PUBLIC ANNOUNCEMENT AND GENERAL INFORMATION

WILLIAMSON COUNTY PURCHASING DEPARTMENT

SOLICITATION

Forest North Drainage Improvements - Bayswater Zone

BIDS MUST BE RECEIVED ON OR BEFORE:
Feb 2, 2016 3:00:00 PM CST
BIDS WILL BE PUBLICLY OPENED:
Feb 2, 2016 3:00:00 PM CST

Notice is hereby given that sealed Bids for the above-mentioned goods and/or services will be accepted by the Williamson County Purchasing Department. Williamson County uses BidSync to distribute and receive bids. Specifications for this IFB may be obtained by registering at www.bidsync.com.

Williamson County prefers and requests electronic submittal of this bid.

All electronic bids must be submitted via: www.bidsync.com

All interested Bidders are invited to submit a Bid in accordance with the Instructions and General Requirements, Bid Format, Bid Specifications, and Definitions, Terms and Conditions stated in this IFB.

Bidders are strongly encouraged to carefully read this entire IFB.

Electronic bids are requested, however paper bids will currently still be received, until further notice and may be mailed or delivered to the address listed below.

Please note that a complete package must be submitted choosing one of the above two methods. Split packages submitted will be considered "unresponsive" and will not be accepted or evaluated.

- ✓ If mailed or delivered in person, Bids and Bid addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the 'Public Announcement and General Information' listed above for this IFB, to:

Williamson County Purchasing Department
Attn: **IFB NAME AND NUMBER**
901 South Austin Avenue
Georgetown, Texas 78626

- ✓ Bidders should list the Bid Number, Bid Name, Name and Address of Bidder, and the Date of the Bid opening on the outside of the box or envelope and note "Sealed Bid Enclosed."
- ✓ Bidder should submit one (1) original; **AND** one (1) CD **OR** (1) USB copy of the Bid.
- ✓ **Williamson County will not accept any Bids received after the submittal deadline, and shall return such Bids unopened to the Bidder.**
- ✓ Williamson County will not accept any responsibility for Bids being delivered by third party carriers.
- ✓ Facsimile transmittals will NOT be accepted.

✓ Bids will be publicly opened and read aloud in the Williamson Purchasing Department at the time and date indicated above.

✓ All submitted questions with their answers will be posted and updated on www.bidsync.com.

✓ It is the Bidder's responsibility to review all documents in BidSync including any addenda that may have been added after the document packet was originally released and posted.

✓ Any addenda and/or other information relevant to the IFB will be posted on www.bidsync.com.

✓ The Williamson County Purchasing Department takes no responsibility to ensure any interested Respondent has obtained any outstanding addenda or additional information.

✓ Williamson County will NOT be responsible for unmarked or improperly marked envelopes.

Bid 1512-037
Forest North Drainage Improvements - Bayswater Zone

Bid Number	**1512-037**
Bid Title	**Forest North Drainage Improvements - Bayswater Zone**
Expected Expenditure	**$245,086.00** (This price is expected - not guaranteed)
Bid Start Date	**In Held**
Bid End Date	**Feb 2, 2016 3:00:00 PM CST**
Question & Answer End Date	**Jan 26, 2016 5:00:00 PM CST**
Bid Contact	**Jewel Walker** **Purchasing Specialist III** **512-943-1692** **jewel.walker@wilco.org**
Contract Duration	**40 days**
Contract Renewal	**Not Applicable**
Prices Good for	**90 days**
Pre-Bid Conference	**Jan 20, 2016 3:00:00 PM CST** **Attendance is mandatory** **Location: Williamson County Road and Bridge** **3151 SE Inner Loop** **Georgetown, TX 78262**

Bid Comments

Williamson County is seeking qualified companies to provide materials, experienced construction crews and equipment to construct the Forest North Drainage Improvements - Bayswater Zone in Austin, Texas.
BID CHECK LIST

If entering an electronic bid in BIDSYNC (PREFERRED), the following documents MUST be completed and attached to FIRST LINE ITEM.

Conflict of Interest Form
References
Pricing: for Bidsync Bid enter total on first line item and attach the Bid Form. For paper bid - complete bid form and submit with other requirements.
Bid Affidavit
Bid Bond

If delivering a paper bid instead of electronic; the above listed documents must be completed and added with the price sheet in a sealed envelope and delivered to: Williamson County Purchasing, 901 South Austin Ave, Georgetown, TX 78626.

BIDS THAT ARE SUBMITTED PARTIALLY ELECTRONIC VIA BIDSYNC, PARTIALLY PAPER WILL BE DISQUALIFIED. Please submit bid entirely electronic or entirely paper.

BID BOND REQUIRED
Bidders are not required to use Surety 2000 for your Bid Bond supplier, however; when bidding electronically in Bidsync and are using Surety 2000, you may import your bid bond directly from the Surety 2000 web site.
To use a different bond provider you MUST:
Scan the completed bond
Download the completed bond to the line item of this bid with your other required documents.
On all bids requiring a bid bond – you MUST supply the bond according to the instructions below or your bid will be disqualified.
All Bids shall be accompanied by either:

a certified cashier's check: payable without recourse to Williamson County and drawn upon a National or State bank in an amount not less than five percent (5%) of the total maximum bid price; OR
A bid bond not less than five percent (5%) of the total maximum bid price, from a surety company authorized to do business in the state of Texas.
For unit price contracts, the total maximum bid price shall be estimated and calculated by multiplying the estimated quantities to the unit bid price;
Bid bonds must be attached to the line item of the electronic bid OR submitted in the same sealed envelope with a paper Bid.
Bids requiring a bid bond and submitted without a cashier's check or a bid bond will not be considered.

TIME OF PERFORMANCE
A time frame of 40 days is given for completion of Plans included in this bid.

LIQUIDATED DAMAGES for failure to substantially complete the work within the allotted time will be applied. The road-user cost Liquidated damages are $200 per calendar day.
PERFORMANCE AND PAYMENT BONDS
To the extent this IFB is for the procurement of a public work contract, the following shall apply:

Chapter 262.032 of the Texas Local Government Code governs the requirements for performance bonds for government entities making public work contracts. A performance bond is required if the contract is in excess of $100,000 and is to be made for the full amount of the contract.

Chapter 2253.021 of the Texas Government Code governs the requirements for payment bonds for government entities making public work contracts. A payment bond is required if the contract is in excess of $25,000 and is to be made for the full amount of the contract.

The bonds are to be executed and delivered to the County prior to issuing Notice to Proceed. The bonds must be executed by a corporate surety or sureties in accordance with the Texas Insurance Code. For unit price contracts, the total contract price shall be estimated and calculated by multiplying the estimated quantities to the Bidder's unit bid price.

If the public works contract is less than $50,000, the performance bond will not be required as long as the contract provides that payment is not due until the work is completed and accepted by the County.

When a Warranty Bond is required it shall be submitted by the Successful Bidder prior to issuing Notice to Proceed, and shall be in the amount of 20 % of the total project construction cost. This Warranty Bond shall be security for the true and faithful performance of all warranties for 1 year from the date of final payment. For unit price contracts, the total project construction cost shall be estimated and calculated by multiplying the estimated quantities to the bidder's unit bid price.

CONTRACT ADMINISTRATION

J. Terron Evertson, P.E. (or successor), Director of Road and Bridge, Williamson County 3151 South East Inner Loop, Suite B, Georgetown, Texas shall serve as Williamson County's Contract Administrator with designated responsibility to ensure compliance with the requirements of the Contract and any ensuing Agreement, such as but not limited to, acceptance, inspection and delivery. The Contract Administrator will serve as liaison between the Williamson County Commissioners Court and the Successful Bidder.

The Successful Bidder agrees to maintain insurance in accordance with this IFB.
Successful Bidder will be required to submit Certificates of Insurance prior to being awarded the Contract. A copy of the issued policy should be submitted to the Purchasing Department within 60 days of the contract award date.

All certificates of insurance coverage as specified below must be provided to Williamson County at the following address:

Williamson County
901 South Austin Avenue
Georgetown, Texas 78626

Failure to comply with these Insurance Requirements may result in the termination of the Contract and any ensuing Agreement between the Successful Bidder and County.

By signing its Bid, the Successful Bidder agrees to maintain at all times during any term of the Contract and any ensuing Agreement, at Successful Bidder's cost, insurance in accordance with this provision.

The following coverage limits shall be required at a minimum:

Worker's Compensation	**Statutory – Texas Law**
Employer's Liability:	
Bodily Injury by Accident	**$500,000 Ea. Accident**
Bodily Injury by Disease	**$500,000 Ea. Employee**
Bodily Injury by Disease	**$500,000 Policy Limit**

Comprehensive general liability including completed operations and contractual liability insurance for bodily injury, death, or property damages in the following amounts:

COVERAGE	**PER PERSON**	**PER OCCURRENCE**
Comprehensive General Liability	**$1,000,000**	**$1,000,000**

Aggregate policy limits: $1,000,000

Comprehensive automobile and auto liability insurance (covering owned, hired, leased and non-owned vehicles):

COVERAGE	**PER PERSON**	**PER OCCURRENCE**
Bodily injury (including death)	**$1,000,000**	**$1,000,000**
Property damage	**$1,000,000**	**$1,000,000**
Aggregate policy limits:	**No aggregate limit**	

E. Umbrella Coverage: $1,000,000

Successful Bidder's property will not be covered by any insurance that may be carried by Williamson County. Successful Bidder assumes the risk of loss on its contents and property that are situated on/in/around Williamson County property. The Successful Bidder is strongly encouraged to obtain insurance on its property to the extent deemed necessary by the Successful Bidder.

The deductible for an insurance policy required hereunder shall not exceed $100,000. Williamson County shall be named as an additional insured under any policy of insurance required hereunder.

Successful Bidder shall not commence any work until it has obtained all required insurance and such insurance has been approved by County. Successful Bidder shall not allow any subcontractor(s) to commence work to be performed in until all required insurance has been obtained by such subcontractor (s) and approved by County. Approval of the insurance by County shall not relieve or decrease the liability of Successful Bidder or its subcontractor(s) hereunder.

The required insurance must be written by a company approved to do business in the State of Texas with a financial standing of at least an A- rating, as reflected in Best's insurance ratings or by a similar rating system recognized within the insurance industry at the time the policy is issued. Successful Bidder shall furnish County with a certification of coverage issued by the insurer. Successful Bidder shall not cause any insurance to be canceled nor permit any insurance to lapse. ALL INSURANCE CERTIFICATES SHALL INCLUDE A CLAUSE TO THE EFFECT THAT THE POLICY SHALL NOT BE CANCELED OR REDUCED, RESTRICTED OR LIMITED UNTIL TEN (10) CALENDAR DAYS AFTER COUNTY HAS RECEIVED WRITTEN NOTICE AS EVIDENCED BY RETURN RECEIPT OF REGISTERED OR CERTIFIED LETTER.

It is the intention of the County, and agreed to and hereby acknowledged by the Successful Bidder, that no provision of this Contract or any ensuing Agreement shall be construed to require the County to submit to mandatory arbitration or mediation in the settlement of any claim, cause of action or dispute, except as specifically required in direct connection with an insurance claim or threat of claim under an insurance policy required hereunder which absolutely requires arbitration or mediation of such claim, or as otherwise required by law or a court of law with jurisdiction over the provisions of this Contract or any

ensuing Agreement.

WORKERS' COMPENSATION COVERAGE REQUIREMENTS

The Texas Labor Code, §406.096, requires workers' compensation insurance coverage for all persons providing services on a building or construction project for a governmental entity such as Williamson County. The rule requires Williamson County to timely obtain certificates of coverage and retain them for the duration of the project. The rule also sets out the language to be included in the Bid specifications and in contracts awarded by a governmental entity and the information required to be in the posted notice to employees. The rule is adopted under the Texas Labor Code, §402.061.

Item Response Form

Item	**1512-037--01-01 - ENTER TOTAL PRICE, ATTACH ALL DOCUMENTS AND BID FORM HERE**
Quantity	**1 each**
Unit Price	
Delivery Location	**Williamson County, Texas** Purchasing Department 901 S. Austin Avenue Georgetown TX 78626 **Qty** 1 **Expected Expenditure** $245,086.00

Description
ENTER TOTAL BID PRICE, ATTACH BID FORM AND THE FOLLOWING DOCUMENTS HERE :
Conflict of Interest Form
References
Completed Bid Form
Bid Affidavit
Bid Bond

WILLIAMSON COUNTY
PROJECT CONSTRUCTION MANUAL

FOR
FOREST NORTH DRAINAGE IMPROVEMENTS
Bayswater Zone

Bid No. _____

Bid Date: <TBD>
Bid Time: <TBD>

Williamson County, Texas
Purchasing Department
901 South Austin Avenue
Georgetown, TX 78626

September 2015

ENGINEER SEAL

09/15/2015

The enclosed Texas Department of Transportation Specifications, Special Specifications, Special Provisions, General Notes and Specification Data in this document have been selected by me, or under my responsible supervision as being applicable to this project. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

FOREST NORTH DRAINAGE IMPROVEMENTS – BAYSWATER ZONE
WILLIAMSON COUNTY
GOVERNING SPECIFICATIONS
(STANDARD SPECIFICATIONS, SPECIAL PROVISIONS, AND SPECIAL SPECIFICATIONS)

WHERE DISCREPANCIES OCCUR BETWEEN THE TECHNICAL SPECIFICATIONS, THE FOLLOWING DESCENDING ORDER OF PRIORITY SHALL GOVERN: (1) SPECIAL CONDITIONS, (2) SPECIAL PROVISIONS TO SPECIAL SPECIFICATIONS, (3) SPECIAL SPECIFICATIONS, (4) SPECIAL PROVISIONS, AND (5) STANDARD SPECIFICATIONS.

