0.53	0.33	Vortechs System #2
16	4	0.24	0.12	Vortechs System #1
17	4	0.73	0.41	Vortechs System #1
18	4	0.04	0.04	Vortechs System #1
19	4	0.87	0.53	Vortechs System #2
20	5	0.88	0.59	Vortechs System #2
21	1	1.15	0.96	Vortechs System #1
22	1	1.62	1.31	Vortechs System #2
23	6	1.98	1.40	Vortechs System #4
24	6	2.59	1.88	Vortechs System #5

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

DRAINAGE AREA MAP

CHRIST OUR KING ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/7/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 1 OF 1

Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Drainage Area map.dwg User: Ingolhull Jun 07, 2010 - 11:27am

Permanent Stormwater Section
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b)(4)(C), (D)(li), (E), and (5), Effective June 1, 1999

REGULATED ENTITY NAME: **Christ Our King Anglican Church**

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

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

2. **X** 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.

   X 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:

   _____

   _____

3. **X** 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.

4. **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.

5. **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 A - 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.

X 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.

6. **ATTACHMENT B - 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 identified as **ATTACHMENT B** at the end of this form.

X If no surface water, groundwater or stormwater originates upgradient from the site and flows across the site, an explanation is provided as **ATTACHMENT B** 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 B** at the end of this form.

7. **ATTACHMENT C - BMPs for On-site Stormwater.**

X A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is identified as **ATTACHMENT C** 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 C** at the end of this form.

8. X **ATTACHMENT D - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is provided at the end of this form. Each feature identified in the Geologic Assessment as "sensitive" has been addressed.

9. X The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.

X The permanent sealing of or diversion of flow from a naturally-occurring "sensitive" or "possibly sensitive" feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed for any naturally-occurring "sensitive" or "possibly sensitive" features on this site.

N/A **ATTACHMENT E - Request to Seal Features.** A request to seal a naturally-occurring "sensitive" or "possibly sensitive" feature, that includes a justification as to why no reasonable and practicable alternative exists, is found at the end of this form. A request and justification has been provided for each feature.

10. X **ATTACHMENT F - 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 man-made or naturally occurring geologic features, all proposed structural measures, and appropriate details must be shown on the construction plans.

11. X **ATTACHMENT G - 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.

12. X 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 H - Pilot-Scale Field Testing Plan.** A plan for pilot-scale field testing is provided at the end of this form.

13. X **ATTACHMENT I -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.

14. X 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.

15. X 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.

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 **PERMANENT STORMWATER SECTION** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Jeffrey D. Moeller, P.E.
Print Name of Customer/Agent

Signature of Customer/Agent

6/7/10
Date

ATTACHMENT "A"
20% of Less Impervious Cover Waiver

The proposed development is a church campus and the 20% Impervious Cover Waiver does not apply. Permanent BMP's will be designed in accordance with TCEQ requirements for the removal of TSS generated by the proposed development.

ATTACHMENT "B"
BMP's for Upgradient Stormwater

The proposed site is at the top of the drainage area, thus no upgradient stormwater is accepted by the site.

ATTACHMENT "C"
BMP's for On-Site Stormwater

The permanent BMP's used to treat on-site stormwater runoff will be a combination of the Vortechs® system and vegetative filter strips. Please refer to the Drainage Area Map in the Temporary Stormwater Section for areas of treatment and BMP structures used.

ATTACHMENT "D"
BMP's for Surface Streams

The vegetative filter strips and Vortechs® Storm water treatment system will be installed to prevent pollutants from entering surface streams and ultimately the aquifer. There were no sensitive features identified by the Geologic Assessment.

The natural vegetation located down gradient of proposed improvements will provide additional filtration to help prevent pollutant from entering streams, sensitive features, and the aquifer.

ATTACHMENT "G"
Inspection, Maintenance, Repair and Retrofit Plan

Vegetative Filter Strips Maintenance and Monitoring Procedures

- *Pest Management* - An Integrated Pest Management (IPM) Plan should be developed for vegetated areas. This plan should specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

- *Seasonal Mowing and Lawn Care* - If the filter strip is made up of turf grass, it should be mowed as needed to limit vegetation height to 18 inches, using a mulching mower (or removal of clippings). If native grasses are used, the filter may require less frequent mowing, but a minimum of twice annually. Grass clippings and brush debris should not be deposited on vegetated filter strip areas. Regular mowing should also include weed control practices, however herbicide use should be kept to a minimum (Urbonas et al., 1992). Healthy grass can be maintained without using fertilizers because runoff usually contains sufficient nutrients. Irrigation of the site can help assure a dense and healthy vegetative cover.

- *Inspection* - Inspect filter strips at least twice annually for erosion or damage to vegetation; however, additional inspection after periods of heavy runoff is most desirable. The strip should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. More frequent inspections of the grass cover during the first few years after establishment will help to determine if any problems are developing, and to plan for long-term restorative maintenance needs. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Construction of a level spreader device may be necessary to reestablish shallow overland flow.

- *Debris and Litter Removal* - Trash tends to accumulate in vegetated areas, particularly along highways. Any filter strip structures (i.e. level spreaders) should be kept free of obstructions to reduce floatables being flushed downstream, and for aesthetic reasons. The need for this practice is determined through periodic inspection, but should be performed no less than 4 times per year.

- *Sediment Removal* - Sediment removal is not normally required in filter strips, since the vegetation normally grows through it and binds it to the soil. However, sediment may accumulate along the upstream boundary of the strip preventing uniform overland flow. Excess sediment should be removed by hand or with flat-bottomed shovels.

- *Grass Reseeding and Mulching* - A healthy dense grass should be maintained on the filter strip. If areas are eroded, they should be filled, compacted, and reseeded

so that the final grade is level. Grass damaged during the sediment removal process should be promptly replaced using the same seed mix used during filter strip establishment. If possible, flow should be diverted from the damaged areas until the grass is firmly established. Bare spots and areas of erosion identified during semi-annual inspections must be replanted and restored to meet specifications. Corrective maintenance, such as weeding or replanting should be done more frequently in the first two to three years after installation to ensure stabilization. Dense vegetation may require irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established.

ATTACHMENT "I"

Measures for Minimizing Surface Stream Contamination

All surface streams will be protected from erosion by not allowing runoff to exceed existing velocities. A portion of the runoff from the proposed development will sheet flow into the vegetative filter strips. The vegetative filter strips will be designed in order to maintain existing runoff velocities prior to leaving the site. The stormwater runoff for the remainder of the property will be concentrated into the Vortechs® system where the pollutants will be removed.

Vortechs® Maintenance

The Vortechs system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, e.g., unstable soils or heavy winter sanding will cause the swirl chamber to fill more quickly but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is provided on the following page, and is also available on contechstormwater.com.

The Vortechs system should be cleaned when inspection reveals that the sediment depth has accumulated to within 12 to 18 inches (300 to 450 mm) of the dry-weather water surface elevation. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.

Cleaning

Cleaning of the Vortechs system should be done during dry weather conditions when no flow is entering the system. Clean-out of the Vortechs system with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. If such a truck is not available, a "clamshell" grab may be used, but it is difficult to remove all accumulated pollutants using a "clamshell".

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads to solidify the oil since these pads are usually much easier to remove from the unit individually and less expensive to dispose of than the oil/water emulsion that may be created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Cleaning of a Vortechs system is typically done by inserting a vacuum hose into the swirl chamber and evacuating this chamber of water and pollutants. As water is evacuated, the water level outside of the swirl chamber will drop to a level roughly equal to the crest of the lower aperture of the swirl chamber. The water outside the swirl chamber should remain near this level throughout pumping as the bottom and sides of the swirl chamber are sealed to the tank floor and walls. This "water lock" feature prevents water from migrating into the swirl chamber, exposing the bottom of the baffle wall and creating excess pump-out volume. Floating pollutants will decant into the swirl chamber as the water level is drawn down. This allows most floating material to be withdrawn from the same access point above the swirl chamber. Floating material that does not decant into the swirl chamber during draw down should be skimmed from the baffle chamber. If maintenance is not performed as recommended, sediment may accumulate outside the swirl chamber. If this is the case, it may be necessary to pump out other chambers. It is advisable to check for sediment accumulation in all chambers during inspection and maintenance.

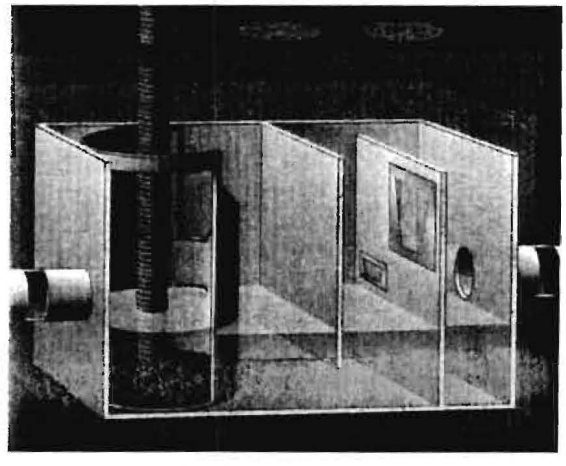
These maintenance recommendations apply to all Vortechs systems with the following exceptions:

1. It is strongly recommended that when cleaning systems larger than the Model 16000 the baffle chamber be drawn down to depth of three feet prior to beginning clean-out of the swirl chamber. Drawing down this chamber prior to the swirl chamber reduces adverse structural forces pushing upstream on the swirl chamber once that chamber is empty.
2. Entry into a Vortechs system is generally not required as cleaning can be done from the ground surface. However, if manned entry into a system is required the entire system should be evacuated of water prior to entry regardless of the system size.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the Vortechs system should be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

For assistance with maintaining your Vortechs system, contact us regarding the CONTECH Maintenance Compliance Certification Program.



Vortechs Inspection & Maintenance Log

Vortech Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Attachment "G"

Maintenance Plan for Vegetative Filter Strips

Location:	Phase 1 - West side of the entrance drive
	Phase 2 - North side of northern parking isle
Owner:	Christ Our King Anglican Church 111 W. San Antonio St. Suite 250 New Braunfels, Texas 78130 Phone: 830-632-7744

I agree that the attached Vegetative Filter Maintenance and Monitoring Procedures will be implemented to ensure that the proposed BMP functions as designed.

Charles Salsman
Christ Our King Anglican Church

6/7/10
Date

I have reviewed the attached maintenance and monitoring procedures and to the best of my knowledge certify that if they are followed as outlined the vegetative filter strips will function as designed.

Jeffrey D. Moeller, P.E.

Attachment "G"

Maintenance Plan for Vortechs Model 16000 & 1421

Vortechs Location:	1 - Southwest corner of Phase 1
	2 - Southeast corner of Phase 2
	3 - Northeast corner of Phase 3
	4 - Southwest corner of Phase 6
	5 - Southeast corner of Phase 6
Owner:	Christ Our King Anglican Church 111 W. San Antonio St. Suite 250 New Braunfels, Texas 78130 Phone: 830-632-7744

I agree that the attached Vortechs Maintenance and Monitoring Procedures will be implemented to ensure that the proposed system functions as designed.

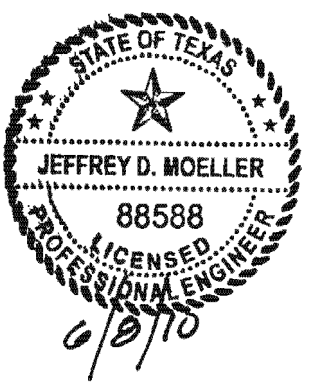
C. Salsman

Charles Salsman
Christ Our King Anglican Church

6/7/10
Date

I have reviewed the attached maintenance and monitoring procedures and to the best of my knowledge certify that if they are followed as outlined the Vortechs units will function as designed.

Jeffrey D. Moeller, P.E.



SECTION 02721

STORMWATER TREATMENT SYSTEM

PART 1.00 GENERAL

1.1 DESCRIPTION

A. Work included:

The Contractor, and/or a manufacturer selected by the Contractor and approved by the Engineer, shall furnish all labor, materials, equipment and incidentals required and install all precast concrete stormwater treatment systems and appurtenances in accordance with the Drawings and these specifications.