ALL SPECIFICATIONS AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT ARE IDENTIFIED AS FOLLOWS:

STANDARD SPECIFICATIONS: ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION NOVEMBER 1, 2014. STANDARD SPECIFICATIONS ARE INCORPORATED INTO THE CONTRACT BY REFERENCE.

< > REFERENCE ITEMS NOT USED ON THIS CONTRACT
( ) REFERENCE ITEMS USED ON THIS CONTRACT

ITEMS 1 - 9 ARE SUPERSEDED BY THE CONTRACT GENERAL AND SPECIAL CONDITIONS, WHERE APPLICABLE. WHEREVER, IN THE TXDOT STANDARD SPECIFICATIONS, REFERENCE IS MADE TO THE STATE OF TEXAS, THE DEPARTMENT AND ITS REPRESENTATIVES, SUCH REFERENCE SHALL BE TAKEN TO MEAN WILLIAMSON COUNTY AND ITS REPRESENTATIVES.

ITEM 100 PREPARING RIGHT OF WAY <103>
ITEM 110 EXCAVATION (132)
ITEM 132 EMBANKMENT (100) <204> <210><216>(400)
ITEM 160 FURNISHING AND PLACING TOPSOIL
ITEM 161 COMPOST (160)
ITEM 164 SEEDING FOR EROSION CONTROL <162><166>(168)
ITEM 168 VEGETATIVE WATERING
ITEM 169 SOIL RETENTION BLANKET
ITEM 400 EXCAVATION AND BACKFILL FOR STRUCTURES (132)<401><420><421>
ITEM 420 CONCRETE STRUCTURES
ITEM 432 RIPRAP (420)(421)(427)(440)
ITEM 462 CONCRETE BOX CULVERTS AND DRAINS (400)<420><421><424><440>(464)
ITEM 464 REINFORCED CONCRETE PIPE (400)
ITEM 466 HEADWALLS AND WINGWALLS (400)<420><421><430><440>(464)
ITEM 467 SAFETY END TREATMENT (400)<420><421><430>(432)<440>(464)
ITEM 496 REMOVING STRUCTURES <430>
ITEM 500 MOBILIZATION
ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING
ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS
ITEM 530 INTERSECTIONS, DRIVEWAYS AND TURNOUTS <247><260><263><275><276> <292><316><330><334><340><360><421><440>
ITEM 531 SIDEWALKS <104><360><420><421><440>(530)
ITEM 560 MAILBOX ASSEMBLIES
ITEM 644 SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES <421><440><441><442><445><634><636><643><656>
ITEM 752 TREE AND BRUSH REMOVAL
ITEM 760 CLEANING AND RESHAPING DITCHES

STANDARD SPECIFICATIONS: MOST CURRENT VERSION ADOPTED BY THE CITY OF AUSTIN

ITEM 701S FENCING <403S>

SPECIAL PROVISIONS: THE CONTENT OF THE SPECIAL PROVISIONS ARE INCLUDED ON THE FOLLOWING PAGES.

SPECIAL PROVISION TO ITEM 002 002-WC2

SPECIAL SPECIFICATIONS: THE CONTENT OF THE SPECIAL SPECIFICATIONS ARE INCLUDED ON THE FOLLOWING PAGES.

ITEM SS1004 TREE PROTECTION
ITEM SS2241 IRRIGATION SYSTEM CAPPING

GENERAL: THE ABOVE-LISTED SPECIFICATION ITEMS ARE THOSE UNDER WHICH PAYMENT IS TO BE MADE. THESE, TOGETHER WITH SUCH OTHER PERTINENT ITEMS, IF ANY, AS MAY BE REFERRED TO IN THE ABOVE-LISTED SPECIFICATION ITEMS, AND INCLUDING THE SPECIAL PROVISIONS AND SPECIAL SPECIFICATIONS LISTED ABOVE, CONSTITUTE THE COMPLETE SPECIFICATIONS FOR THIS PROJECT.

ATTACHMENT A UTILITY ADJUSTMENT EXHIBITS

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

Definition of Terms

County: Williamson County acting through the Road and Bridge Division.

Contractor: Successful bidder of the attached Invitation for Bid.

Engineer: Williamson County Director of Road and Bridge or designee.

Inspector: Engineer's designee assigned full, or part, time to the contractor's crew for the oversight of the work.

Specifications: Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges 2014.

TxDOT: Texas Department of Transportation

Working Day: Monday through Friday (excluding County approved holidays), if weather permits the performance of the contract (as determined by the inspector) for a continuous period of at least 6 hrs. (excluding lunch) between 8:00 A.M. and 5:00 P.M.

Control of Materials

Source Control. The Contractor shall use only materials that meet Contract requirements. Unless otherwise specified or approved by the Engineer, the Contractor shall use new materials for the work. The Contractor shall secure the Engineer's approval of the proposed source of materials to be used before their delivery to the site. Materials can be approved by the Engineer at a supply source or staging area but may be re-inspected at the job site. Contractor shall be responsible for cost of additional sampling and testing if material source changes.

Material Quality. It is the Contractor's responsibility to correct or remove materials that fail to meet the contract requirements.

Materials not meeting Contract requirements will be rejected, unless the Engineer approves corrective actions. Upon rejection by the Engineer, the Contractor must immediately remove and replace rejected materials.

If the Contractor does not comply with this Article, the County may remove and replace defective material. The cost of testing, removal, and replacement will be deducted from invoice submitted to the County.

Manufacturer Warranties. Contractor shall transfer to the County warranties and guarantees required by the Contract, from Contractor sources, or received as part of normal trade practice.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

Plant Inspection and Testing. The Engineer may, but is not obligated to, inspect materials at the acquisition or manufacturing source. Material samples will be obtained and tested for compliance with quality requirements. Materials produced under County inspection are for County use only unless released in writing by the Engineer.

If inspection is at the plant, Contractor shall meet the following conditions unless otherwise specified:

- Cooperate fully and assist the Engineer during the inspection.
- Ensure the Engineer has full access to all parts of the plant used to manufacture or produce materials.
- In accordance with pertinent items and the Contract, provide a facility at the plant for use by the Engineer as an office or laboratory.

The Engineer may provide inspection for periods other than daylight hours if:

- Continuous production of materials for County use is necessary due to the production volume being handled at the plant, and
- The lighting is adequate to allow satisfactory inspection.

The Contractor shall provide copies of all test results to the County and the Engineer prior to the County's acceptance of improvements.

The Contractor shall coordinate with the County's field representative 48 hours prior to schedule density testing. The County's field representative shall witness all testing.

BASIS OF ESTIMATE & GENERAL NOTES:

Specification Data
Basis of Estimate

Item	Description	Rate **	Basis	Quantity
160	Topsoil	1 CY/9 SY	627 CY	5,643 SY
161	Compost	1 CY/12 SY	470 CY	5,643 SY
164	Seed for Erosn Cont	4840 SY/AC	1.17 AC	5,643 SY
168	Veg Watering			
	(Item 164) Perm	20 GAL/SY	5,643 SY	855 MG
	(Item 164) Temp	10 GAL/SY	5,643 SY	428 MG

** For Informational Purposes Only

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

GENERAL NOTES

All work performed and all products furnished under the provision of the contract shall comply with requirements which pertain to the various items of work included herein as *Standard Specification for Construction of Highways, Streets and Bridges* of the Texas Department of Transportation, adopted November 1, 2014, and as amended and/or updated, which is incorporated herein by reference for all purposes. In the event that any specification set out herein conflicts with said TxDOT specifications, the specification set out herein shall control and govern.

The Contractor will be given written Notice to Proceed on this project. The overlay project shall begin within five (5) working days after such notification and shall continue for thirty (30) working days.

Once work begins, Contractor shall continuously execute the work until completion, unless otherwise directed by Engineer.

The Contractor shall determine the exact location of all existing utilities before commencing work, and is fully responsible for any and all damages associated by Contractor's failure to locate and preserve utilities.

All construction equipment involved in roadway work shall be equipped with a permanently mounted 360 degree revolving or strobe warning light with amber lens. This light shall have a minimum lens height of 5 inches and a diameter of 5 inches. This light shall have a mounting height of not less than 6 feet above the roadway surface and shall be visible from all sides. this equipment shall also have attached at each side of the rear end of the vehicle an approved orange warning flag mounted not less than 6 feet above the roadway surface.

The actual quantity required may be varied from the estimated quantities in the contract. The Contractor shall be compensated for completed work based on actual quantities per bid item.

If multiple days are required to complete work, Contractor shall not leave work in hazardous conditions, as determined by the engineer.

Do not park equipment or make stockpiles where driver sight distance to businesses and side street intersections is obstructed, especially after work hours. If it is necessary to park where driver's views are blocked, Contractor shall make every effort to flag traffic accordingly. Give the travelling public first priority.

The Contractor shall be responsible for marking every 100 foot station, and shall maintain the markings for the duration of the project. This work shall be considered subsidiary to the various bid items.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

An English-speaking superintendent shall be available on the project at all times when work is being performed. The Contractor shall provide the construction inspector with contact information for the superintendent.

If any significant recharge features, such as sinkholes, caves, or any other subterranean openings are discovered during construction or core sampling, all activities near the feature must be immediately suspended. The construction inspector must be contacted for evaluation. The discovery may require TCEQ review and approval for the methods proposed to protect the aquifer from any potential adverse impacts.

Construction vehicles may be restricted from traversing or utilizing existing roadways, unprotected construction areas, and areas with vegetative cover, as determined by the construction inspector.

Contractor's equipment and vehicles shall not be maintained on-site during construction, except at designated maintenance sites as approved by the construction inspector.

Any soils contaminated during construction of the proposed project shall be transported from the site and properly disposed of off-site, off the contributing zone, and off any draining to the recharge zone of the Edwards Aquifer. Payment for this work shall be considered subsidiary to the pertinent bid items.

Contractor shall provide at least one portable restroom near the work site(s) at all times in order to provide a bathroom to individuals providing work hereunder. Contractor shall monitor and prevent its employees and any of its subcontractors that are providing work on the project from urinating or defecating on property in, on or adjacent to the areas in which work is being performed.

Contractor shall maintain positive drainage for permanent and temporary site conditions for duration of project.

Contractor shall comply with insurance requirements dictated within this contract.

Weekend and holiday work is allowed with prior approval by engineer.

The Contractor shall perform work during appropriate weather conditions, unless otherwise directed by engineer. If work is performed at the Contractor's option during, or prior to, inclement weather conditions and the work is damaged, the Contractor is responsible for all costs associated with replacing the work.

ABOVE-GROUND STORAGE TANKS

Shall not be permitted.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

BLASTING

No Blasting will be allowed on the project.

ENTRY INTO AND PROTECTION OF ADJACENT PROPERTIES

Design of this project did not contemplate a need to enter adjacent properties except where either permanent or temporary working easements are shown on the Plans. Should it be necessary during construction of the work to enter on adjacent properties, the County shall be notified. The Contractor shall be responsible for all arrangements to enter and shall be liable for repair of fences and restoration of any property damage outside of the right of way and easements shown in the plans.

The Contractor shall access the Lake Creek Channel at the designated maintenance access ramps. Access to the right of way and easements adjacent to private property shall be coordinated with the adjacent property owner at least 48 hours in advance.

LOCATION AND PROTECTION OF UTILITIES

Notwithstanding any other provision of this Contract, the Contractor shall be solely responsible for the location and protection of any and all public and/or private utility lines and utility customer service lines in the work area. The Contractor shall exercise due care to locate and to mark, uncover or otherwise protect all such lines in the construction zone and any of the Contractor's work or storage areas. Upon request, the County may provide such information that it has about the location and grade of water, gas, telephone, cable TV and electric lines and other utilities in the work area, but such information shall not relieve or be deemed to be in satisfaction of the Contractor's obligation hereunder, which shall be primary and nondelegable. Any such lines damaged by the Contractor's operations shall be immediately repaired by the Contractor or he shall cause such damage to be repaired at his expense. Contractor shall contact Dig-Tess at 1-800-344-8377, for utility verification, prior to beginning construction.

SURPLUS MATERIAL

Excavated or surplus natural soil and rock material, unless otherwise noted in the Plans or Specifications, shall be known as "spoil" and properly disposed of by the Contractor off-site at his sole expense. Any permits necessary for the disposal of such material shall be acquired by the Contractor at his expense.

Any surplus material defined as "solid waste" under the Texas Commission on Environmental Quality Municipal Solid Waste Regulations shall be disposed of in compliance with all applicable solid waste management regulations.

Final cleanup will include the removal of excess material considered detrimental to vegetation growth within the working area. Materials such as excess concrete and other materials, as specified by the Engineer, will be removed at the Contractor’s expense.

RESTORATION/REVEGETATION

All disturbed areas within the right of way, easements, and limits of construction shall be restored. Restoration shall include all topsoil, seeding/sodding, watering, fertilizer, labor and equipment necessary to complete the project in accordance with the Plans and Specifications.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

Restoration shall be installed and vegetation established prior to final acceptance of the project, or as approved by the County.

Care shall be exercised to prevent damage to all property in and around the construction zone. The Contractor shall be liable for the repair and restoration of any property damaged as a result of the Contractor's prosecution of the work. This shall include, but is not limited to, revegetation of all areas damaged or destroyed by construction. Contractor will be held liable and responsible for such areas until growth is reestablished to the satisfaction of the County.

Ornamental landscape plantings of trees, shrubs and grasses that are damaged or destroyed during construction shall be replaced with plant material of comparable size and quality approved by the County.

Revegetation measures will begin as soon as practical. The County reserves the right to require the immediate installation of revegetation measures whenever deemed necessary.

The County reserves the right to require additional revegetation measures deemed necessary at any time after construction has begun until the County has accepted the erosion control measures and revegetation measures.

The Contractor shall be responsible for maintaining, repairing or replacing all erosion control devices as may be directed by the Construction Inspector. This work will be considered subsidiary to the various bid items.

Item 100

The Contractor shall notify the Construction Inspector prior to clearing operations. Upon notification, the observer will schedule a walk-through with the Contractor and designate all trees and other features to be protected during construction. The Contractor shall not begin any clearing of the right-of-way prior to this walk-through. The designated trees shall be protected in accordance with the plans and specifications, or as directed by the inspector. No fences shall be removed without notification to the observer.

Removal of any obstructions on the right of way that are not shown on the plans is included under preparing right of way. The inspector shall be notified prior to removal of obstructions. All right-of-way clearing operations will be coordinated with the project's SW3P and as directed or approved by the construction observer.

The Contractor may be required to trim and remove brush and trees in order to construct the project or to provide a horizontal clearance of approximately 2 feet inside the right-of-way line and a vertical clearance of at least 12 feet. For this operation, no vertical flailing equipment shall be used and the method shall be approved by the Construction Observer.

Burning of brush will not be permitted, unless otherwise directed by the County.

The Contractor is responsible for plugging and capping all irrigation systems at the right-of-way line. The Contractor shall notify the property owner at least 48-hours in advance of performing modifications to irrigation systems.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

Item 110
Excavation quantities are measured to the bottom of the topsoil (4" below the proposed grade). To the extent possible, all existing topsoil shall be salvaged, stockpiled and redistributed to the graded areas.

Item 132
All materials brought to project site shall have a maximum P.I. of 25 and minimum P.I. of 6. Borrow sources shall be submitted and approved by observer prior to delivery to project. The Engineer must approve the embankment material before use on the project.

Embankment quantities are measured to the bottom of the topsoil (4" below the proposed grade). To the extent possible, all existing topsoil shall be salvaged, stockpiled and redistributed to the graded areas.

Item 160
The Construction Observer shall be notified to inspect all topsoil sources before digging begins. All off-site topsoil shall have a minimum PI of 20. The actual depth of the topsoil source shall be as approved by the construction observer. Topsoil shall comply with the requirements of item 20-1 of the Williamson County Protocol for sustainable roadsides.

Item 161 and Item 164
Compost, mulch and seed mixtures shall comply with the requirements of the Williamson County protocol for sustainable roadsides. Apply 3" of erosion control compost (ECC) on top of 4" of topsoil in all areas to be revegetated, unless otherwise directed. Install topsoil at proposed grade and place ECC above proposed grade.

Item 168
The Contractor shall obtain water at a source that is metered or shall furnish the manufacturer's specifications showing tank capacity for each truck used. The Contractor shall notify the Construction Observer prior to watering so that the Construction Observer may verify meter readings or truck counts. Water all areas of the project to be seeded or sodded. Maintain the seed bed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of 1/2 –inch or greater, but shall be resumed before the soil dries out, continue watering until final acceptance. County is not responsible for the source of water to be used on the project even during a drought condition. Watering rates shall comply with the requirements of the Williamson County protocol for sustainable roadsides.

Item 400
Any adjustments or changes made to a job mix formula must be submitted and approved prior to production of the new job mix formula. No RAP or RAS will be allowed in asphalt mix. Maximum lifts for level-up at culverts is 2-inches. Temporary pavement will be subsidiary to the Cut & Restore Pavement pay item.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

Item 432
Typical concrete riprap shall be placed at a 5" thickness or as directed by the Engineer.

Item 462
If pre-cast units are used, the fill material between the boxes shall consist of concrete aggregate with two sacks of Portland Cement per cubic yard (two sack concrete). The two sacks of cement are part of the box culvert work and will not be paid for directly.

Item 466
Removal of existing headwalls will not be paid for directly, but will be considered subsidiary to the pertinent bid items.

Item 467
Contractor shall cut extruding pipe ends, in the field, to match roadway or driveway side slope and shall use asphalt based paint on cut end.

Item 496
If necessary, Contractor shall perform traffic control for any structure removal, as directed by the Engineer.

Item 502
Traffic control plans shown within these plans are a minimum requirement. The contractor shall be responsible for any additional signs, barricades, flagmen or other traffic control devices as necessary for the safety of the traveling public. All traffic control deveices shall be compliant with the current Texas Manual of Uniform Traffic Control Devices.

Necessary barricades, sufficient lighting, signage and other traffic control methods as may be necessary for the protection and safety of the public shall be provided by the Contractor and maintained during the construction process. Any open trenches shall be covered and protected overnight as needed. The traffic control shall be adjusted in the morning prior to beginning any work.

The Contractor shall notify the County when any traffic control changes are to be made. The notification must be made TWO DAYS prior to any change.

The Contractor shall provide all traffic control measures to prosecute the work in conformance with the Texas Manual on Uniform Traffic Control Devices, latest edition.

The Contractor will be required to maintain a minimum of one through lane in each direction during daylight hours on all roadways, except with written approval by the Inspector. Two lane roadways shall use single lane traffic control, which will require the use of flagmen. This shall not be paid for directly, but shall be considered subsidiary. Flaggers must comply with all

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

requirements outlined in TxDOT specification Item 502.2B. The Contractor shall notify the County 48 hours prior to any closures. Lane closures are restricted to 9:00 A.M. to 4:30 P.M.

Access to all side streets and driveways shall be maintained at all times by the Contractor. The Contractor shall maintain 3:1 safety slopes on drop-offs greater than 2-inches that are adjacent to traffic.

The Contractor's crew leader shall be a competent person who will be responsible and available on the project site or in the immediate area to insure compliance with the TCP.

Advanced warning signs shall be in compliance with TxDOT standard specifications and standards.

Item 530
Notify property owners a minimum of 48 hours in advance of beginning work on their driveways. Provide, to the County, a list of each notification and contact prior to each closure.

Provide access, at all times, to adjacent property. Construct driveways one-half sections, to allow access. Do not completely close driveways for reconstruction purposes, unless a reasonable alternate access exists to the property, as approved.

Item 531
Notify property owners who utilize access of sidewalk 48-hours in advance of proposed work. Access to property must be provided at all times by the Contractor. Construction of sidewalks shall be in accordance with the TxDOT standards.

Item 560
Contractor shall coordinate the locations of temporary mailboxes with the Engineer and homeowner. All temporary products shall match the setup approved by the Engineer. This work shall be considered subsidiary to the installation of the proposed mailbox.

Contractor shall replace all mailboxes disturbed by the work with the existing mailboxes removed or with mailboxes approved by the Engineer. This work shall be coordinated with the sequence of construction within the plan set. All permanent replacement products used shall match the existing mailboxes removed or be replaced with Gibraltar mailboxes Freemont post mount mailbox and post kit model #FC000B01 or equivalent approved by the Engineer.

Item 644
All small signs not detailed in the plans shall be built in accordance with the latest edition of the Standard Highway Sign Designs for Texas. Where a sign size or particular legend is shown and such sign size or legend is not shown in the publication, the Contractor shall furnish the sign as detailed in the plans.

Project Number: < >

County: Williamson

Project Name: Forest North Drainage Improvements - Bayswater

All existing regulatory signs must remain displayed at all times unless the roadway is closed to traffic.

The Contractor shall be responsible for removing and replacing any signs that are in the way of construction. Existing signs and sign posts that are in good condition can be replaced with a new triangular slipbase per TxDOT detail. A complete new sign assembly will be required if sign is damaged or at the direction of the Engineer. Sign mounting height shall comply with TxDOT standards.

County: Williamson
Project No.
Roadway: Forest North
Limits: Bayswater

SPECIAL PROVISION
002---WC2
UTILITIES

IMPORTANT NOTICE TO CONTRACTORS

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT THERE MAY BE SOME OUTSTANDING UTILITY ADJUSTMENTS AS OF SEPTEMBER 15, 2015 REQUIRED FOR THE CONSTRUCTION OF THIS PROJECT. THE COUNTY ANTICIPATES THAT THESE UTILITY ADJUSTMENTS WILL BE COMPLETED AS SHOWN.

THE CONTRACTOR IS INVITED TO REVIEW THE OUTSTANDING UTILITY ADJUSTMENTS WITH THE ENGINEER ASSIGNED TO THIS PROJECT AND LISTED IN THE "NOTICE TO CONTRACTORS." AN EXTENSION OF WORK TIME MAY BE GRANTED, AS NECESSARY, FOR DELAYS CAUSED BY UTILITY INTERFERENCE WITH THIS WORK.

THE UTILITIES ARE TO BE ADJUSTED BY THEIR OWNERS AND ARE TO BE COMPLETED AS SHOWN IN THE ATTACHED. THE APPROXIMATE LOCATION IS BASED ON THE PROJECT CENTERLINE/BASELINE STATIONING.

check this

Special Specification 1004
Tree Protection

1. DESCRIPTION

Install tree protection as shown on the plans or as directed.

2. MATERIALS

Furnish materials in accordance with the plans.

3. CONSTRUCTION

Use construction methods in accordance with the plans.

4. MEASUREMENT

This Item will be measured by the acres of trees protected or by each tree protected.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Tree Protection." This price is full compensation for furnishing all materials, equipment, labor, and incidentals.

SPECIAL SPECIFICATION SS2241

IRRIGATION SYSTEM CAPPING

PART 1: GENERAL

1.01 DESCRIPTION

A. Installation and materials necessary to cap existing irrigation systems at the right-of-way.

PART 2: EXECUTION

2.01 CONSTRUCTION

A. All irrigation system piping encountered within the project area shall be cut at the right-of-way line and capped. All materials shall be disposed of per contract.