1.2 QUALITY CONTROL INSPECTION

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28 MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3 inch (76 mm) diameter by 6 inch (152 mm) long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

1.3 SUBMITTALS

A. Shop Drawings

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction, reinforcing, joints and any cast-in-place appurtenances. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than 3/16-inches per foot (1:75). Six (6) hard copies of said shop drawings shall be submitted to the Engineer for review and approval.

PART 2.00 PRODUCTS

2.1 MATERIALS AND DESIGN

A. Concrete for precast stormwater treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:

1. The wall thickness shall not be less than 6 inches (152 mm) or as shown on the dimensional drawings. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 (MS18) loading requirements as determined by a Licensed Professional Engineer.

2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II Portland cement conforming to ASTM C 150.

4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.

5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M

B. Internal aluminum plate components shall be aluminum alloy 5052-H32 in accordance with ASTM B 209.

C. Sealant to be utilized at the base of the swirl chamber shall be 60 durometer extruded nitrile butadiene rubber (Buna N) and shall be provided to the concrete precaster for installation.

D. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.30B and AASHTO M105. The manhole frame and cover shall be equivalent to Campbell Foundry Pattern #1009A or #1012D custom cast with the CONTECH Stormwater Solutions logo and the words "Vortechs® Stormwater Treatment System".

F. A bitumen sealant in conformance with ASTM C 990 shall be utilized in the sealing of the joint between the swirl chamber and the vault at the long wall tangent points. The butyl material shall be 3/4-inch thick by 3/4-inch wide.

2.2 PERFORMANCE

Each stormwater treatment system shall adhere to the following performance specifications at the design treatment capacities, as listed below:

Table 2.2

Vortechs® Model	**Design Treatment Capacity** (cfs)/(l/s)	**Sediment Storage** (yd^3)/(m^3)
1000	**0 - 1.6 (0 - 45)**	**0.7 (0.54)**
2000	**1.6 - 2.8 (45-80)**	**1.2 (0.91)**
3000	**2.8 - 4.5 (80-125)**	**1.8 (1.38)**
4000	**4.5 - 6.0 (125-175)**	**2.4 (1.84)**
5000	**6.0 - 8.5 (175-240)**	**3.2 (2.45)**
7000	**8.5 - 11.0 (240-315)**	**4.0 (3.06)**
9000	**11.0 - 14.0 (315-400)**	**4.8 (3.67)**
11000	**14.0 - 17.5 (400-495)**	**5.6 (4.28)**
16000	**17.5 - 25.0 (495-710)**	**7.1 (5.43)**

Each stormwater treatment system shall include a circular aluminum "swirl chamber" (or "grit chamber") with a tangential inlet to induce a swirling flow pattern that will accumulate and store settleable solids in a manner and a location that will prevent re-suspension of previously captured particulates.

Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

Each stormwater treatment system shall be capable of removing **80% of the net annual Total Suspended Solids (TSS)** load based on a 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity listed in Table 2.2, and shall not re-suspend trapped sediments or re-entrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.

Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in Table 2.2. The systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

A water-lock feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

Stormwater treatment systems shall be completely housed within one rectangular structure.

2.3 MANUFACTURER

Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.

Each stormwater treatment system shall be a Vortechs® System as manufactured by CONTECH Stormwater Solutions Inc., 200 Enterprise Drive, Scarborough, Maine 04074, phone: 207-885-9830, fax: 207-885-9825; and as protected under U.S. Patent #5,759,415.

PART 3.00 EXECUTION

3.1 INSTALLATION

A. Each Stormwater Treatment System shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer.

B. Place the precast base unit on a granular subbase of minimum thickness of six inches (152 mm) after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.

C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990 along the construction joint in the section that is already in place.

D. After setting the base and wall or riser sections, prepare to install the swirl chamber. Place the 3/4-inch (19 mm) thick by 3/4-inch (19 mm) wide butyl mastic seal vertically on the outside of the swirl chamber starting one inch above the bottom of the swirl chamber and continuing to a height equal to the elevation of the bottom of the upper aperture of the swirl chamber. The butyl mastic seal should abut the downstream side of the pre-drilled mounting holes that attach the swirl chamber to the long walls of the concrete vault. Next, install the extruded Buna N seal on the bottom edge of the 180 degree downstream section of the swirl chamber by first applying a bead of Sikaflex-1a polyurethane elastomeric sealant into the extruded slot then slide the seal onto the swirl chamber. The extruded seal should extend 3-inches (76 mm) upstream of the mounting holes, toward the inlet end of the vault. Set the swirl chamber into position and keep the seal approximately ½-inch (13 mm) above the floor of the concrete vault. Apply a continuous bead of Sikaflex-1a sealant under the cupped bottom of the seal. Set the circular swirl chamber on the floor of the vault and anchor it by bolting the swirl chamber to the side walls of the concrete vault at the three (3) tangent points and at the inlet tab using HILTI brand stainless steel drop-in wedge anchors or equivalent 3/8-inch (10 mm) diameter by 2-3/4 inch (70 mm) minimum length at heights of approximately three inches (3") (76 mm) off the floor and at fifteen inch (15") (381 mm) intervals to approximately the same height of the butyl mastic sealant (at locations of pre-drilled holes in aluminum components). Apply a continuous bead of Sikaflex-1a sealant to the intersection of the inside bottom edge of the extruded seal and the vault floor.

E. If the oil baffle wall (Baffle A) and flow control wall (Baffle B) are not integrally cast-in to riser/wall sections then the Baffle wall panels shall be placed in the formed keyways or between

bolted-in-place angle flanges as provided by the manufacturer. Apply non-shrink grout or Sikaflex-1a sealant to each end of Baffle A and Baffle B at the upstream intersection with the side walls of the concrete vault.

F. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the oil baffle wall (Baffle A), using more than one layer of mastic if necessary, to a thickness at least 1-inch (25 mm) greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. Do not seal the top of Baffle B unless specified on the shop drawings to do so. After placement of the roof section has compressed the butyl mastic sealant in the gap over Baffle A, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. If roof section is "clamshell" or "bathtub" halves, then finish sealing the ends of the Baffle walls by applying non-shrink grout or Sikaflex-1a sealant to each end of Baffle A at the upstream intersection with the side walls of the concrete vault and to each end of Baffle B at the downstream intersection with the side walls of the concrete vault.

G. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a ¼-inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch (152 mm) lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".

H. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.

I. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.10**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.30**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7971**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 1

Total drainage basin/outfall area =	**2.42**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.75**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.72**	
$L_{M\ THIS\ BASIN}$ =	**1571**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **2.42** acres
A_I = **1.75** acres
A_P = **0.67** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.53**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	

Irrigation Area Calculations:

Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter = 40.62 feet

R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = 0.32 feet

n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultanec
The required "Swale

Design Q = CiA = 4.71 cfs

Manning's Equation Q = 0.76 cfs Error 1 = 3.95

Swale Width= 6.00 ft

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

Instructions are provided to the right (green comments).

The resulting "Swale
If the resulting "Swal

Flow Velocity 0.36 ft/s

Minimum Length = 107.24 ft

If there is not the opti
Click on "Tools" and
Then proceed as inst

Instructions are provided to the right (blue comments).

If you would like to in
Excel can simultanec
The required "Design

Design Width = 6 ft

Design Discharge = 0.76 cfs Error 2 = 3.95

Design Depth = 0.33 ft

Flow Velocity = 0.[illegible] cfs
Minimum Length = 97.[illegible] ft

First set the desired I
Highlight Cell F232. '

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

Click on "Tools" and
The value in the "Set
The value in the "By '
Click on solve.

16. Vegetated Filter Strips

Designed as Required in RG-348 Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

The resulting "Desigr
If the resulting "Desi
First set the desired I
Highlight Cell F232. '
Click on "Tools" and
The value in the "Set
The value in the "By '
Click on solve.

17. Wet Vaults

Designed as Required in RG-348 Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 = **NA** lbs

The resulting "Desigr
If the resulting "Desi

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: Q = CiA

C = runoff coefficient for the drainage area = 0.55 **C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity = 1.1 in/hour
A = drainage area in acres = 1 acres

Q = flow rate in cubic feet per second = 0.61 cubic feet/sec

RG-348 Page 3-31 Equation 3.5: V_{OR} = Q/A

Q = Runoff rate calculated above = 0.61 cubic feet/sec
A = Water surface area in the wet vault = 150 square feet

V_{OR} = Overflow Rate = 0.00 feet/sec

Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) = 53 percent

Load removed by Wet Vault = #VALUE! lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs = 0.5 in/hour

Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 = 0.75 percent
Efficiency Reduction for Actual Rainfall Intensity = 0.83 percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 1736.21 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1570.80**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.60	EA
Calculated Model Size(s) =	Vx16000	
Actual Model Size (if choosing larger model size) =	Vx16000	Pick Model Size
Surface Area =	113.10	ft^2
Overflow Rate =	0.015514	V_{or}
Rounded Overflow Rate =	0.015600	V_{or}
BMP Efficiency % =	80.00	%
L_R Value =	1608.07	lbs
TSS Load Credit =	37.27	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1570.80	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.11**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.30**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7971**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 2

Total drainage basin/outfall area =	**4.14**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**2.88**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.70**	
$L_{M\ THIS\ BASIN}$ =	**2585**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **4.14** acres
A_I = **2.88** acres
A_P = **1.26** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.50**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	

Irrigation Area Calculations:

Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter = 40.62 feet

R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = 0.32 feet

n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

The resulting "Swale
If the resulting "Swal

If there is not the opti
Click on "Tools" and
Then proceed as inst

If you would like to in
Excel can simultaneo
The required "Design

Design Q = CiA = 4.71 cfs

Manning's Equation Q = 0.76 cfs — Error 1 = 3.95

Swale Width= 6.00 ft

Instructions are provided to the right (green comments).

Flow Velocity 0.36 ft/s

Minimum Length = 107.24 ft

Instructions are provided to the right (blue comments).

Design Width = 6 ft

Design Discharge = 0.76 cfs — Error 2 = 3.95

Design Depth = 0.33 ft

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.52	
i = design rainfall intensity =	1.1	in/hour
A = drainage area in acres =	1	acres
Q = flow rate in cubic feet per second =	0.57	cubic feet/sec

C = Runoff Coefficient = $0.546\ (IC)^2 + 0.328\ (IC) + 0.03$

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.57	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = $E_1 =$ 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = $E_2 =$ 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = $E_3 =$ 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 2859.74 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**2585.09**	lbs
Impervious Cover Overtreatment=	0.00	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	2.63	EA
Calculated Model Size(s) =	Area Too Large	
Actual Model Size (if choosing larger model size) =	Vx1421	Pick Model Size
Surface Area =	153.90	ft^2
Overflow Rate =	0.018796	V_{or}
Rounded Overflow Rate =	0.018900	V_{or}
BMP Efficiency % =	75.00	%
L_R Value =	2483.13	lbs
TSS Load Credit =	-101.96	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	No	
TSS Treatment by BMP (LM + TSS Uncapt.) =	NA	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.11**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.30**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7971**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 3

Total drainage basin/outfall area =	**2.78**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.42**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.51**	
$L_{M\ THIS\ BASIN}$ =	**1275**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **4.14** acres
A_I = **2.88** acres
A_P = **1.26** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.50**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	0.00	acres	
Off-site Impervious cover draining to BMP =	0.00	acres	
Impervious fraction of off-site area =	0		
Off-site Runoff Coefficient =	0.00		
Off-site Water Quality Volume =	#DIV/0!	cubic feet	
Storage for Sediment =	#DIV/0!		
Total Capture Volume (required water quality volume(s) x 1.20) =	#DIV/0!	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	

Irrigation Area Calculations:

Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter = 40.62 feet

R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = 0.32 feet

n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

Design Q = CiA = 4.71 cfs

First, highlight Cell F
Manning's Equation Q = 0.76 cfs Error 1 = 3.95 **Then click on "Tools'**
Swale Width= 6.00 ft **The value in the "Set**
The value in the "By
Click on solve.

Instructions are provided to the right (green comments).

The resulting "Swale
If the resulting "Swal

Flow Velocity 0.36 ft/s
Minimum Length = 107.24 ft

If there is not the opti
Click on "Tools" and
Then proceed as inst

Instructions are provided to the right (blue comments).

If you would like to in
Design Width = 6 ft
Design Discharge = 0.76 cfs Error 2 = 3.95 **Excel can simultaneo**
Design Depth = 0.33 ft **The required "Design**

Flow Veloc... = 0 cfs
Minimum Leng... = 97.63 ft

First set the desired l
Highlight Cell F232.

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

16. Vegetated Filter Strips

Designed as Required in RG-348 Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

The resulting "Desig
If the resulting "Desi
First set the desired l
Highlight Cell F232.
Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

17. Wet Vaults

Designed as Required in RG-348 Pages 3-30 to 3-32 & 3-79

The resulting "Desig
If the resulting "Desi

Required Load Removal Based upon Equation 3.3 = **NA** lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area = 0.34 **C = Runoff Coefficient = $0.546 (IC)^2 + 0.328 (IC) + 0.03$**
i = design rainfall intensity = 1.1 in/hour
A = drainage area in acres = 1 acres

Q = flow rate in cubic feet per second = 0.37 cubic feet/sec

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above = 0.37 cubic feet/sec
A = Water surface area in the wet vault = 150 square feet

V_{OR} = Overflow Rate = 0.00 feet/sec

Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) = 53 percent

Load removed by Wet Vault = #VALUE! lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs = 0.5 in/hour

Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 = 0.75 percent
Efficiency Reduction for Actual Rainfall Intensity = 0.83 percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 2859.74 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1274.59**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.32	EA
Calculated Model Size(s) =	Vx16000	
Actual Model Size (if choosing larger model size) =	Vx16000	Pick Model Size
Surface Area =	113.10	ft^2
Overflow Rate =	0.012827	V_{or}
Rounded Overflow Rate =	0.013300	V_{or}
BMP Efficiency % =	83.00	%
L_R Value =	1365.84	lbs
TSS Load Credit =	91.25	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1274.59	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.10**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.30**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7971**	lbs.

*** The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 4

Total drainage basin/outfall area =	**1.98**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.40**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.71**	
$L_{M\ THIS\ BASIN}$ =	**1257**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **1.98** acres
A_I = **1.40** acres
A_P = **0.58** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.51**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	**0.00**	acres	
Off-site Impervious cover draining to BMP =	**0.00**	acres	
Impervious fraction of off-site area =	**0**		
Off-site Runoff Coefficient =	**0.00**		
Off-site Water Quality Volume =	**#DIV/0!**	cubic feet	
Storage for Sediment =	**#DIV/0!**		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	

Irrigation Area Calculations:

Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet	

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	4.71 cfs		
Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

Instructions are provided to the right (green comments).

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

Instructions are provided to the right (blue comments).

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

To solve for bottom v
Excel can simultaneo
The required "Swale

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

The resulting "Swale
If the resulting "Swal

If there is not the opti
Click on "Tools" and
Then proceed as inst

If you would like to in
Excel can simultaneo
The required "Design

Flow Velocity =	0.32	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi
First set the desired l
Highlight Cell F232.
Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 =	**NA**	lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: $Q = CiA$

C = runoff coefficient for the drainage area =	0.53		**C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity =	1.1	in/hour	
A = drainage area in acres =	1	acres	
Q = flow rate in cubic feet per second =	0.59	cubic feet/sec	

RG-348 Page 3-31 Equation 3.5: $V_{OR} = Q/A$

Q = Runoff rate calculated above =	0.59	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 1389.65 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1256.64**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.28	EA
Calculated Model Size(s) =	Vx16000	
Actual Model Size (if choosing larger model size) =	Vx16000	Pick Model Size
Surface Area =	113.10	ft^2
Overflow Rate =	0.012424	V_{or}
Rounded Overflow Rate =	0.012500	V_{or}
BMP Efficiency % =	84.00	%
L_R Value =	1351.44	lbs
TSS Load Credit =	94.80	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1256.64	

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Christ Our King Anglican Church
Date Prepared: 6/6/2010

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**22.10**	acres
Predevelopment impervious area within the limits of the plan * =	**0.42**	acres
Total post-development impervious area within the limits of the plan* =	**9.30**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7971**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **5**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = 5

Total drainage basin/outfall area =	**2.59**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.88**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.73**	
$L_{M\ THIS\ BASIN}$ =	**1687**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vortechs**
Removal efficiency = **0** percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **1.98** acres
A_I = **1.40** acres
A_P = **0.58** acres
L_R = **0** lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **3482** lbs.

F = **#DIV/0!**

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth = **#DIV/0!** inches
Post Development Runoff Coefficient = **0.51**
On-site Water Quality Volume = **#DIV/0!** cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	0.00	acres	
Off-site Impervious cover draining to BMP =	0.00	acres	
Impervious fraction of off-site area =	0		
Off-site Runoff Coefficient =	0.00		
Off-site Water Quality Volume =	#DIV/0!	cubic feet	
Storage for Sediment =	#DIV/0!		
Total Capture Volume (required water quality volume(s) x 1.20) =	**#DIV/0!**	cubic feet	

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

7. Retention/Irrigation System — Designed as Required in RG-348 — Pages 3-42 to 3-46

Required Water Quality Volume for retention basin =	**NA**	cubic feet	

Irrigation Area Calculations:

Soil infiltration/permeability rate =	**0.1**	in/hr	**Enter determined permeability rate or assumed value of 0.1**
Irrigation area =	**NA**	square feet	
	NA	acres	

8. Extended Detention Basin System — Designed as Required in RG-348 — Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin =	**NA**	cubic feet

9. Filter area for Sand Filters — Designed as Required in RG-348 — Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**NA**	cubic feet	
Minimum filter basin area =	**NA**	square feet	
Maximum sedimentation basin area =	**NA**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**NA**	square feet	**For maximum water depth of 8 feet**

10. Bioretention System — Designed as Required in RG-348 — Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins — Designed as Required in RG-348 — Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands — Designed as Required in RG-348 — Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System — Designed as Required in RG-348 — Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 8.00 acres
Impervious Cover in Drainage Area = 4.00 acres
Rainfall intensity = i = 1.1 in/hr
Swale Slope = 0.01 ft/ft
Side Slope (z) = 3
Design Water Depth = y = 0.33 ft
Weighted Runoff Coefficient = C = 0.54

A_{CS} = cross-sectional area of flow in Swale = 13.17 sf

P_W = Wetted Perimeter =	40.62 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.32 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 38.51 feet

Q = CiA = 4.71 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

To solve for bottom v
Excel can simultaneo
The required "Swale

First, highlight Cell F
Then click on "Tools'
The value in the "Set
The value in the "By
Click on solve.

The resulting "Swale
If the resulting "Swal

If there is not the opti
Click on "Tools" and
Then proceed as inst

If you would like to in
Excel can simultaneo
The required "Design

Design Q = CiA =	4.71 cfs		
Manning's Equation Q =	0.76 cfs	Error 1 =	3.95
Swale Width=	6.00 ft		

Instructions are provided to the right (green comments).

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

Instructions are provided to the right (blue comments).

Design Width =	6 ft		
Design Discharge =	0.76 cfs	Error 2 =	3.95
Design Depth =	0.33 ft		

Flow Velocity =	0.[illegible]	cfs
Minimum Length =	97.48	ft

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

First set the desired l
Highlight Cell F232.

Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi
First set the desired l
Highlight Cell F232.
Click on "Tools" and
The value in the "Set
The value in the "By
Click on solve.

The resulting "Desig
If the resulting "Desi

16. Vegetated Filter Strips

Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

17. Wet Vaults

Designed as Required in RG-348 — Pages 3-30 to 3-32 & 3-79

Required Load Removal Based upon Equation 3.3 = **NA** lbs

First calculate the load removal at 1.1 in/hour

RG-348 Page 3-30 Equation 3.4: Q = CiA

C = runoff coefficient for the drainage area =	0.56	**C = Runoff Coefficient = 0.546 (IC)^2 + 0.328 (IC) + 0.03**
i = design rainfall intensity =	1.1	in/hour
A = drainage area in acres =	1	acres
Q = flow rate in cubic feet per second =	0.61	cubic feet/sec

RG-348 Page 3-31 Equation 3.5: V_{OR} = Q/A

Q = Runoff rate calculated above =	0.61	cubic feet/sec
A = Water surface area in the wet vault =	150	square feet
V_{OR} = Overflow Rate =	0.00	feet/sec
Percent TSS Removal from Figure 3-1 (RG-348 Page 3-31) =	53	percent
Load removed by Wet Vault =	#VALUE!	lbs

If a bypass occurs at a rainfall intensity of less than 1.1 in/hours
Calculate the efficiency reduction for the actual rainfall intensity rate

Actual Rainfall Intensity at which Wet Vault bypass Occurs =	0.5	in/hour
Fraction of rainfall treated from Figure 3-2 RG-348 Page 3-32 =	0.75	percent
Efficiency Reduction for Actual Rainfall Intensity =	0.83	percent

Resultant TSS Load removed by Wet Vault = #VALUE! lbs

18. Permeable Concrete Designed as Required in RG-348 Pages 3-79 to 3-83

PERMEABLE CONCRETE MAY ONLY BE USED ON THE CONTRIBUTING ZONE

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

$E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =$ 86.38 percent NET EFFICIENCY OF THE BMPs IN THE SERIES

EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 = 75.00 percent

EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 = 70.00 percent

EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 = 0.00 percent

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

$L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) =$ 1389.65 lbs

20. Stormceptor

Required TSS Removal in BMP Drainage Area=	**NA**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	NA	EA
Calculated Model Size(s) =	#N/A	
Actual Model Size (if multiple values provided in Calculated Model Size or if you are choosing a larger model size) =	0	Model Size
Surface Area =	#N/A	ft^2
Overflow Rate =	#VALUE!	V_{or}
Rounded Overflow Rate =	#VALUE!	V_{or}
BMP Efficiency % =	#VALUE!	%
L_R Value =	#VALUE!	lbs
TSS Load Credit =	#VALUE!	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	#VALUE!	
TSS Treatment by BMP (LM + TSS Uncapt.) =	#VALUE!	

21. Vortech

Required TSS Removal in BMP Drainage Area=	**1687.49**	lbs
Impervious Cover Overtreatment=	0.0000	ac
TSS Removal for Uncaptured Area =	0.00	lbs

BMP Sizing

Effective Area =	1.71	EA
Calculated Model Size(s) =	Vx1319	
Actual Model Size (if choosing larger model size) =	Vx1421	Pick Model Size
Surface Area =	153.90	ft^2
Overflow Rate =	0.012246	V_{or}
Rounded Overflow Rate =	0.012500	V_{or}
BMP Efficiency % =	84.00	%
L_R Value =	1813.76	lbs
TSS Load Credit =	126.27	lbs
Is Sufficient Treatment Available? (TSS Credit $\geq$ TSS Uncapt.)	Yes	
TSS Treatment by BMP (LM + TSS Uncapt.) =	1687.49	

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I **Charles Salsman**,
Print Name

Project Manager,
Title - Owner/President/Other

of **Christ Our King Anglican Church**,
Corporation/Partnership/Entity Name

have authorized **Jeffrey D. Moeller, P.E.**
Print Name of Agent/Engineer

of **Hollmig Moeller Thornhill, 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 Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For applicants who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

Applicant's Signature

6/3/10
Date

AMANDA M. GOLD
Notary Public, State of Texas
My Commission Expires
September 15, 2013

THE STATE OF Texas §

County of Comal §

BEFORE ME, the undersigned authority, on this day personally appeared Charles Salsman 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 3 day of June, 2010.