PART 3: MEASUREMENT & PAYMENT METHOD

3.01 MEASUREMENT

A. Irrigation system capping will be measured by each property.

3.02 PAYMENT

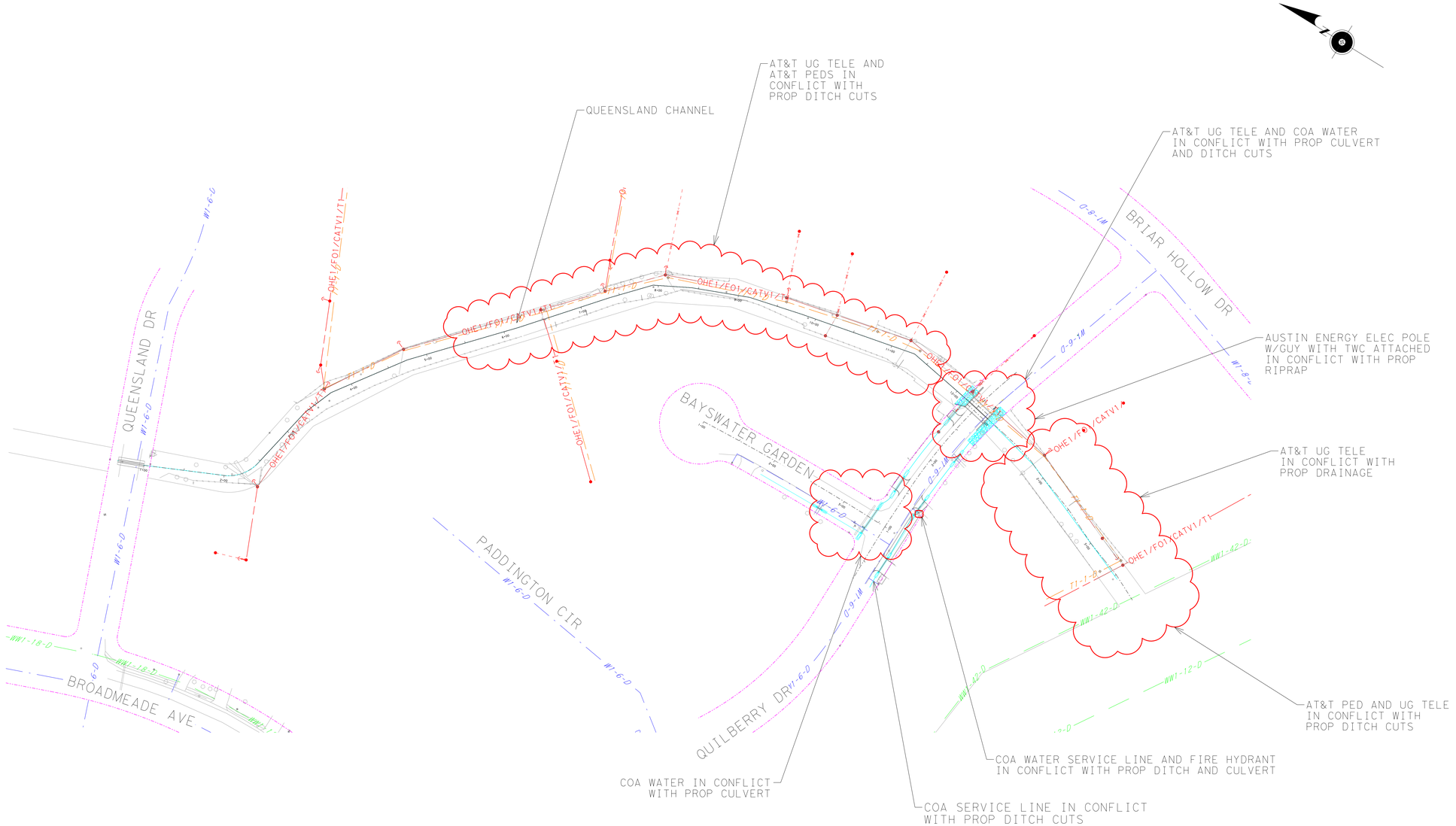
A. The work performed and the materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Irrigation System Capping”. This price is full compensation for furnishing materials.

ATTACHMENT A

UTILITY ADJUSTMENT EXHIBITS

Williamson County, Texas
Williamson County
Utility Tracking Report

SUE #	SUE Symbol	Utility Company	Facility Description	Location of Possible Conflict				Type Parallel / Crossing	Treatment of Utility					Comments
				Street / Channel	Begin STA	End STA	Conflict Problem		No Conflict	Protect	Abandon	Relocate	Adjust in Place	
		City of Austin	Water	Queensland Drive	None	None	culvert - existing	Lateral R		X				Protect water line under current culvert.
		City of Austin	Water	Queensland Channel South	+90	+90	culvert C-8	Crossing				X		Water line in conflict with prop culvert. Culvert has a FL of 880.50' and the top of the pipe is at elevation 879.38' which leaves a clearance of less than 0.5'. Pipe needs to be relocated. Pipe is DI under the existing culvert.
		City of Austin	Water	Bayswater Garden	3+50	3+50	culvert C-7	Crossing		?		X		Water line in conflict with prop culvert. Culvert has a FL of 882.43 and top of pipe was found to be at elev 880.79. This line has approximately 1.39' of clearance. This line may be able to be protected, but may need to be relocated. Need confirmation from COA if to remain.
		City of Austin	Water	Quilberry Dr	1+30	1+30	Hydrant and water line in conflict with prop. Ditch cut	Lateral R				X		Hydrant and water line in conflict with prop ditch cut channel BW4
		City of Austin	Water	Quilberry Dr	+35	+35	Water line in conflict with prop. Ditch cut	Lateral R				X		Service water line to water meter and valve in conflict with prop ditch cut channel BW4-1
		Austin Energy	Electric	Quilberry Dr	2+50	2+50	ditch cut / concrete rip rap	Lateral L				X		Pole in proposed ditch cut of 1.5' with concrete rip rap. TWC is attached to this pole'.
		Austin Energy	Electric	Queensland Channel North/Quilberry Dr	1+15		culvert C-8 riprap	Lateral L				X		Pole in conflict with proposed riprap
		TWC	CATV	Quilberry Dr	2+50	2+50	ditch cut / concrete rip rap	Lateral L				X		Pole in proposed ditch cut of 1.5' with concrete rip rap. TWC on Austin Energy pole.
		ATT	Tele	Queensland Channel South	1+00	3+50	UG tele in conflict with prop ditch cuts	Lateral L				X		UG line in conflict with propsed ditch cuts.
		ATT	Tele	Queensland Channel North	3+60	12+00	UG tele in conflict with prop ditch cuts	Parallel				X		UG tele in conflict with prop ditch cuts channel BW2.
		ATT	Tele	Queensland Channel North	3+60	11+30	Tele Ped in conflict with prop ditch cut	Lateral L				X		Tele peds in conflict with prop ditch cuts channel BW2.
		ATT	Tele	Queensland Channel South	+50	1+10	Ug tele in conflct with prop culvert	Parallel				X		UG tele in conflict with prop culvert c-8
		ATT	Tele	Queenslans Channel South	1+10	3+00	UG tele in conflict with prop ditch cuts	Parallel				X		UG tele in conflict with prop ditch cuts channel bw1.
		ATT	Tele	Queensland Channel South	3+40	3+40	UG tele in conflcit with prop ditch cuts.	Crossing				X		UG tele in conflict with prop ditch cuts.
		ATT	Tele	Queensland Channel South	3+40	3+40	Tele Ped in conflict with prop ditch cut	Lateral R				X		two Peds in conflict with prop ditch cut.



0′ 50′ 100′
SCALE IN FEET

LEGEND

- EXISTING ROADWAY
- EXISTING ROW
- PROPOSED DRAINAGE
- PROPOSED PAVEMENT
- OHE1/FO1/CATV1/T1 — EXIST OVERHEAD AUSTIN ENERGY TWC
- OHC-1 — EXIST OVERHEAD TWC
- OHC-2 — EXIST GRANDE
- OHT-1 — EXIST OVERHEAD TELE ATT
- OHE-1 — EXIST OVERHEAD AUSTIN ENERGY
- W1-4-D — EXIST WATER COA 4"
- W1-6-D — EXIST WATER COA 6"
- W1-8-D — EXIST WATER COA 8"
- W1-12-D — EXIST WATER COA 12"
- EXIST WATER COA ABANDONED PER RECORDS
- EXIST WASTEWATER COA ABANDONED PER RECORDS
- WW1-8-D — EXIST WASTEWATER COA 8"
- WW1-10-D — EXIST WASTEWATER COA 10"
- WW1-12-D — EXIST WASTEWATER COA 12"
- G1-1-D — EXIST GAS ATMOS
- E1-1-D — EXIST UG ELECTRIC AE
- T1-1-D — EXIST ATT UNDERGROUND TELE

QUALITY LEVELS

Quality Level "D"- Existing Records: Utilities are plotted from review of available records.

Quality Level "C"- Surface Visible Feature Survey: Quality Level "D" information from existing records is correlated with surveyed surface-visible features.

Quality Level "B"- Designate: Two-dimensional horizontal mapping.This information is obtained through the application and interpretation of appropriate non-destructive surface geophysical methods. Utility indications are referenced to appropriate survey control.

WILLIAMSON COUNTY
1848

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING

CobbFendley
Texas Registration No. 274
505 East Huntland Drive, Suite 485
Austin, Texas 78752
512.834.9798 | fax 512.834.9553 | www.cobbfendley.com

FOREST NORTH DRAINAGE BAYSWATER
UTILITY STRIP MAP 100%

DESIGN BY: KW	SCALE: 1" = 50′
DRAWN BY: SG	
CHECKED BY: SK	
APPROVED BY: SK	SHEET: 1 OF 1
PROJECT NO:	
DATE: 7/28/2015	

CobbFendley
Texas Registration No. 274

TEST HOLE DATA SHEET

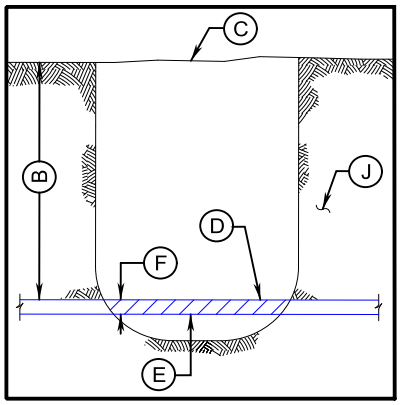
Project Name FOREST NORTH - BAYSWATER
Project No. 1403-088-01
Location BAYSWATER GARDEN / QUILBERRY DR.

Test Hole No. 15
Utility WATER
Date 7-24-2015
Weather SUNNY

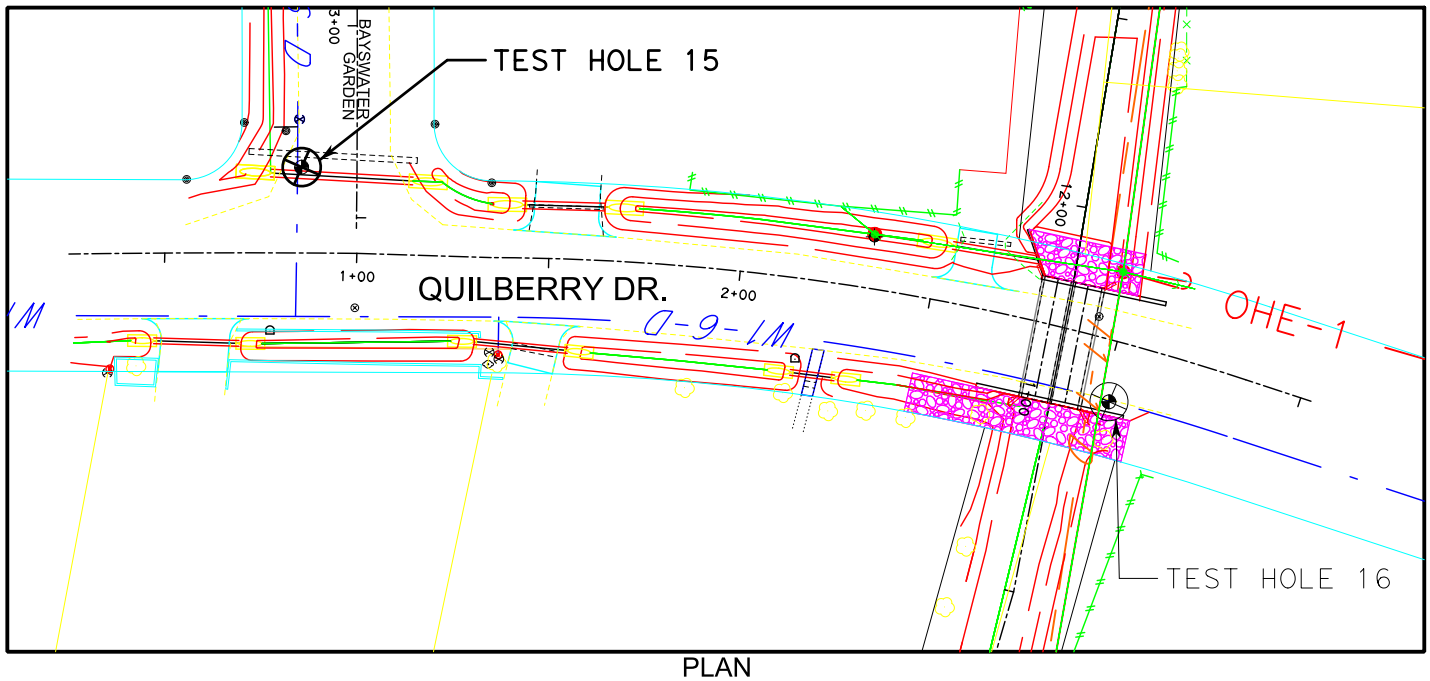
TEST HOLE DATA

A. Northing 10,144,956.08
Easting 3,101,845.36
B. Depth of Utility 4.24'
C. Elevation Grade @ Top of Hole 885.03
D. Elev. @ Top of Utility 880.79
E. Elev. @ Bottom of Utility 880.29
F. Width or Dia. of Utility 6"
G. Material of Utility POLY
H. General Condition GOOD
I. Thickness of Pvmt. N/A
Base, etc. N/A
J. Description of Soil CLAY

TOP



PROFILE



PLAN

B.M. C.P. 617 Elev.=872.64 Description TPT - MAG/ SHINER
Northing: 10,143,092.64 Easting: 3,103,381.62
B.M. C.P. 2002 Elev.=884.06 Description PK IN ASPHALT
Northing: 10,144,854.59 Easting: 3,102,186.92
Remarks

LEGEND
SEE PLAN SHEETS

CobbFendley
Texas Registration No. 274

TEST HOLE DATA SHEET

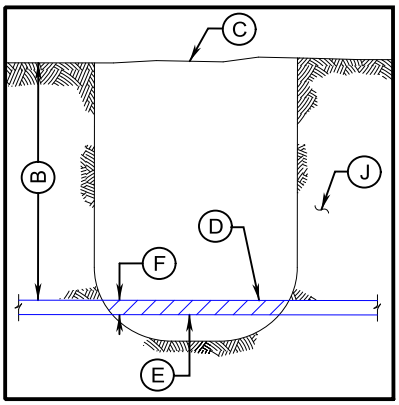
Project Name FOREST NORTH - BAYSWATER
Project No. 1403-088-01
Location BAYSWATER GARDEN / QUILBERRY DR.