Amanda M. Gold
NOTARY PUBLIC

Amanda M. Gold
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: September 15, 2013

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Form

NAME OF PROPOSED REGULATED ENTITY: **Christ Our King Anglican Church**
REGULATED ENTITY LOCATION: **463 FM 1863, New Braunfels, TX 78132**
NAME OF CUSTOMER: **Christ Our King Anglican Church**
CONTACT PERSON: **Charles Salsman** PHONE: **(830) 632-7744**
(Please Print)

Customer Reference Number (if issued): CN _____ (nine digits)

Regulated Entity Reference Number (if issued): RN _____ (nine digits)

Austin Regional Office (3373) ☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362) ☐ Bexar ☒ Comal ☐ Medina ☐ Kinney ☐ Uvalde

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to (Check One):

☐ **Austin Regional Office**

☐ **Mailed to TCEQ:**
TCEQ – Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☒ **San Antonio Regional Office**

☐ **Overnight Delivery to TCEQ:**
TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Site Location (Check All That Apply): ☐ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	Size		Fee Due
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling		Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks		Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	**22.11**	Acres	$ **6,500**
Sewage Collection System		L.F.	$
Lift Stations without sewer lines		Acres	$
Underground or Aboveground Storage Tank Facility		Tanks	$
Piping System(s)(only)		Each	$
Exception		Each	$
Extension of Time		Each	$

Signature

6/3/10
Date

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

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

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Schedule
30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications
Contributing Zone Plans and Modifications

PROJECT	PROJECT AREA IN ACRES	FEE
One Single Family Residential Dwelling	< 5	$650
Multiple Single Family Residential and Parks	< 5 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $10,000

Organized Sewage Collection Systems and Modifications

PROJECT	COST PER LINEAR FOOT	MINIMUM FEE MAXIMUM FEE
Sewage Collection Systems	$0.50	$650 - $6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

PROJECT	COST PER TANK OR PIPING SYSTEM	MINIMUM FEE MAXIMUM FEE
Underground and Aboveground Storage Tank Facility	$650	$650 - $6,500

Exception Requests

PROJECT	FEE
Exception Request	$500

Extension of Time Requests

PROJECT	FEE
Extension of Time Request	$150

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

☒ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No — WPAP Application

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN		RN

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy) 5/24/2010

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☐ Owner ☐ Operator ☒ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☒ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☐ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☒ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*
Christ Our King Anglican Church		

10. Mailing Address:	111 W. San Antonio, St. Suite 250						
City	New Braunfels	State	TX	ZIP	78130	ZIP + 4	5158

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*
	csalsman@signalequities.com

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
(830) 632-7744		(830) 632-7779

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
	32037185405		800985577

20. Number of Employees

☒ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information ☐ No Change** *(See below)*

**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

23. Regulated Entity Name *(name of the site where the regulated action is taking place)*

Christ Our King Anglican Church

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*	463 FM 1863						
	City	New Braunfels	**State**	TX	**ZIP**	78132	**ZIP + 4**	3629
25. Mailing Address:	111 W. San Antonio St, Suite 250						
	City	New Braunfels	**State**	TX	**ZIP**	78130	**ZIP + 4**	5158

26. E-Mail Address:	csalsman@signalequities.com

27. Telephone Number	**28. Extension or Code**	**29. Fax Number** *(if applicable)*
(830) 632-7744		(830) 632-7779

30. Primary SIC Code (4 digits)	**31. Secondary SIC Code** (4 digits)	**32. Primary NAICS Code** (5 or 6 digits)	**33. Secondary NAICS Code** (5 or 6 digits)
8661	NA	813110	NA

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Church Campus and School

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	It is located on FM 1863 approx. 0.75 miles southwest of the intersection with State Highway 46

36. Nearest City	**County**	**State**	**Nearest ZIP Code**
New Braunfels	Comal	TX	78132

37. Latitude (N) In Decimal:	29.7150		**38. Longitude (W) In Decimal:**	98.1875	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
029	42	54	98	11	15

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☐ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Jeffrey D. Moeller, P.E.	**41. Title:**	Authorized Agent

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(830) 625-8555		(830) 625-8556	Jeffm@hmtnb.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Christ Our King Anglican Church	**Job Title:**	Project Manager
Name *(In Print)*:	Charles Salsman	**Phone:**	(830) 632-7744
Signature:		**Date:**	6/3/2010

LEGEND

LEGAL BOUNDARY
LIMITS OF DRAINAGE AREA
ROCK BERM
SILT FENCE — SF — SF —
STABILIZED CONSTRUCTION ENTRANCE
VEGETATIVE FILTER STRIP
EXISTING CONTOURS 900
PROPOSED CONTOURS 900

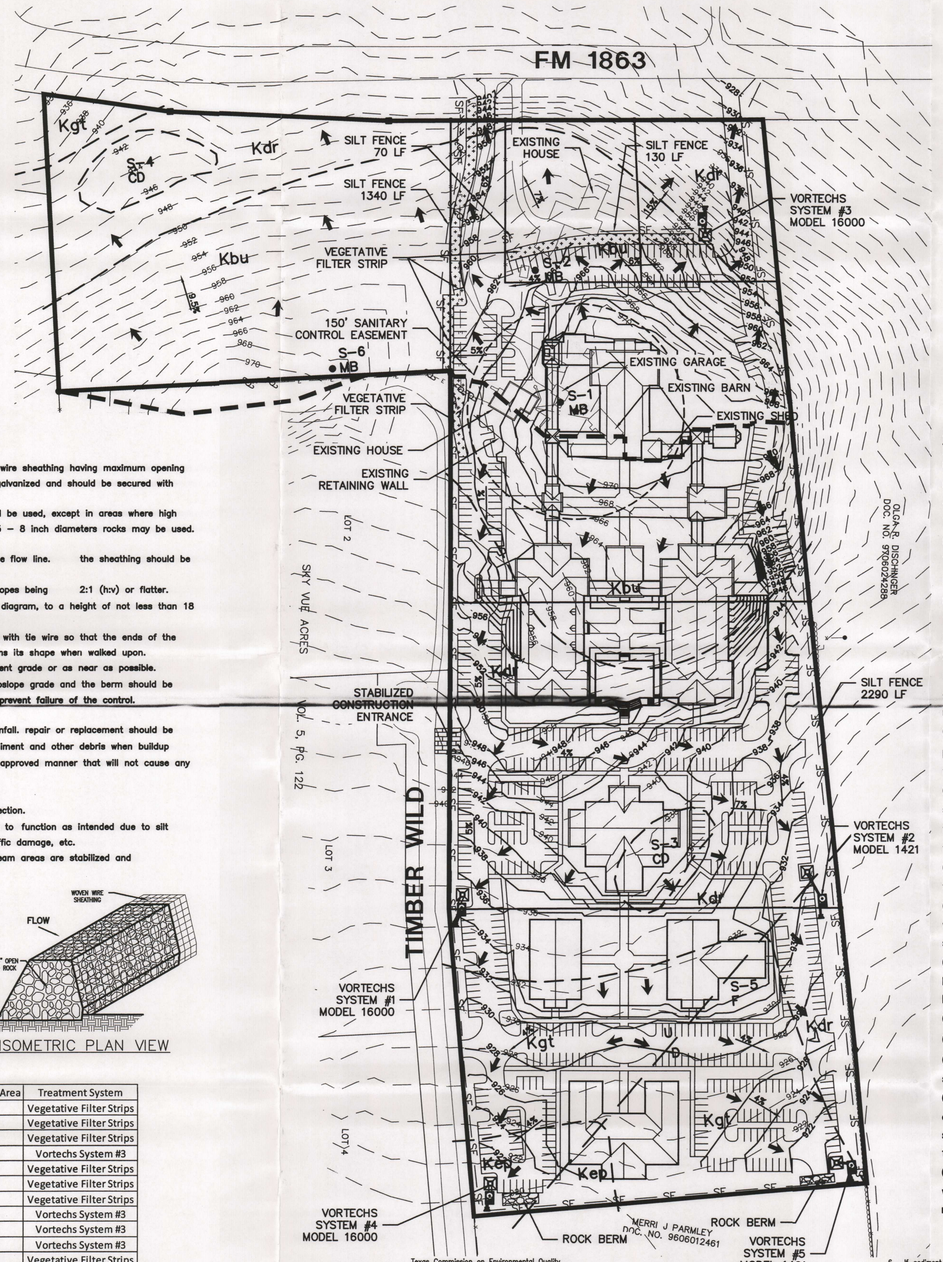
0 100' 200'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

DISTURBED AREA NOTE

ALL AREAS SHOWN WITH PAVEMENT, BUILDINGS, SIDEWALKS, SITE GRADING, VEGETATIVE FILTER STRIPS, AND VORTECHS SYSTEMS WILL BE DISTURBED. THE TOTAL DISTURBED AREA FOR THE PROJECT IS 12.38 ACRES. DUE TO THE PHASING OF THE PROJECT, NO MORE THAN 10 ACRES WILL BE DISTURBED AT ONE TIME.



ROCK BERM

Materials:

(1) The berm structure should be secured with a woven wire sheathing having maximum opening of 11 inch and a minimum wire diameter of 20 gauge galvanized and should be secured with shoat rings.

(2) Clean, open graded 3 – 5 inch diameter rock should be used, except in areas where high velocities or large volumes of flow are expected, where 5 – 8 inch diameters rocks may be used.

Installation:

(1) Lay out the woven wire sheathing perpendicular to the flow line. the sheathing should be 20 gauge woven wire mesh with 1 inch openings.

(2) Berm should have a top width of 2 feet with side slopes being 2:1 (h:v) or flatter.

(3) Place the rock along the sheathing as shown in the diagram, to a height of not less than 18 inches.

(4) Wrap the wire sheathing around the rock and secure with tie wire so that the ends of the sheathing overlaps at least 2 inches, and the berm retains its shape when walked upon.

(5) Berm should be built along the contour at zero percent grade or as near as possible.

(6) The ends of the berm should be tied into existing upslope grade and the berm should be buried in a trench approximately 3 to 4 inches deep to prevent failure of the control.

Inspection and Maintenance Guidelines:

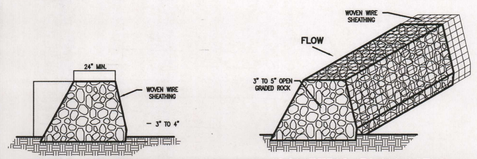
(1) Inspection should be made weekly and after each rainfall. repair or replacement should be made promptly as needed by contractor. (2) Remove sediment and other debris when buildup reaches 6" and dispose of the accumulated silt in an approved manner that will not cause any additional siltation.

(3) Repair any loose wire sheathing.

(4) The berm should be reshaped as needed during inspection.

(5) The berm should be replaced when structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.

(6) The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.



CROSS SECTION ISOMETRIC PLAN VIEW

Drainage Area ID	Phase	Total Area	Impervious Area	Treatment System
1	1	0.12	0.12	Vegetative Filter Strips
2	2	0.11	0.11	Vegetative Filter Strips
3	2	0.23	0.23	Vegetative Filter Strips
4	2	0.16	0.16	Vortechs System #3
5	2	0.04	0.04	Vegetative Filter Strips
6	1	0.14	0.13	Vegetative Filter Strips
7	2	0.17	0.14	Vegetative Filter Strips
8	2	0.19	0.11	Vortechs System #3
9	2	0.97	0.00	Vortechs System #3
10	3	0.12	0.12	Vortechs System #3
11	1	0.06	0.06	Vegetative Filter Strips
12	2	0.47	0.20	Vortechs System #3
13	2	0.05	0.05	Vortechs System #1
14	2	0.45	0.26	Vortechs System #1
15	3	0.53	0.33	Vortechs System #2
16	4	0.24	0.12	Vortechs System #1
17	4	0.73	0.41	Vortechs System #1
18	4	0.04	0.04	Vortechs System #1
19	4	0.87	0.53	Vortechs System #2
20	5	0.88	0.59	Vortechs System #2
21	1	1.15	0.96	Vortechs System #1
22	1	1.62	1.31	Vortechs System #2
23	6	1.98	1.40	Vortechs System #4
24	6	2.59	1.88	Vortechs System #5

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.
2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.
6. 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).
7. 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.
8. 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).
9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
11. The following records shall be maintained and made available to the TCEQ 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.

The holder of any approved Edward Aquifer protection plan must notify the appropriate regional office in writing and obtain approval from the executive director prior to initiating any of the following:

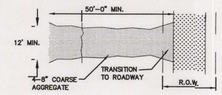
A. any physical or operational modification of any water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

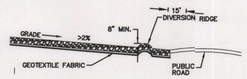
C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office
2800 S. IH 35, Suite 100
Austin, Texas 78704-5712
Phone (512) 339-2929
Fax (512) 339-3795

San Antonio Regional Office
14250 Judson Road
San Antonio, Texas 78233-4480
Phone (210) 490-3096
Fax (210) 545-4329

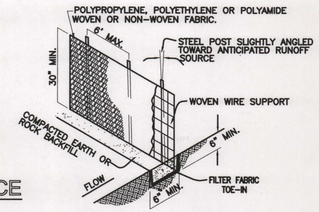


PLAN VIEW



PROFILE

SILT FENCE



Materials:

(1) Silt fence material should be polypropylene, polyethylene or polyamide woven or nonwoven fabric. The fabric width should be 36 inches, with a minimum unit weight of 4.5 oz/yd, mullen burst strength exceeding 190 lb/in2, ultraviolet stability exceeding 70%, and minimum apparent opening size of U.S. Sieve No. 30.