Test Hole No. 16
Utility WATER
Date 7-24-2015
Weather SUNNY

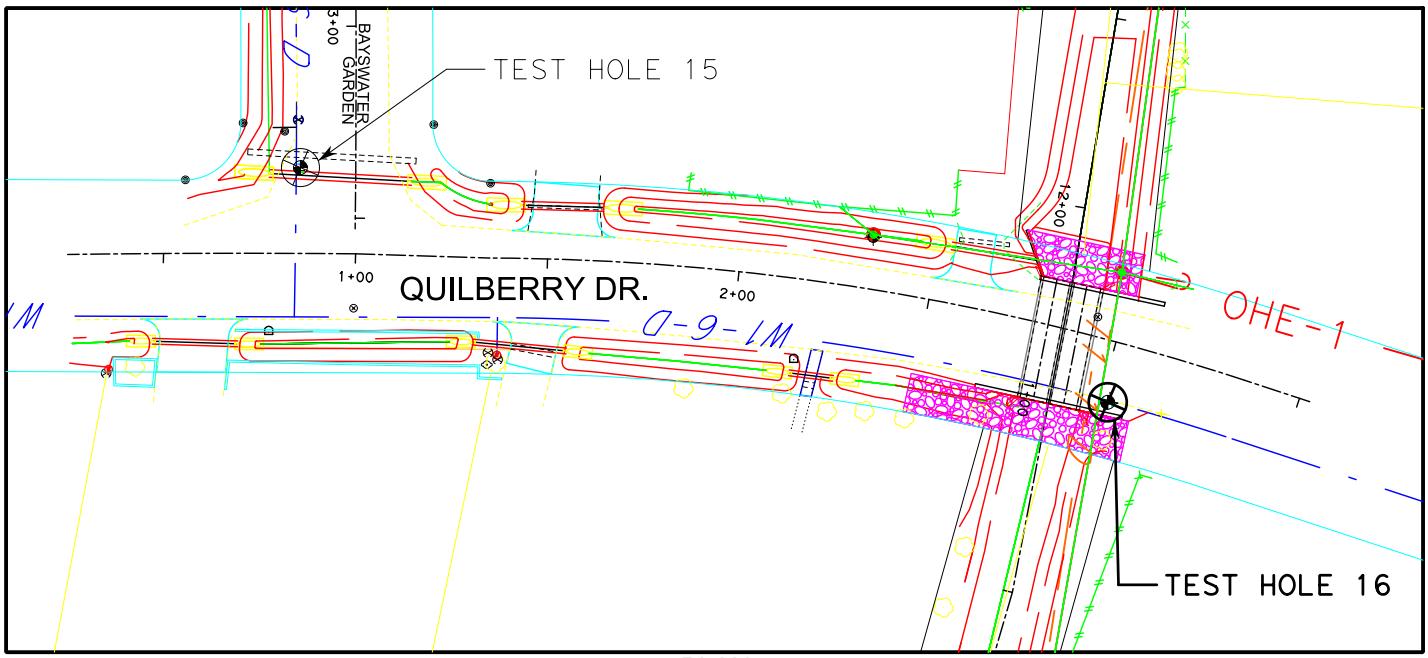
TEST HOLE DATA

A. Northing 10,144,894.95
Easting 3,102,055.63
B. Depth of Utility 4.91'
C. Elevation Grade @ Top of Hole 884.29
D. Elev. @ Top of Utility 879.38
E. Elev. @ Bottom of Utility 878.72
F. Width or Dia. of Utility 8"
G. Material of Utility DI
H. General Condition GOOD
I. Thickness of Pvmt. N/A
Base, etc. N/A
J. Description of Soil ROCK & DIRT

TOP



PROFILE



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Remarks

LEGEND
SEE PLAN SHEETS

WILLIAMSON COUNTY

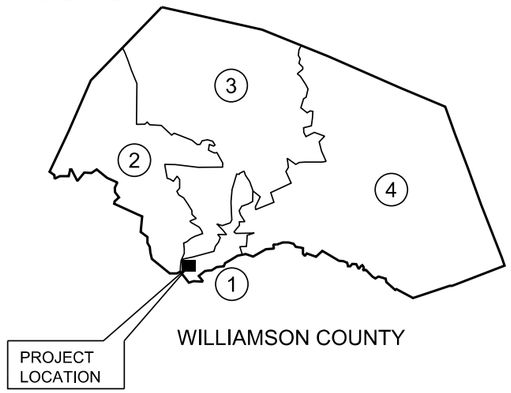
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE

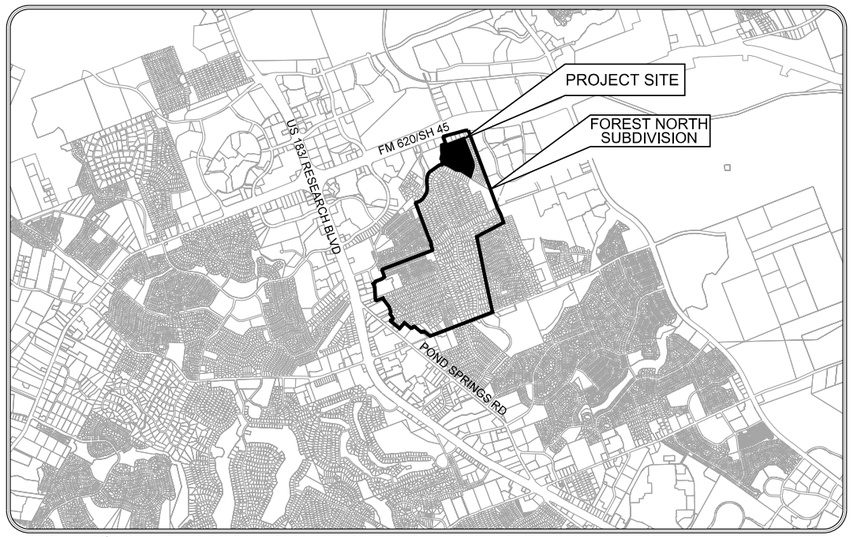
SEPTEMBER 2015

INDEX OF SHEETS

HORIZONTAL DATUM:
ALL BEARINGS ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 83. ALL DISTANCES AND COORDINATES SHOWN ON THE PLANS HAVE BEEN ADJUSTED TO THE SURFACE. TO TRANSFORM FROM SURFACE VALUES TO LAMBERT GRID VALUES USE A FACTOR OF 0.99988706.



VICINITY MAP
NO EQUATIONS
NO EXCEPTIONS
NO RAILROADS



NO SCALE

WILLIAMSON COUNTY
1848

TxDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES ADOPTED ON NOVEMBER 1, 2014 AND ALL APPLICABLE SPECIAL PROVISIONS AND SPECIAL SPECIFICATIONS AS INDICATED IN THE BID DOCUMENTS SHALL GOVERN ON THIS PROJECT.

PREPARED BY:
K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P - 512.338.1704 F - 512.338.1784
TBPE Firm #6535
www.kfriese.com

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED
PROFESSIONAL ENGINEER

Charlotte Gilpin 9/14/2015
CHARLOTTE A. GILPIN, P.E. DATE
PROJECT MANAGER

APPROVED AND RECOMMENDED FOR CONSTRUCTION:

_____ _____
J. TERRON EVERTSON, P.E. DATE
WILLIAMSON COUNTY
DIRECTOR OF ROAD AND BRIDGE

THIS PLAN SET IS FULL SIZE AT 11" X 17".

WILLIAMSON COUNTY - FOREST NORTH DRAINAGE IMPROVEMENTS

TXDOT BID ITEM	*100	*110	*132	*161	*164	*164	*164	*168	*169	400
	6002	6002	6003	6016	6007	6009	6011	6001	6006	6006
CIP ID NO	PREPARING ROW	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL)(ORD COMP)(TY B)	COMPOST MANUF TOPSOIL (4")	BROADCAST SEED (PERM) (URBAN) (CLAY)	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 2) (TY F)	CUT & RESTORING PAV
	STA	CY	CY	STA	SY	SY	SY	MG	SY	SY
CIP BW1	3	140	9	1231	1231	616	616	187	1231	
CIP BW2	10			3703	3703	1851	1851	560	3703	
CIP BW3	3	75	8	460	460	230	230	70	460	31
CIP BW4	3	63	4	249	249	124	124	38	249	
ZONE TOTAL	19	278	21	5643	5643	2822	2822	855	5643	31

TXDOT BID ITEM	420	432	462	464	464	466	467	467	467	496	500
	6074	6002	6003	6003	6005	6178	6140	6359	6391	6016	6001
CIP ID NO	CL C CONC (MISC)	RIPRAP (CONC)(5 IN)	CONC BOX CULV (4 FT X 2 FT)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	WINGWALL (PW - 1) (HW=3 FT)	SET (TY I)(S=4 FT)(HW= 3 FT)(4:1) (P)	SET (TY II) (18 IN) (RCP) (4: 1) (P)	SET (TY II) (24 IN) (RCP) (4: 1) (P)	REMOV STR (PIPE)	MOBILIZATION
	CY	CY	LF	LF	LF	EA	EA	EA	EA	EA	LS
CIP BW1		9									
CIP BW2											
CIP BW3	6		47	8	38	1	3	2	2	1	
CIP BW4				60				6			
ZONE TOTAL	6	9	47	68	38	1	3	8	2	1	1

TXDOT BID ITEM	502	*506	*506	*506	*506	530	531	560	644	752	*760	1004	COA
	6001	6002	6011	6038	6039	6004	6002	6001	6075	6007	6001	6002	701S
CIP ID NO	BARRICADES, SIGNS AND TRAFFIC HANDLING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	DRIVEWAYS (CONC)	CONC SIDEWALKS (5")	MAILBOX INSTALL-S (TWG-POST) TY 1	RELOCATE SM RD SN SUP&AM(SIGN ONLY)	TREE REMOVAL (18" - 24" DIA)	DITCH CLEANING AND RESHAPING (FOOT)	TREE PROTECTION	FENCING (WOOD)
	MO	LF	LF	LF	LF	SY	SY	EA	EA	EA	LF	AC	LF
CIP BW1		40	40	28	28					1		0	
CIP BW2		80	80								787	0	195
CIP BW3						47	5		1			0.1	
CIP BW4				40	40	46	4	1				0	
ZONE TOTAL	1.5	120	120	68	68	93	9	1	1	1	787	0.1	195

NOTES:

UTILITY RELOCATIONS WILL BE PERFORMED BY OTHERS.

* THESE ITEMS OF WORK SHALL BE COMPLETED BY OTHERS.

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

SUMMARY OF QUANTITIES
BAYSWATER ZONE

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015

SHEET NO.
GN2 OF GN5

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

PROJECT LAYOUT

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
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www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 600'
DATE	9/14/2015

SHEET NO.
GN3 OF GN5

- ANTENNA
- AERIAL TARGET
- BOX TARGET
- AXLE FOUND
- BENCHMARK
- BRACE POLE
- CMKR (TYPE I) FOUND
- CLEANOUT
- CABLE TV PEDESTAL
- CABLE TV SRVC BOX
- FAUCET
- FIRE HYDRANT
- GAS METER
- GUY POLE (DEADMAN)
- GUY ANCHOR
- GAS VALVE
- HIGH VOLTAGE TRANS TOWER
- ELEC. JUNCT. BOX
- TELE. JUNCT. BOX
- LUMINARE STANDARD
- ELEC. MANHOLE
- STORM MANHOLE
- TELE. MANHOLE
- WASTEWATER MANHOLE
- PULL BOX
- POWER POLE
- WOODEN FENCE
- CHAINLINK FENCE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- EXISTING OVERHEAD UTILITY
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- EXISTING GAS
- EXISTING COMMUNICATIONS
- EXISTING UNDERGROUND ELECTRIC

- RAILROAD CONTROL BOX
- RAILROAD SWITCH
- RAILROAD XING SIGN
- SIGNAL PEDISTAL
- SPRINKLER HEAD
- SERVICE POLE ELEC.
- TELE. POLE
- TELE. PEDESTAL
- TRAVERSE POINT
- TRAFF SIGNAL LIGHT POLE
- FLOODLIGHT
- GAS VALVE
- GAS VENT
- WATER VALVE
- WATER METER
- MAILBOX
- LIGHT POLE
- SIGN
- GPS MONUMENT
- TYPE I CONCRETE MONUMENT FOUND
- TYPE II MONUMENT SET
- TYPE II MONUMENT FOUND
- ½" IRON PIPE FOUND UNLESS NOTED
- ½" IRON ROD SET W/TXDOT-ALUMINUM CAP UNLESS NOTED
- ½" IRON ROD FOUND UNLESS NOTED
- 60 D NAIL SET UNLESS NOTED
- 60 D NAIL FOUND UNLESS NOTED
- CALCULATED POINT
- FENCE POST
- PROPERTY LINE

- DRIVEWAY ID
- EXISTING TREE

TREE LEGEND

AE	AMERICAN ELM
BP	BRADFORD PEAR
CB	CHINABERRY
CE	CEDAR ELM
CED	CEDAR
CM	CREPE MYRTLE
CT	CHINESE TALLOW
CW	COTTONWOOD
CYP	CYPRESS
HB	HACKBERRY
LO	LIVEOAK
MSQ	MESQUITE
MUL	MULBERRY
PEC	PECAN
PO	POST OAK
SO	SPANISH OAK
WIL	WILLOW

TREE SYMBOLS WITHOUT DESIGNATIONS ARE ORNAMENTALS

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

GENERAL SYMBOLS

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015
SHEET NO.	GN4 OF GN5

NOTE:

1. THE HYDROLOGIC MODEL WAS DEVELOPED IN HEC-HMS 3.5 BASED ON THE METHODOLOGY DESCRIBED IN THE TXDOT HYDRAULIC MANUAL, MAY 2014, CHAPTER 4, SECTION 13.

   LOSS METHOD: SCS CURVE NUMBER
   TRANSFORM: SCS UNIT HYDROGRAPH (TR-55 LAG)
   ROUTING METHOD: LAG

2. PRECIPITATION DEPTHS WERE ESTIMATED FROM THE ATLAS OF DEPTH-DURATION-FREQUENCY OF PRECIPITATION ANNUAL MAXIMA FOR TEXAS, SCIENTIFIC INVESTIGATIONS REPORT 2004-5041. WILLIAM H. ASQUITH AND MEGHAN C. ROUSSEL. THE SCS TYPE III STORM DISTRIBUTION WAS UTILIZED.

STORM	DEPTH (IN)
2-YEAR	3.40
5-YEAR	4.70
10-YEAR	5.50
25-YEAR	6.90
50-YEAR	8.00
100-YEAR	9.50

Description	SOIL TYPE	CN	BW-01 Area (ac) 22.93	BW-02 Area (ac) 3.61	BW-03 Area (ac) 2.20	BW-04 Area (ac) 0.95	BW-05 Area (ac) 0.75	BW-06 Area (ac) 0.23	BW-07 Area (ac) 0.66
Streets - Paved Ditches	D	93	2.29	0.60	0.67	0.11	0.19	0.01	0.45
Urban - Commerical	D	95	6.06						
Residential - 1/4 ac	D	87	1.15						
Residential - 1/3 ac	D	86	10.82	1.65	1.53	0.84	0.56	0.21	0.21
Residential - 1/2 ac	D	85	2.61	1.36					
			22.93	3.61	2.20	0.95	0.75	0.23	0.66
CN (AMC III)			89	87	88	87	88	86	91

Drainage Basin		BW-01	BW-02	BW-03	BW-07
Sheet Flow					
Flow Length	ft	100	39	100	32
Slope	ft/ft	0.0100	0.0256	0.0050	0.0234
Manning's "n"		0.150	0.011	0.150	0.011
Travel Time	hr	0.209	0.008	0.276	0.007
Shallow Concentrated Flow					
Flow Length	ft	478	400	231	
Slope	ft/ft	0.0063	0.0288	0.0043	
Surface (paved or unpaved)		unpaved	unpaved	unpaved	
V	fps	1.28	2.74	1.06	
Travel Time	hr	0.104	0.041	0.060	
Channel Flow					
Flow Length	ft	1504	295	375	816
Slope	ft/ft	0.0033	0.0085	0.0053	0.0067
Manning's "n"		0.04	0.04	0.04	0.04
Cross Section Area	ft^2	21.0	1.5	12.0	6.0
Wetted Perimeter	ft	23.2	6.1	12.6	12.2
V	fps	2.01	1.35	2.63	1.91
Travel Time	hr	0.208	0.061	0.040	0.119
Total Travel Time (Tc)	hr	0.52	0.11	0.38	0.13

DRAINAGE AREA	AREA (sq mi)	CN	Tc (hr)	Tc (min)	Tc Used (min)	Tc Lag Time (min)
BW-01	0.0358	89	0.52	31	31	19
BW-02	0.0056	87	0.11	7	10	6
BW-03	0.0034	88	0.38	23	23	14
BW-04	0.0015	87	0.17	10	10	6
BW-05	0.0012	88	0.17	10	10	6
BW-06	0.0004	86	0.17	10	10	6
BW-07	0.0010	91	0.13	8	10	6

DRAINAGE AREA	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
BW-01	34.9	52.9	64.0	83.3	98.4	118.9
BW-02	7.9	12.2	14.9	19.6	23.2	28.2
BW-03	3.7	5.6	6.8	9.0	10.6	12.8
BW-04	2.2	3.4	4.1	5.4	6.4	7.8
BW-05	1.8	2.8	3.4	4.4	5.2	6.3
BW-06	0.6	0.9	1.1	1.4	1.7	2.1
BW-07	1.6	2.3	2.8	3.6	4.2	5.0
BW-J04	7.0	10.8	13.2	17.3	20.5	24.9
BW-OUTLET01	45.0	68.8	83.5	109.1	129.1	156.3

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STATE OF TEXAS
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1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE
DRAINAGE AREA MAP

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WILLIAMSON COUNTY
1848

SCALE	1" = 200'
DATE	9/14/2015

SHEET NO.
GN5 OF GN5

LEGEND
- CITY OF AUSTIN LIMITS
- EXISTING PROPERTIES
- 13515 EXISTING ADDRESS
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED TEMPORARY EASEMENT
- CHANNEL CENTERLINE / FLOW DIRECTION
- DRIVEWAY ID
- BENCHMARK

0 50 100

NOTES:

1. COORDINATES ARE BASED ON TEXAS STATE PLANE SYSTEM, CENTRAL ZONE, ADJUSTED TO THE SURFACE. TO TRANSFORM FROM SURFACE VALUES TO LAMBERT GRID VALUES USE A FACTOR OF 0.99988706.
2. BENCHMARKS: (VERTICAL DATUM: NAD 83)

   TBM "WC": SQUARE CUT ON DRIVEWAY.
   ELEVATION: 889.94'
   N: 104145763.96 E: 3101365.71

   TBM "WD": RAILROAD SPIKE IN POWER POLE.
   ELEVATION: 884.73'
   N: 10144937.10 E: 3101994.35
3. PARCEL INFORMATION FOR THE PROJECT LAYOUT WAS OBTAINED FROM THE WILLIAMSON COUNTY APPRASIAL DISTRICT AND IS FOR REFERENCE ONLY.
4. CIP BW1 DESCRIPTION:
   CHANNEL BW1-1:
   REGRADE QUEENSLAND CHANNEL WITHIN EXISTING EASEMENT FROM QUILBERRY DRIVE TO LAKE CREEK.
   CULVERT C-8:
   REMOVE AND REPLACE EXISTING CULVERT.
5. CIP BW2 DESCRIPTION:
   CHANNEL BW2-1:
   REGRADE QUEENSLAND CHANNEL WITHIN EXISTING EASEMENT FROM EXISTING LOW POINT TO QUILBERRY DRIVE.
6. CIP BW3 DESCRIPTION:
   CHANNEL BW3-1:
   REGRADE CHANNEL ALONG NORTH SIDE OF QUILBERRY DRIVE FROM BAYSWATER GARDEN TO QUEENSLAND CHANNEL.
   CULVERT C-7:
   REMOVE AND REPLACE EXISTING CULVERT.
   CHANNEL BW3-3:
   REGRADE CHANNEL ALONG WEST SIDE OF BAYSWATER GARDEN FROM 13502 BAYSWATER GARDEN TO QUILBERRY DRIVE.
7. CIP BW4 DESCRIPTION:
   CHANNEL BW4-1:
   REGRADE CHANNEL ALONG SOUTH SIDE OF QUILBERRY DRIVE FROM BAYSWATER GARDEN TO QUEENSLAND CHANNEL.
8. ALL PROPERTIES WITHIN THIS ZONE ARE SUBJECT TO THE FOLLOWING RESTRICTIONS IN ACCORDANCE WITH FOREST NORTH SUBDIVISION RESTRICTIONS:
   -ALLOWED ONE-RIBBON DRIVEWAY

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
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9/14/2015

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WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE
PROJECT LAYOUT

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WILLIAMSON COUNTY 1848

SCALE	1" = 100'
DATE	9/14/2015

SHEET NO.
BW1 OF BW16

Beginning chain BW1 description
Point BW100 N 10,144,894.5908 E 3,102,040.2172 Sta 1+00.00
Course from BW100 to BW101 S 13° 34' 11.10" W Dist 79.7382
Point BW101 N 10,144,817.0785 E 3,102,021.5083 Sta 1+79.74
Course from BW101 to BW102 S 22° 11' 52.22" W Dist 175.6849
Point BW102 N 10,144,654.4145 E 3,101,955.1335 Sta 3+55.42
Ending chain BW1 description