(2) Fence posts should be made of hot rolled steel, at least 4 feet long with Tee or Ybar cross section, surface painted or galvanized, minimum nominal weight 1.25 lb/ft2, and Brindell hardness exceeding 140.

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

Installation:

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

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

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

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

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

(6) Silt fence should be removed when the site is completely stabilized so as not to block or impede storm flow or drainage.

Inspection and Maintenance Guidelines:

(1) Inspect all fencing weekly, and after any rainfall.

(2) Remove sediment when buildup reaches 6 inches.

(3) Replace any torn fabric or install a second line of fencing parallel to the torn section.

(4) Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.

(5) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

STABILIZED CONSTRUCTION ENTRANCE / EXIT

Materials:

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

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

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

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

Installation:

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

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

(3) The construction entrance should be at least 50 feet long.

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

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

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

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

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

Inspection and Maintenance Guidelines:

(1) The entrance should be maintained in a condition, which will prevent tracking or lowing of sediment onto public rights–of–way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.

(2) All sediment spilled, dropped, washed or tracked onto public rights–of–way should be removed immediately by contractor.

(3) When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right–of–way.

(4) When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.

(5) All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

HYDRAULIC MULCH

Materials:

Hydraulic Mulches: Wood fiber mulch can be applied alone or as a component of hydraulic matrices. Wood fiber applied alone is typically applied at the rate of 2,000 to 4,000 lb/acre. Wood fiber mulch is manufactured from wood or wood waste from lumber mills or from urban sources.

Hydraulic Matrices: Hydraulic matrices include a mixture of wood fiber and acrylic polymer or other tackifier as binder. Apply as a liquid slurry using a hydraulic application machine (i.e., hydro seeder) at the following minimum rates, or as specified by the manufacturer to achieve complete coverage of the target area: 2,000 to 4,000 lb/acre wood fiber mulch, and 5 to 10% (by weight) of tackifier (acrylic copolymer, guar, psyllium, etc.)

Bonded Fiber Matrix: Bonded fiber matrix (BFM) is a hydraulically applied system of fibers and adhesives that upon drying forms an erosion resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,000 lb/acre to 4,000 lb/acre based on the manufacturer's recommendation. A biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re–wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Installation:

(1) Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.

(2) To be effective, hydraulic matrices require 24 hours to dry before rainfall occurs.

(3) Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Inspection and Maintenance Guidelines:

(1) Mulched areas should be inspected weekly and after each rain event to locate and repair any damage.

(2) Areas damaged by storms or normal construction activities should be regraded and hydraulic mulch reapplied as soon as practical.

RECEIVED
JUN 11 2010
COUNTY ENGINEER

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F–10961
www.hmtnb.com
Ph: 830–625–8555
Fax: 830–625–8556

JEFFREY D. MOELLER
88588
LICENSED PROFESSIONAL ENGINEER
6/8/10

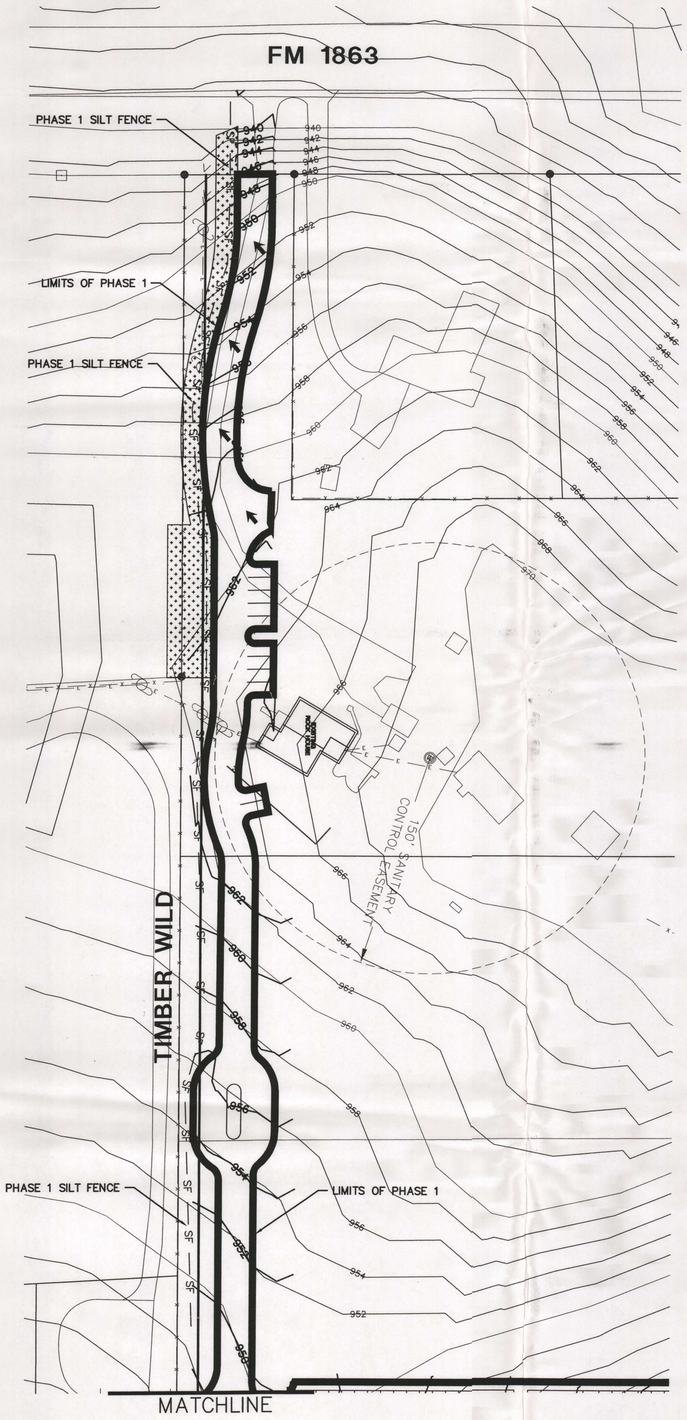
WPAP SITE PLAN

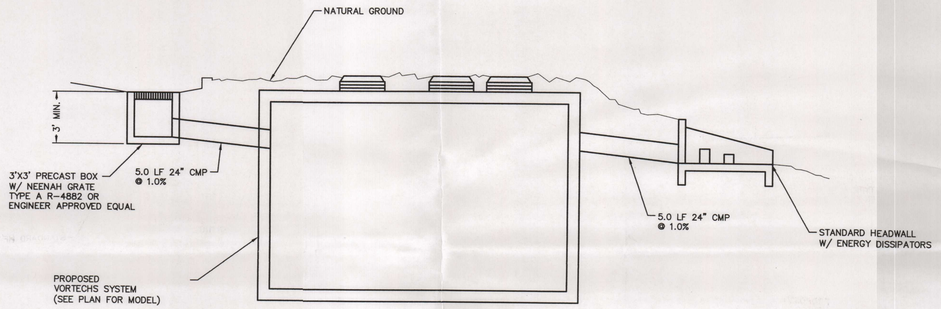
CHRIST OUR KING ANGLICAN CHURCH
111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE:	6/8/2010
DRAWN BY:	JJI
DESIGNED BY:	JJI
CHECKED BY:	JOS
REVIEWED BY:	JDM
PROJECT NUMBER:	COK001.101

SHEET 1 OF 1

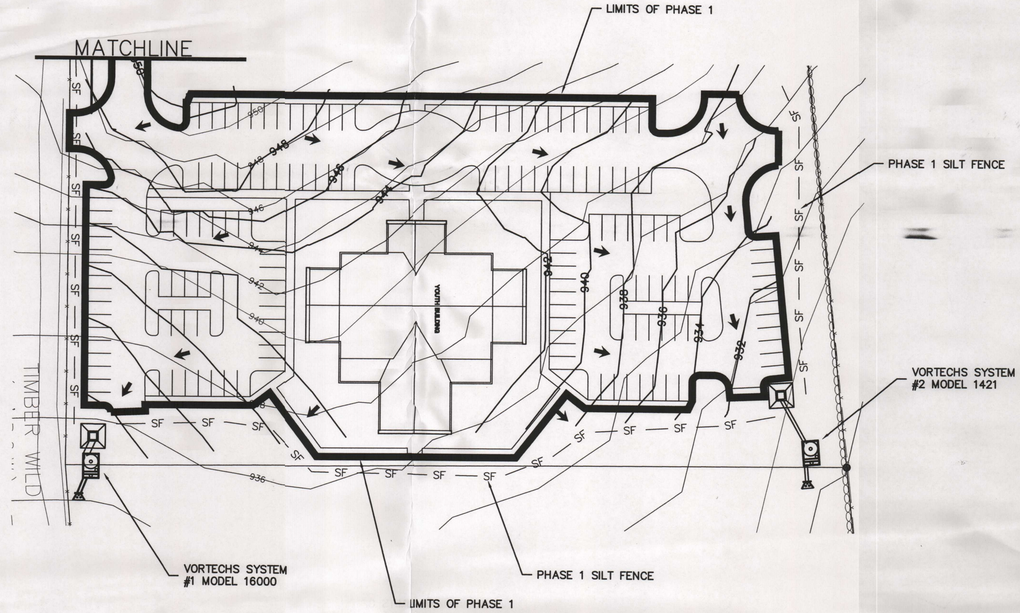
Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Site Plan.dwg User: ingallsJJ Jun 08, 2010 - 11:01am

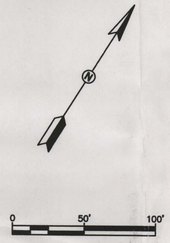




STORM DRAIN PROFILE

N.T.S.





LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- 900 EXISTING CONTOURS
- 900 PROPOSED CONTOURS

0 50' 100'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.
2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.
6. 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).
7. 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.
8. 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).
9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.
12. The holder of any approved Edward Aquifer protection plan must notify the appropriate regional office in writing and obtain approval from the executive director prior to initiating any of the following:

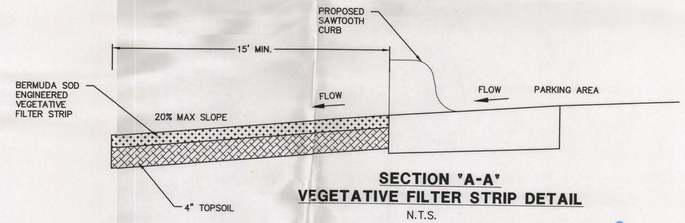
A. any physical or operational modification of any water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office
2800 S. IH 35, Suite 100
Austin, Texas 78704-5712
Phone (512) 339-2929
Fax (512) 339-3795

San Antonio Regional Office
14250 Judson Road
San Antonio, Texas 78233-4480
Phone (210) 490-3096
Fax (210) 545-4329



SECTION "A-A"
VEGETATIVE FILTER STRIP DETAIL

N.T.S.

RECEIVED
JUN 11 2010
COUNTY ENGINEER

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

JEFFREY D. MOELLER
88588
LICENSED PROFESSIONAL ENGINEER
6/8/10

WPAP SITE GRADING PLAN PHASE 1

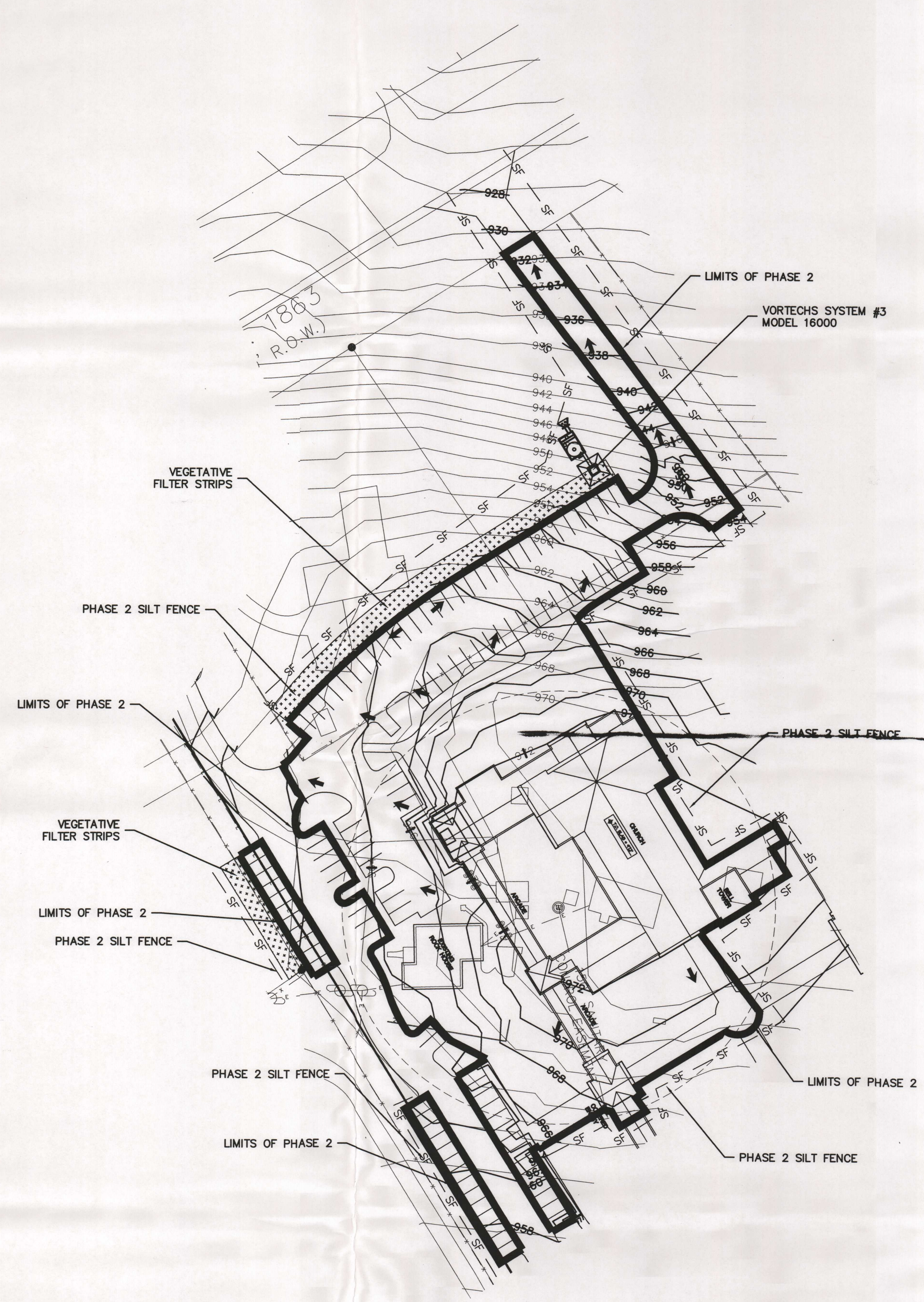
CHRIST OUR KING ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 1 OF 7

Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Grading Plan-Phase 1.dwg User: ingalls1 Jun 08, 2010 - 11:10am



Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.

2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.

3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.

4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.

6. 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).

7. 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.

8. 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).

9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.

10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

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

12. The holder of any approved Edward Aquifer protection 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 water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

   B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

   C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office	San Antonio Regional Office
2800 S. IH 35, Suite 100	14250 Judson Road
Austin, Texas 78704-5712	San Antonio, Texas 78233-4480
Phone (512) 339-2929	Phone (210) 490-3096
Fax (512) 339-3795	Fax (210) 545-4329

N

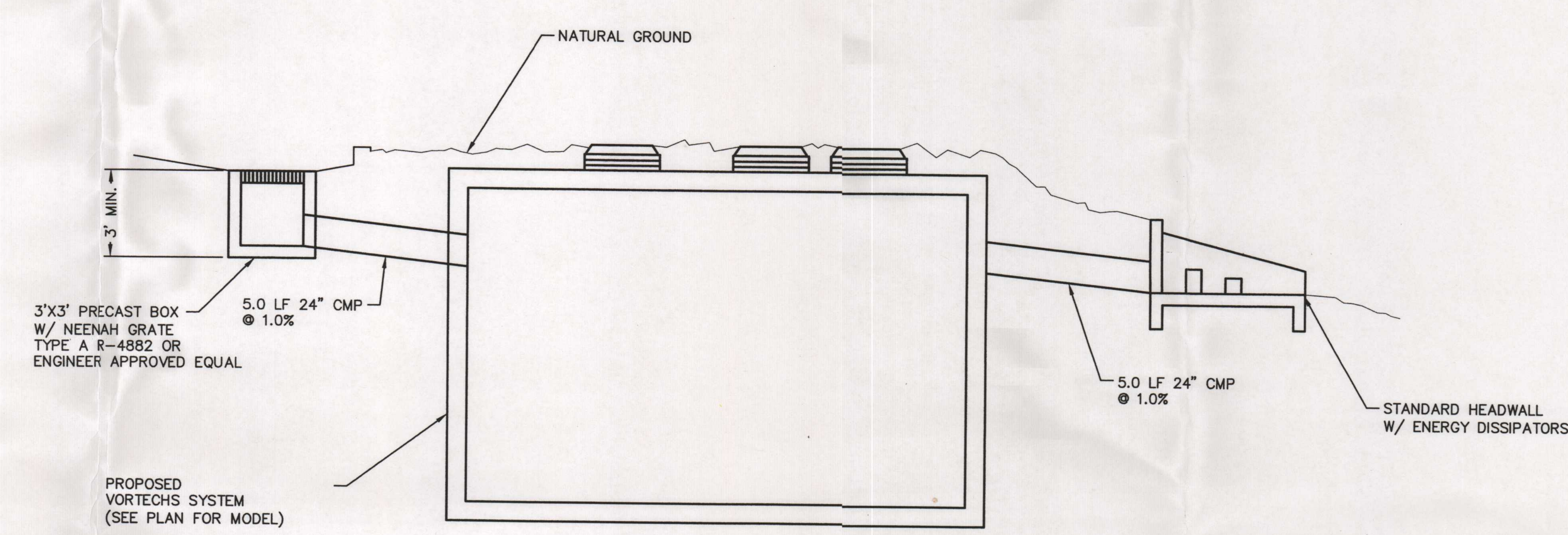
0 50' 100'

LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- — SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- — — 900 — — EXISTING CONTOURS
- —— 900 —— PROPOSED CONTOURS

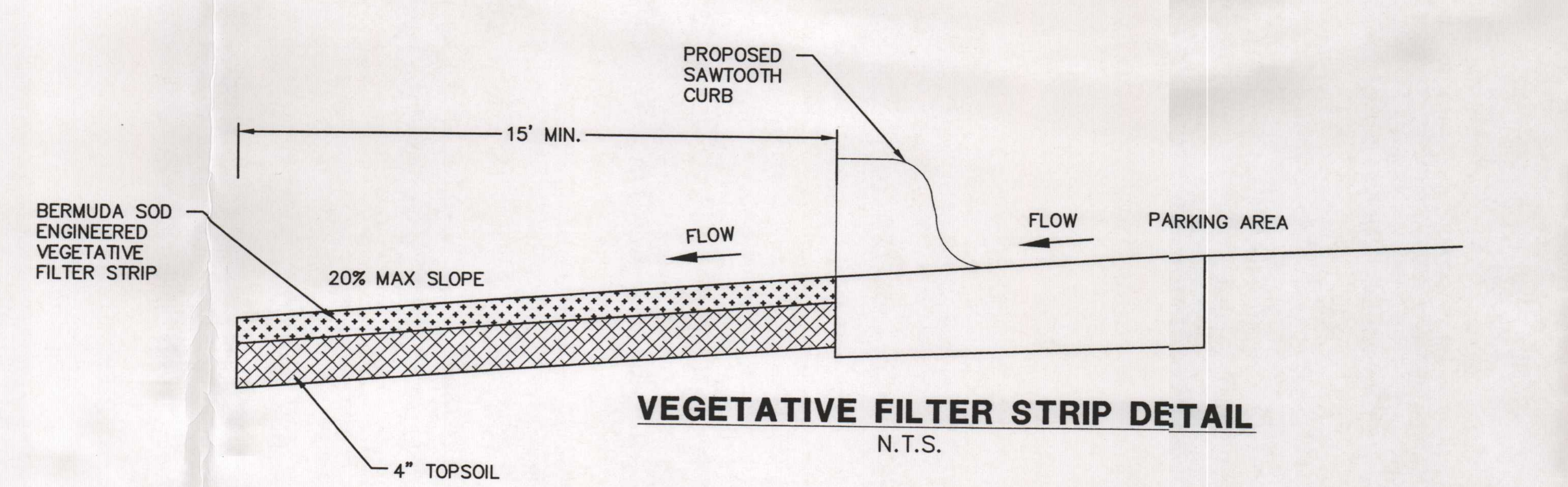
SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.



STORM DRAIN PROFILE

N.T.S.



VEGETATIVE FILTER STRIP DETAIL

N.T.S.

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL

410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130

TBPE Firm F-10961
www.hmtnb.com

Ph: 830-625-8555
Fax: 830-625-8556

JEFFREY D. MOELLER
88588
LICENSED PROFESSIONAL ENGINEER
6/8/10

WPAP SITE GRADING PLAN
PHASE 2

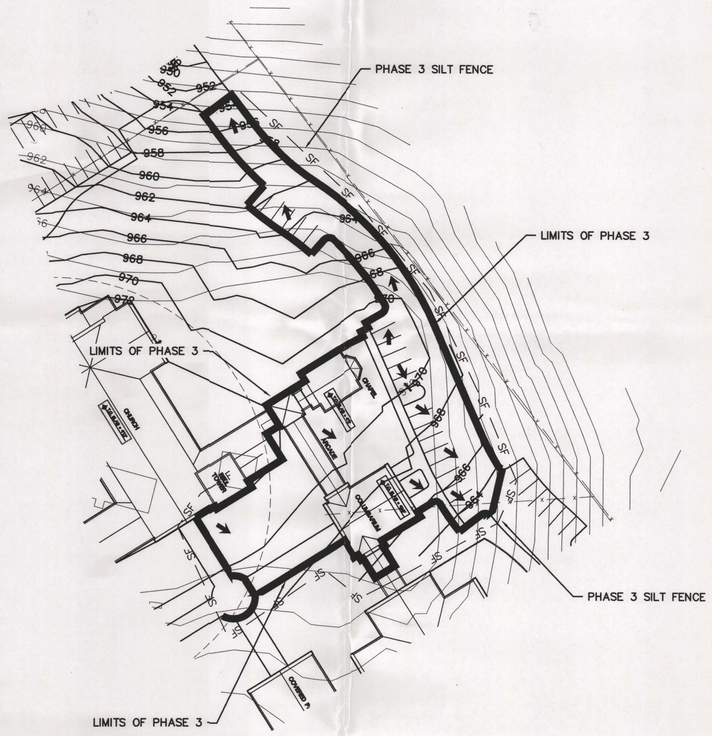
CHRIST OUR KING ANGLICAN CHURCH

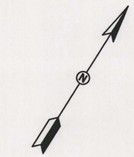
111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 2 OF 7

Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Grading Plan-Phase 2.dwg User: IngallsJ Jun 08, 2010 - 11:24am





LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- — 900 — — EXISTING CONTOURS
- 900 PROPOSED CONTOURS

0 50' 100'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.
2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.
6. 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).
7. 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.
8. 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).
9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.
12. The holder of any approved Edward Aquifer protection 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 water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
    B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
    C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office	San Antonio Regional Office
2800 S. IH 35, Suite 100	14250 Judson Road
Austin, Texas 78704-5712	San Antonio, Texas 78233-4480
Phone (512) 339-2929	Phone (210) 490-3096
Fax (512) 339-3795	Fax (210) 545-4329