Beginning chain BW2 description
Point BW200 N 10,145,754.6399 E 3,101,443.3402 Sta 1+00.00
Course from BW200 to BW201 S 24° 24' 40.92" E Dist 97.2466
Point BW201 N 10,145,666.0870 E 3,101,483.5307 Sta 1+97.25
Course from BW201 to BW202 S 22° 15' 47.47" E Dist 1.6226
Point BW202 N 10,145,664.5853 E 3,101,484.1455 Sta 1+98.87
Course from BW202 to BW203 S 24° 53' 10.36" E Dist 2.3113
Point BW203 N 10,145,662.4886 E 3,101,485.1181 Sta 2+01.18
Course from BW203 to BW204 S 27° 33' 57.57" E Dist 2.3150
Point BW204 N 10,145,660.4364 E 3,101,486.1895 Sta 2+03.50
Course from BW204 to BW205 S 30° 14' 44.79" E Dist 2.3150
Point BW205 N 10,145,658.4365 E 3,101,487.3556 Sta 2+05.81
Course from BW205 to BW206 S 32° 55' 31.93" E Dist 2.3144
Point BW206 N 10,145,656.4938 E 3,101,488.6136 Sta 2+08.13
Course from BW206 to BW207 S 35° 35' 44.23" E Dist 2.2793
Point BW207 N 10,145,654.6404 E 3,101,489.9403 Sta 2+10.40
Course from BW207 to BW208 S 37° 57' 59.89" E Dist 1.7654
Point BW208 N 10,145,653.2486 E 3,101,491.0263 Sta 2+12.17
Course from BW208 to BW209 S 39° 19' 09.98" E Dist 0.6375
Point BW209 N 10,145,652.7554 E 3,101,491.4303 Sta 2+12.81
Course from BW209 to BW210 S 40° 21' 44.03" E Dist 1.1945
Point BW210 N 10,145,651.8452 E 3,101,492.2039 Sta 2+14.00
Course from BW210 to BW211 S 41° 43' 13.49" E Dist 1.1582
Point BW211 N 10,145,650.9807 E 3,101,492.9747 Sta 2+15.16
Course from BW211 to BW212 S 43° 40' 03.20" E Dist 2.2275
Point BW212 N 10,145,649.3695 E 3,101,494.5127 Sta 2+17.39
Course from BW212 to BW213 S 46° 19' 27.93" E Dist 2.3135
Point BW213 N 10,145,647.7718 E 3,101,496.1860 Sta 2+19.70
Course from BW213 to BW214 S 49° 00' 15.15" E Dist 2.3150
Point BW214 N 10,145,646.2531 E 3,101,497.9333 Sta 2+22.02
Course from BW214 to BW215 S 51° 41' 02.30" E Dist 2.3150
Point BW215 N 10,145,644.8178 E 3,101,499.7497 Sta 2+24.33
Course from BW215 to BW216 S 54° 21' 49.50" E Dist 2.3130
Point BW216 N 10,145,643.4701 E 3,101,501.6296 Sta 2+26.64
Course from BW216 to BW217 S 57° 00' 44.95" E Dist 2.1897
Point BW217 N 10,145,642.2779 E 3,101,503.4663 Sta 2+28.83
Course from BW217 to BW218 S 58° 39' 00.71" E Dist 0.7164
Point BW218 N 10,145,641.9052 E 3,101,504.0781 Sta 2+29.55
Course from BW218 to BW219 S 60° 02' 44.08" E Dist 1.7611
Point BW219 N 10,145,641.0258 E 3,101,505.6040 Sta 2+31.31
Course from BW219 to BW220 S 62° 23' 10.76" E Dist 2.1748
Point BW220 N 10,145,640.0178 E 3,101,507.5310 Sta 2+33.49
Course from BW220 to BW221 S 64° 11' 17.07" E Dist 0.9660
Point BW221 N 10,145,639.5972 E 3,101,508.4006 Sta 2+34.45
Course from BW221 to BW222 S 65° 35' 06.95" E Dist 1.5129
Point BW222 N 10,145,638.9719 E 3,101,509.7782 Sta 2+35.97
Course from BW222 to BW223 S 67° 46' 41.36" E Dist 2.2575
Point BW223 N 10,145,638.1181 E 3,101,511.8680 Sta 2+38.22
Course from BW223 to BW224 S 70° 26' 32.73" E Dist 2.3140
Point BW224 N 10,145,637.3435 E 3,101,514.0486 Sta 2+40.54
Course from BW224 to BW225 S 73° 07' 19.88" E Dist 2.3150
Point BW225 N 10,145,636.6714 E 3,101,516.2639 Sta 2+42.85
Course from BW225 to BW226 S 75° 48' 07.10" E Dist 2.3118
Point BW226 N 10,145,636.1043 E 3,101,518.5050 Sta 2+45.16
Course from BW226 to BW227 S 78° 25' 53.93" E Dist 2.0417
Point BW227 N 10,145,635.6949 E 3,101,520.5052 Sta 2+47.21
Course from BW227 to BW228 S 78° 50' 28.77" E Dist 85.0694
Point BW228 N 10,145,619.2317 E 3,101,603.9664 Sta 3+32.27
Course from BW228 to BW229 S 68° 44' 47.33" E Dist 40.2062
Point BW229 N 10,145,604.6572 E 3,101,641.4380 Sta 3+72.48
Course from BW229 to BW230 S 54° 51' 43.13" E Dist 102.7315
Point BW230 N 10,145,545.5303 E 3,101,725.4485 Sta 4+75.21
Course from BW230 to BW231 S 47° 52' 49.01" E Dist 143.0799
Point BW231 N 10,145,449.5692 E 3,101,831.5773 Sta 6+18.29
Course from BW231 to BW232 S 49° 45' 20.61" E Dist 118.9247
Point BW232 N 10,145,372.7381 E 3,101,922.3522 Sta 7+37.22
Course from BW232 to BW233 S 47° 44' 56.89" E Dist 56.2292
Point BW233 N 10,145,334.9309 E 3,101,963.9735 Sta 7+93.45
Course from BW233 to BW234 S 27° 48' 07.78" E Dist 47.8833
Point BW234 N 10,145,292.5751 E 3,101,986.3072 Sta 8+41.33
Course from BW234 to BW235 S 22° 16' 32.56" E Dist 72.1083
Point BW235 N 10,145,225.8482 E 3,102,013.6408 Sta 9+13.44
Course from BW235 to BW236 S 13° 17' 07.56" E Dist 40.9176
Point BW236 N 10,145,186.0257 E 3,102,023.0438 Sta 9+54.36
Course from BW236 to BW237 S 14° 14' 17.48" E Dist 1.1473
Point BW237 N 10,145,184.9136 E 3,102,023.3260 Sta 9+55.50
Course from BW237 to BW238 S 14° 14' 57.87" E Dist 26.4939
Point BW238 N 10,145,159.2348 E 3,102,029.8473 Sta 9+82.00
Course from BW238 to BW239 S 12° 15' 07.78" E Dist 148.0600
Point BW239 N 10,145,014.5472 E 3,102,061.2678 Sta 11+30.06
Course from BW239 to BW240 S 9° 30' 24.29" W Dist 89.5863
Point BW240 N 10,144,926.1912 E 3,102,046.4713 Sta 12+19.64
Ending chain BW2 description

Beginning chain BW3A description

Curve Data

Curve BW3A-1
P.I. Station 2+26.45 N 10,145,066.5679 E 3,101,861.2019
Delta = 4° 27' 17.23" (RT)
Degree = 1° 45' 44.62"
Tangent = 126.4483
Length = 252.7691
Radius = 3,251.0200
External = 2.4582
Long Chord = 252.7054
Mid. Ord. = 2.4563
P.C. Station 1+00.00 N 10,145,192.7458 E 3,101,852.9378
P.T. Station 3+52.77 N 10,144,940.1293 E 3,101,859.6405
C.C. N 10,144,980.2733 E 3,098,608.8683
Back = S 3° 44' 50.19" E
Ahead = S 0° 42' 27.05" W
Chord Bear = S 1° 31' 11.57" E
Ending chain BW3A description

Beginning chain BW3B description
Point BW330 N 10,144,933.6120 E 3,101,859.7592 Sta 1+00.00

Course from BW330 to PC BW3B-1 S 88° 11' 50.34" E Dist 34.9922

Curve Data

Curve BW3B-1
P.I. Station 2+35.78 N 10,144,932.1620 E 3,101,995.5222
Delta = 17° 59' 57.53" (RT)
Degree = 9° 00' 12.21"
Tangent = 100.7888
Length = 199.9171
Radius = 636.3800
External = 7.9319
Long Chord = 199.0960
Mid. Ord. = 7.8343
P.C. Station 1+34.99 N 10,144,932.5112 E 3,101,894.7341
P.T. Station 3+34.91 N 10,144,900.6858 E 3,102,091.2700
C.C. N 10,144,296.1351 E 3,101,892.5291
Back = S 89° 48' 05.31" E
Ahead = S 71° 48' 07.78" E
Chord Bear = S 80° 48' 06.55" E
Course from PT BW3B-1 to BW331 S 71° 48' 07.78" E Dist 17.8977
Point BW331 N 10,144,895.0963 E 3,102,108.2725 Sta 3+52.81
Ending chain BW3B description

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STATE OF TEXAS
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9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE
HORIZONTAL ALIGNMENT DATA

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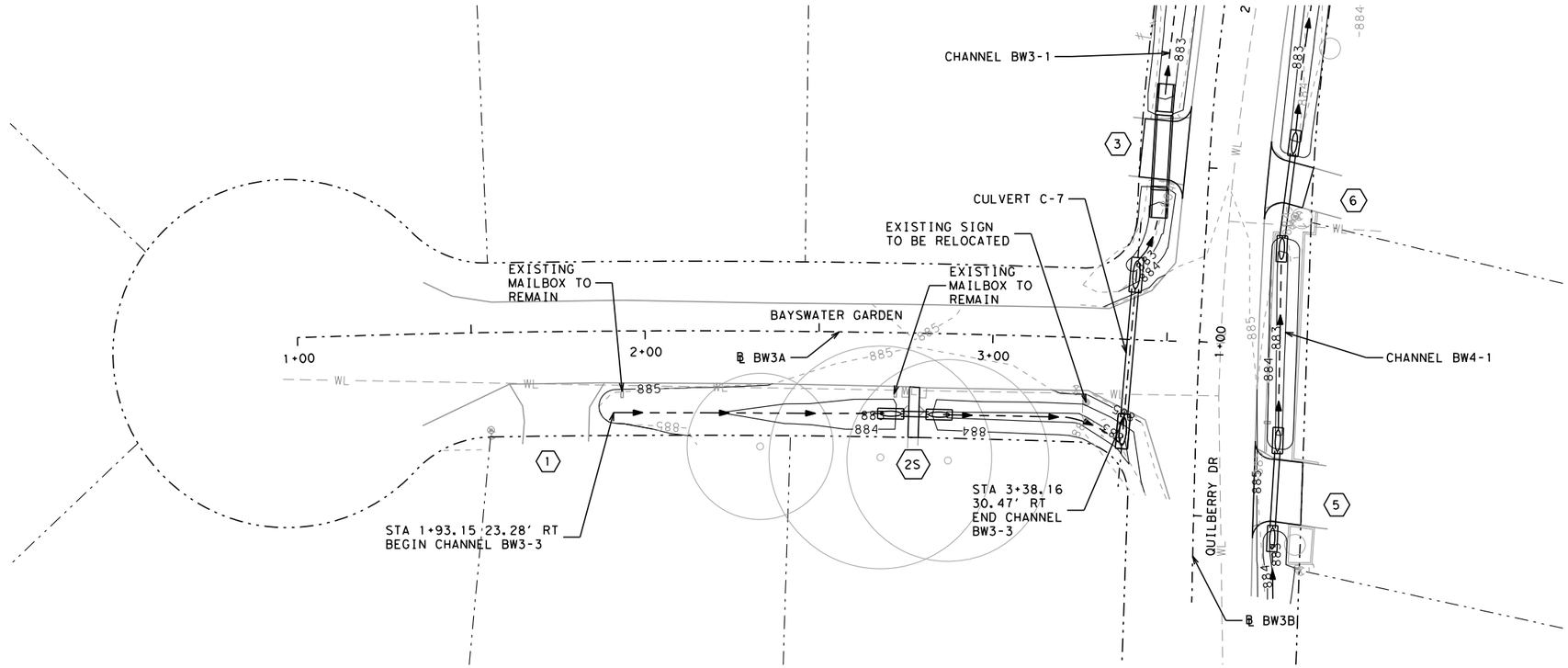
WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015
SHEET NO.	BW2 OF BW16



LEGEND

- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- (X) DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

N

0 20 40

NOTES:

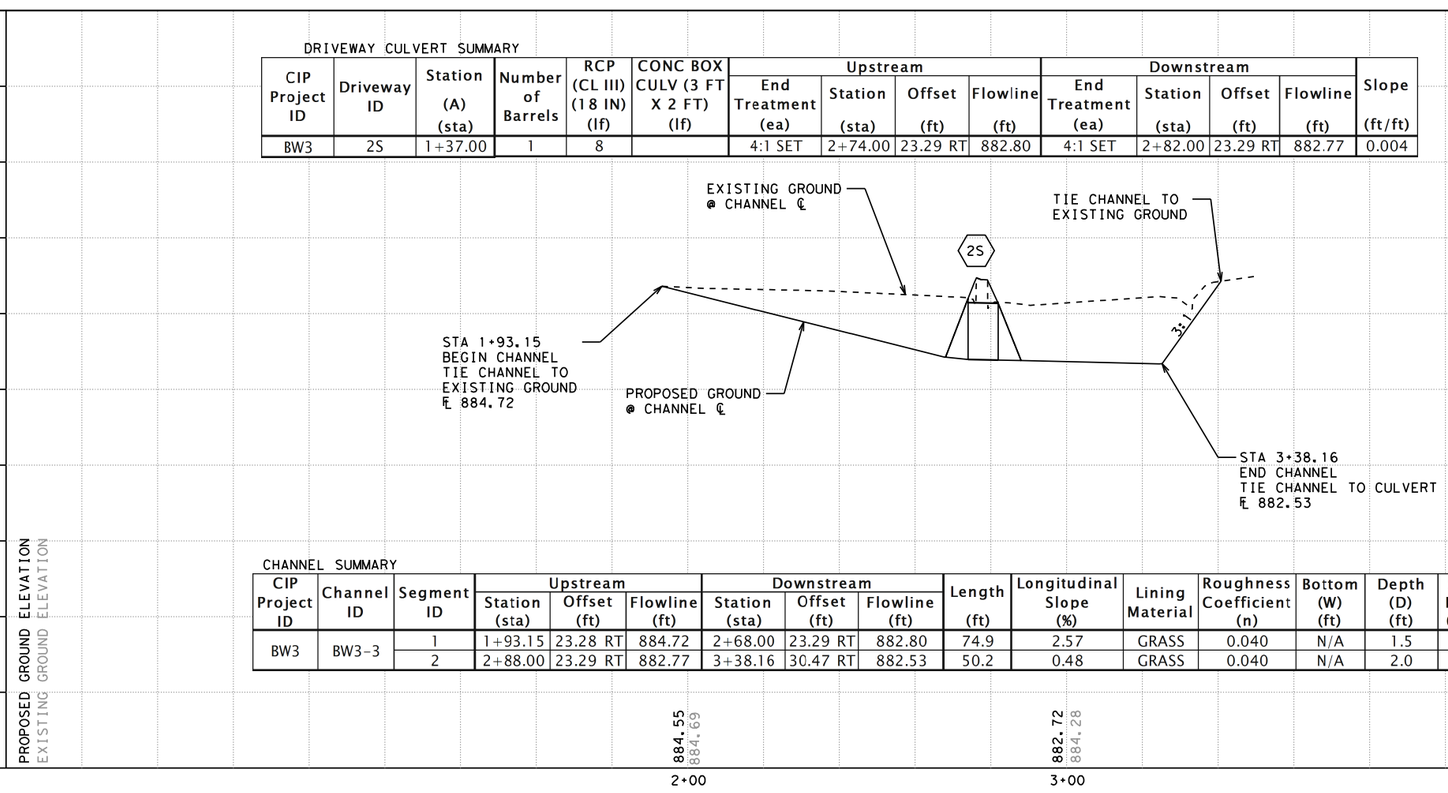
1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