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

JEFFREY D. MOELLER
88588
LICENSED PROFESSIONAL ENGINEER
6/8/10

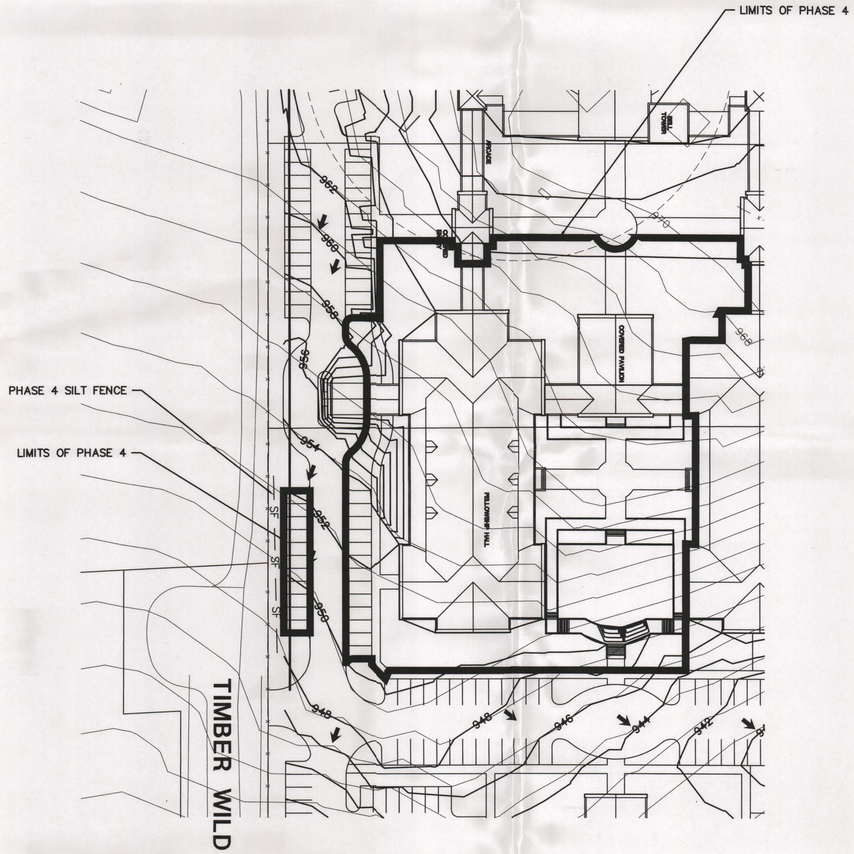
WPAP SITE GRADING PLAN PHASE 3

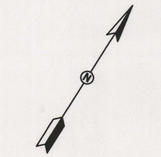
CHRIST OUR KING ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 3 OF 7





LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- — — 900 — — EXISTING CONTOURS
- 900 PROPOSED CONTOURS

0 50' 100'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.
2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.
6. 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).
7. 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.
8. 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).
9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.
12. The holder of any approved Edward Aquifer protection 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 water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office
2800 S. IH 35, Suite 100
Austin, Texas 78704-5712
Phone (512) 339-2929
Fax (512) 339-3795

San Antonio Regional Office
14250 Judson Road
San Antonio, Texas 78233-4480
Phone (210) 490-3096
Fax (210) 545-4329

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

JEFFREY D. MOELLER
88588
LICENSED
PROFESSIONAL ENGINEER

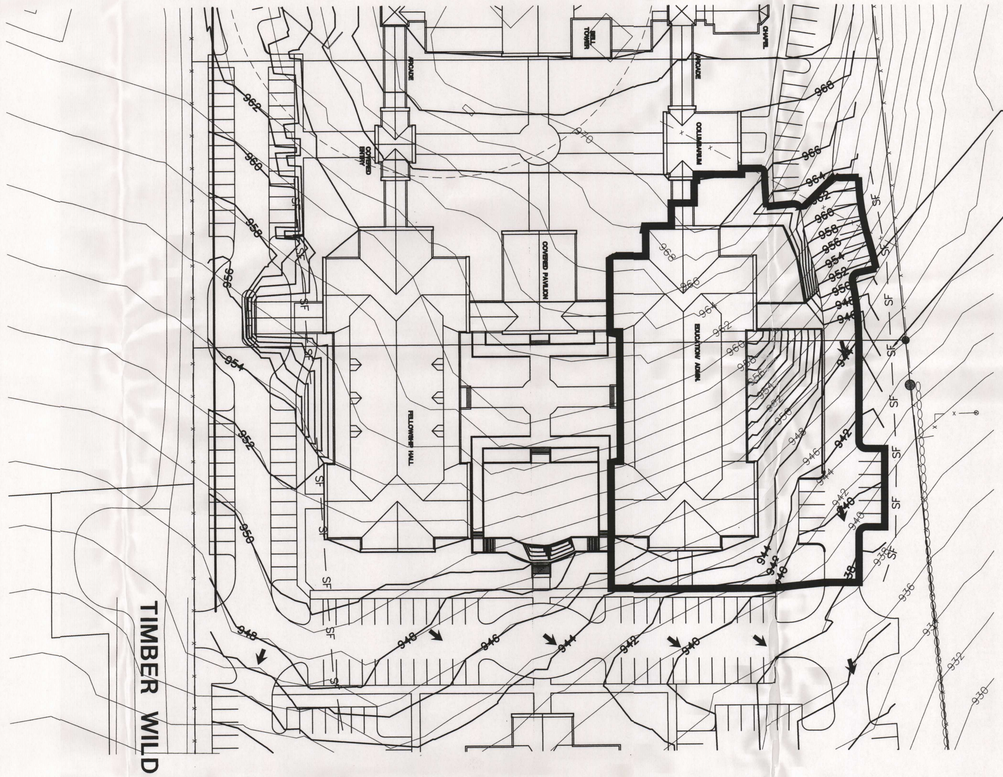
WPAP SITE GRADING PLAN
PHASE 4

CHRIST OUR KING
ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JJI
DESIGNED BY: JJI
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 4 OF 7



LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- — 900 — — EXISTING CONTOURS
- 900 PROPOSED CONTOURS

0 50' 100'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.

2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.

3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.

4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.

6. 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).

7. 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.

8. 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).

9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.

10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

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

12. The holder of any approved Edward Aquifer protection 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 water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office
2800 S. IH 35, Suite 100
Austin, Texas 78704-5712
Phone (512) 339-2929
Fax (512) 339-3795

San Antonio Regional Office
14250 Judson Road
San Antonio, Texas 78233-4480
Phone (210) 490-3096
Fax (210) 545-4329

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

JEFFREY D. MOELLER
88588
LICENSED PROFESSIONAL ENGINEER
6/8/10

WPAP SITE GRADING PLAN
PHASE 5

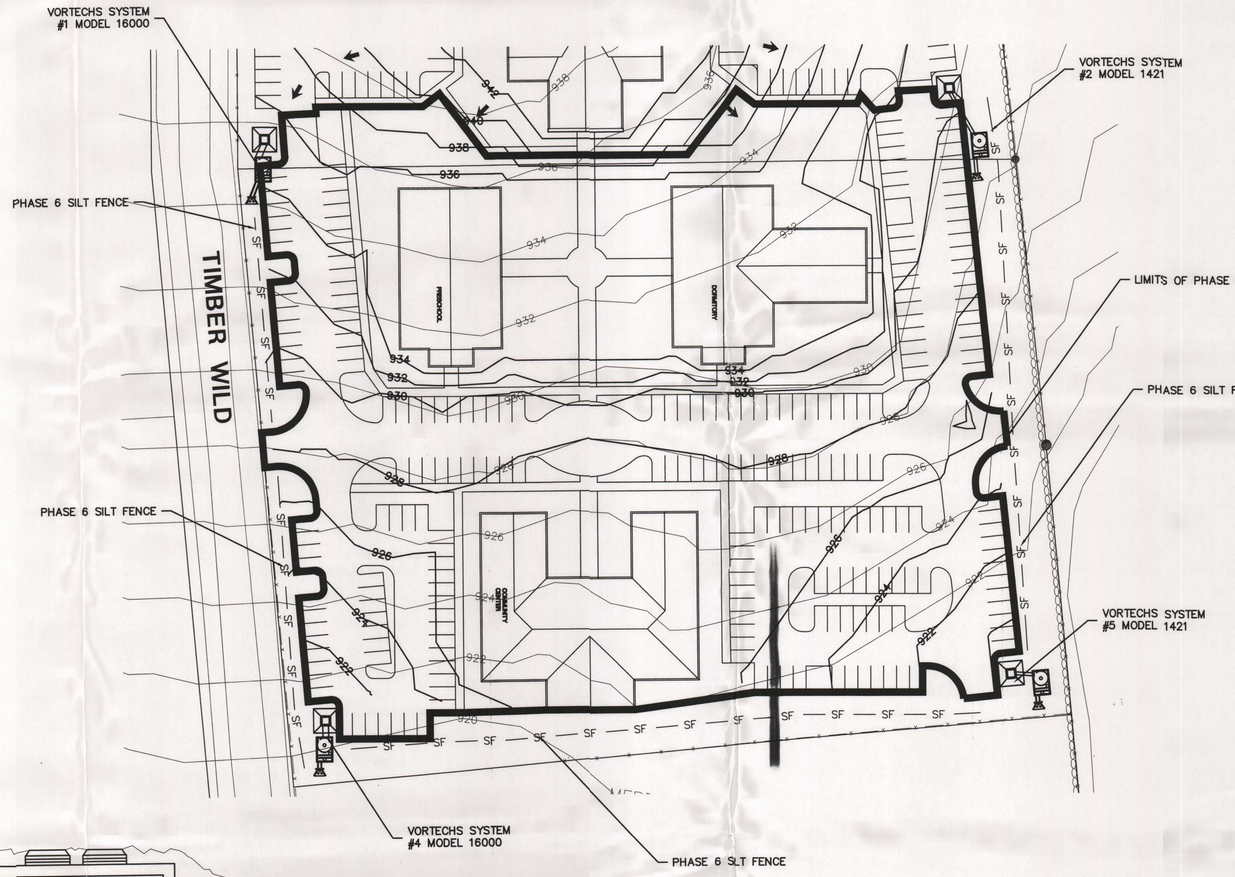
CHRIST OUR KING ANGLICAN CHURCH

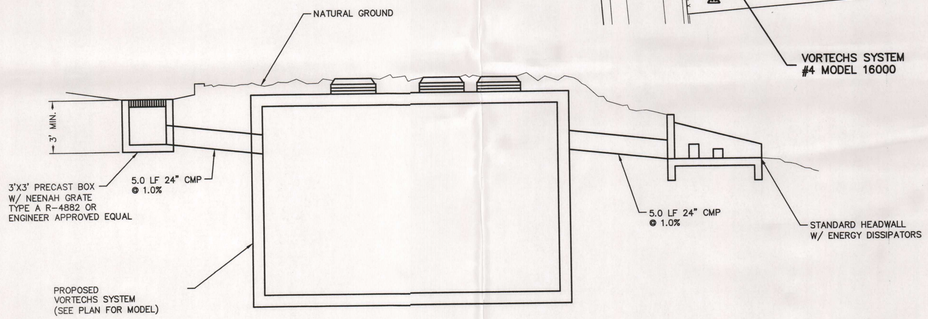
111 W. SAN ANTONIO ST. SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 5 OF 7

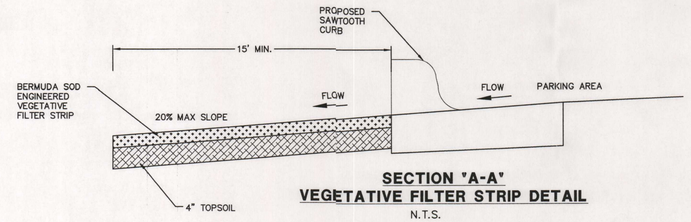
Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Grading Plan-Phase 5.dwg User: IngallsJI Jun 08, 2010 - 11:15am





STORM DRAIN PROFILE

N.T.S.



SECTION 'A-A'
VEGETATIVE FILTER STRIP DETAIL

N.T.S.

LEGEND

- LEGAL BOUNDARY
- LIMITS OF PHASE
- — SF — SF — SILT FENCE
- VEGETATIVE FILTER STRIP
- — — 900 — — EXISTING CONTOURS
- 900 PROPOSED CONTOURS

0 50' 100'

SOIL STABILIZATION NOTE

ALL DISTURBED SOILS SHOULD BE SEEDED OR OTHERWISE STABILIZED WITH 14 CALENDAR DAYS AFTER FINAL GRADING OR WHERE CONSTRUCTION ACTIVITY HAS TEMPORARILY CEASED FOR MORE THAN 21 DAYS.

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must 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 and the name and telephone number of the contact person.
2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection 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.
6. 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).
7. 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.
8. 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).
9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.
12. The holder of any approved Edward Aquifer protection 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 water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office	San Antonio Regional Office
2800 S. IH 35, Suite 100	14250 Judson Road
Austin, Texas 78704-5712	San Antonio, Texas 78233-4480
Phone (512) 339-2929	Phone (210) 490-3096
Fax (512) 339-3795	Fax (210) 545-4329

HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556

STATE OF TEXAS
JEFFREY D. MOELLER
86588
LICENSED PROFESSIONAL ENGINEER
6/8/10

WPAP SITE GRADING PLAN
PHASE 6

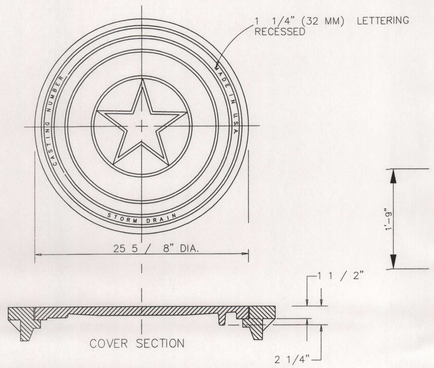
CHRIST OUR KING
ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/8/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: COK001.101

SHEET 6 OF 7

Drawing Name: R:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Grading Plan-Phase 6.dwg User: ingalls Jun 08, 2010 - 11:23am



MANHOLE LID & RING DETAIL

SCALE : NTS

NOTES FOR MANHOLE LID AND RING

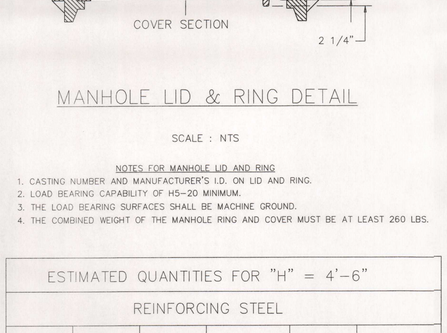
1. CASTING NUMBER AND MANUFACTURER'S I.D. ON LID AND RING.
2. LOAD BEARING CAPABILITY OF H5-20 MINIMUM.
3. THE LOAD BEARING SURFACES SHALL BE MACHINE GROUND.
4. THE COMBINED WEIGHT OF THE MANHOLE RING AND COVER MUST BE AT LEAST 260 LBS.

ESTIMATED QUANTITIES FOR "H" = 4'-6"					
REINFORCING STEEL					
BAR	NO.	SIZE	SPACE	LENGTH	WEIGHT
A	18	4	8"+/-	7'-6 1/2"	79
A 1	10	4	8"+/-	4'-0 1/2"	27
B	4	4	AS SHOWN	5'-7"	15
B 1	20	4	8"+/-	4'-7"	61
C	12	4	9"+/-	18'-6"	148
J	4	4	AS SHOWN	2'-8"	6
TOTAL REINFORCING STEEL					336 Lbs. *
CLASS A CONCRETE					2.10 CY *

* FOR CONTRACTOR'S INFORMATION ONLY.
QUANTITIES VARY WITH "H".
SEE INLET & MANHOLE SUMMARY SHEETS FOR "H".

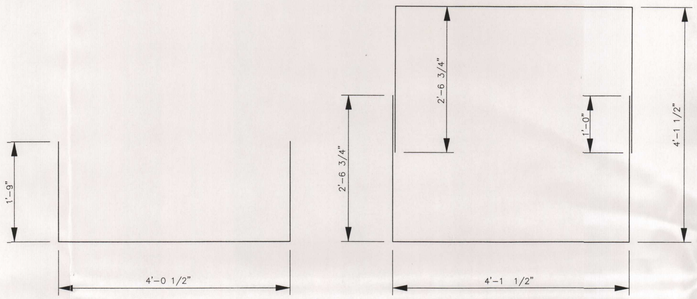
GENERAL NOTES:

1. ALL BARS INTERCEPTING THE RING AND COVER OPENING AND PIPE OPENINGS SHALL BE FIELD CUT
2. CONCRETE SHALL BE CLASS "A", 3000 PSI IN 28 DAYS.
3. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS.
4. ALL EXPOSED CORNERS SHALL HAVE 3/4" CHAMFER
5. PAYMENT FOR ALL EXCAVATION, BACK FILLING, CONCRETE, REINFORCING STEEL, RING, AND COVER SHALL BE INCLUDED IN THE UNIT COST OF ITEM 403 "STORM SEWER JUNCTION BOXES AND INLETS".



TOP SLAB PLAN VIEW

SCALE : NTS

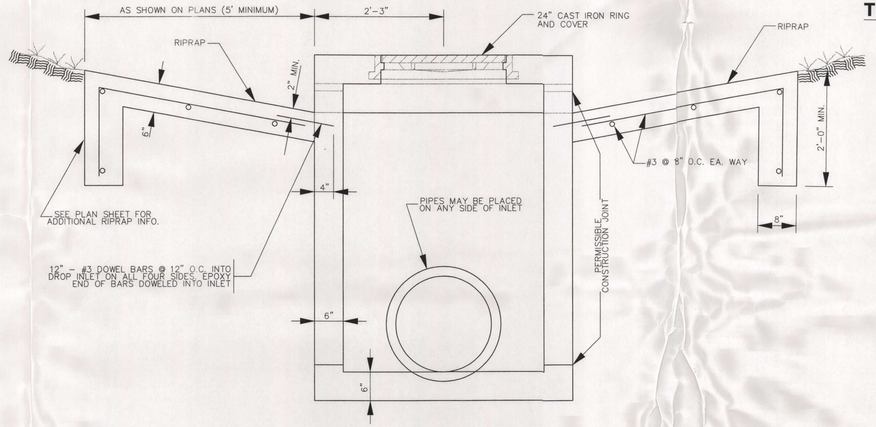


BARS A

SCALE : NTS

BARS C

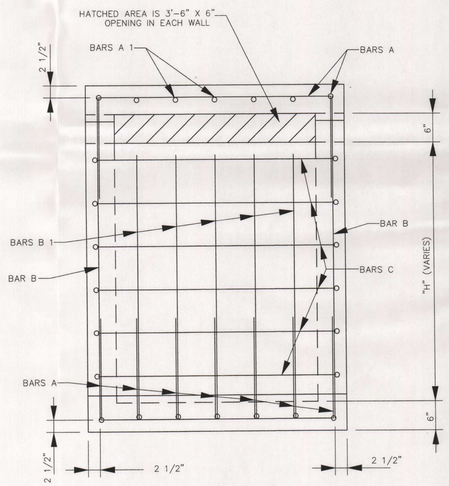
SCALE : NTS



SECTION A-A

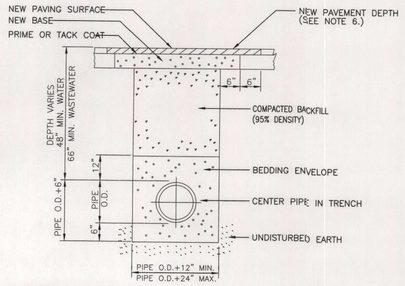
SCALE : NTS

4-WAY INLET DETAIL



SIDE VIEW WALL

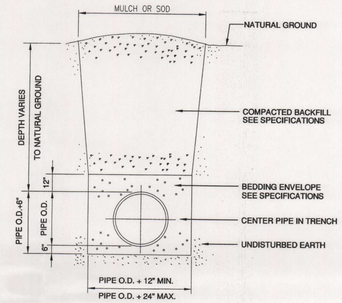
SCALE : NTS



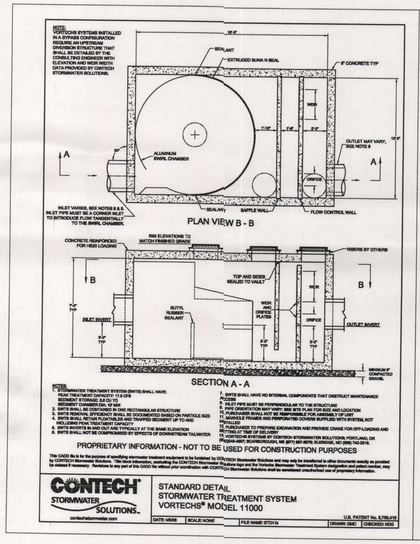
NOTES:

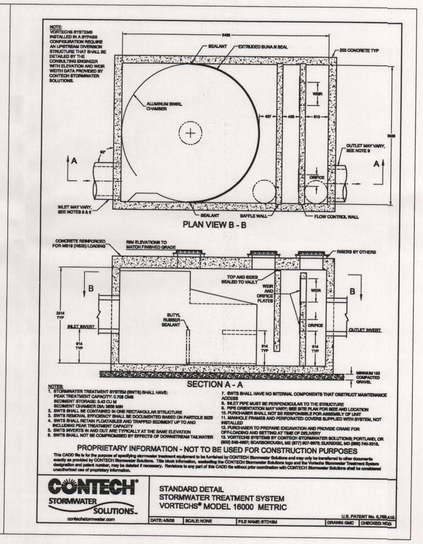
1. IF EXCAVATION AREA IS OPEN FOR TEMPORARY PUBLIC USE THE SURFACE SHALL BE MAINTAINED LEVEL WITH ADJACENT RIDING SURFACE WITH COLD MIX OR TEMPORARY HOT MIX.
2. ROAD BASE AND SURFACE MATERIALS IN THE TRENCH CUT SHALL BE REPLACED IN KIND OF EQUAL THICKNESS, OR MINIMUM BASE THICKNESS OF 10 INCHES, WHICHEVER IS GREATER.
3. ALL DAMAGED AREAS OF PAVEMENT OUTSIDE THE TRENCH CUT SHALL BE REMOVED AND REPLACED WITH MINIMUM OF 8 INCHES OF BASE OR MATCH EXISTING, WHICHEVER IS GREATER.
4. PAVEMENT SECTION SHALL BE CONSTRUCTED AS SHOWN ON THE DETAIL SHEET "TYPICAL PAVEMENT SECTION"

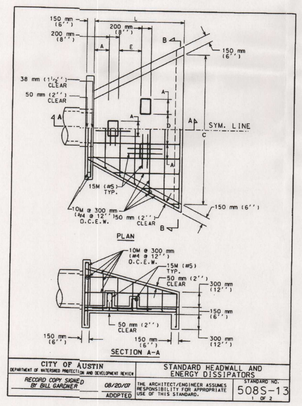
TRENCH DETAIL - PAVED AREAS

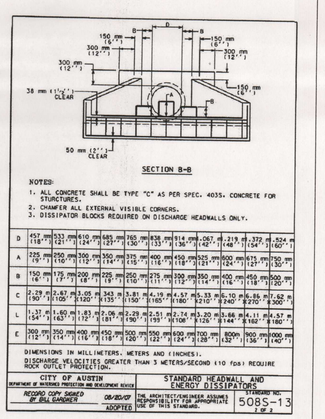


TYPICAL TRENCH WITH UNFINISHED SURFACE

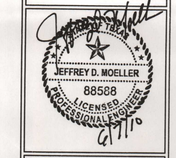








HMT ENGINEERING & SURVEYING
HOLLMIG • MOELLER • THORNHILL
410 N. SEGUIN ST.
NEW BRAUNFELS
TEXAS, 78130
TBPE Firm F-10961
www.hmtnb.com
Ph: 830-625-8555
Fax: 830-625-8556



CONSTRUCTION DETAILS

CHRIST OUR KING
ANGLICAN CHURCH

111 W. SAN ANTONIO ST, SUITE 250
NEW BRAUNFELS, TEXAS 78130

DATE: 6/7/2010
DRAWN BY: JII
DESIGNED BY: JII
CHECKED BY: JOS
REVIEWED BY: JDM
PROJECT NUMBER: CKK001.101

SHEET 7 OF 7

Drawing Name: N:\Projects\Christ Our King Anglican Church\Project Admin\Documents\WPAP\WPAP Grading Plan-Phase 1.dwg User: SchmidtJO Jun 07, 2010 - 12:56pm