DRIVEWAY CULVERT SUMMARY

CIP Project ID	Driveway ID	Station (A) (sta)	Number of Barrels	RCP (CL III) (18 IN) (lf)	CONC BOX CULV (3 FT X 2 FT) (lf)	Upstream End Treatment (ea)	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream End Treatment (ea)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Slope (ft/ft)
BW3	2S	1+37.00	1	8		4:1 SET	2+74.00	23.29 RT	882.80	4:1 SET	2+82.00	23.29 RT	882.77	0.004

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW3	BW3-3	1	1+93.15	23.28 RT	884.72	2+68.00	23.29 RT	882.80	74.9	2.57	GRASS	0.040	N/A	1.5	4.0	3.0
		2	2+88.00	23.29 RT	882.77	3+38.16	30.47 RT	882.53	50.2	0.48	GRASS	0.040	N/A	2.0	3.0	3.0



REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
9/14/2015

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1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE - CIP BW3
CHANNEL BW3-3 PLAN AND PROFILE - START TO END

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TBPE Firm #6535
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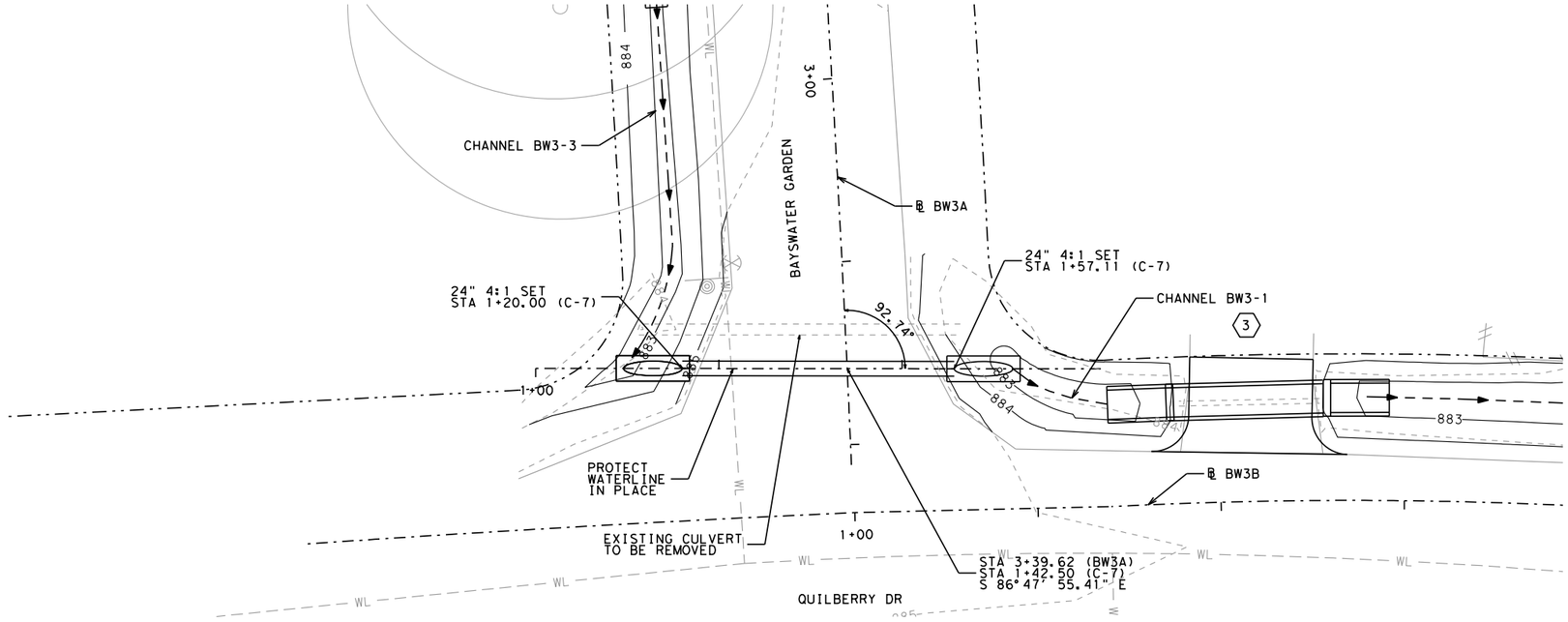
WILLIAMSON COUNTY
1848

SCALE	1" = 40'
DATE	9/14/2015

SHEET NO.
BW3 OF BW16



LEGEND

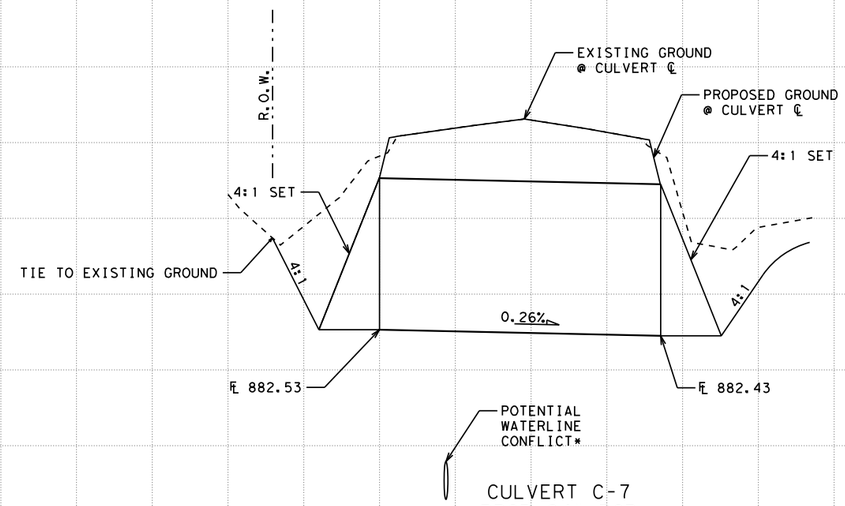
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

N

0 10 20

NOTES:

1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.



CULVERT C-7
PROP 24" RCP
38 LF @ 0.26%

*NOTE: CONTRACTOR SHALL VERIFY UTILITY LOCATION AND ELEVATION
CONTRACTOR SHALL PROTECT WATERLINE IN PLACE

FLOW

Q_{25} = 17.3 CFS
Q_{100} = 24.9 CFS

EXISTING HEADWATER

HW_{25} = 885.41
HW_{100} = 885.49

EXISTING TAILWATER

TW_{25} = 884.66
TW_{100} = 884.96

PROPOSED HEADWATER

HW_{25} = 885.11
HW_{100} = 885.36

PROPOSED TAILWATER

TW_{25} = 883.87
TW_{100} = 884.08

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

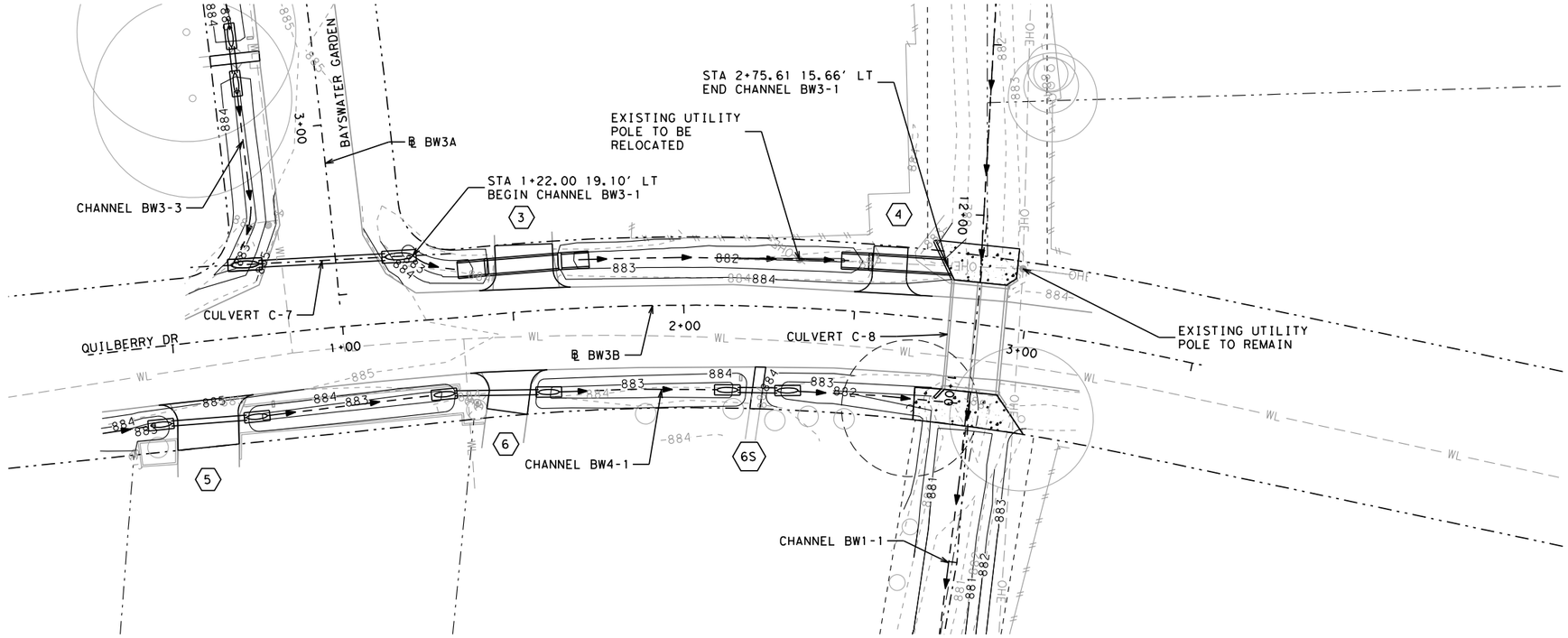
WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE - CIP BW3
CULVERT C-7

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 20'
DATE	9/14/2015
SHEET NO.	BW4 OF BW16



LEGEND

- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- (X) DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

N

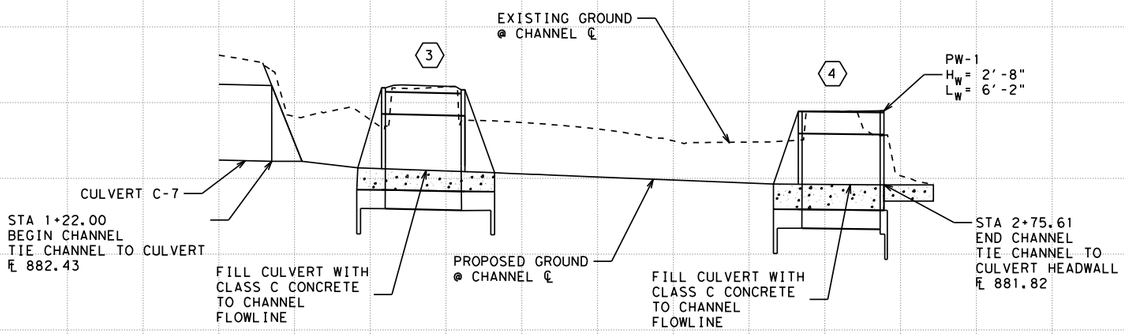
0 20 40

NOTES:

1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

DRIVEWAY CULVERT SUMMARY

CIP Project ID	Driveway ID	Station (A) (sta)	Number of Barrels	RCP (CL III) (18 IN) (lf)	CONC BOX CULV (3 FT X 2 FT) (lf)	Upstream End Treatment (ea)	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream End Treatment (ea)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Slope (ft/ft)
BW3	3	1+54.00	1		23	4:1 SETB	1+43.00	13.84 LT	882.20	4:1 SETB	1+65.00	14.00 LT	882.15	0.002
	4	4+09.16	1		24	4:1 SETB	2+53.00	14.79 LT	881.88	PW-1	2+75.61	15.66 LT	881.82	0.003



CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW3	BW3-1	1	1+22.00	19.10 LT	882.45	1+34.79	13.88 LT	882.20	12.8	1.95	GRASS	0.040	N/A	1.5	3.0	3.0
		2	1+72.83	14.05 LT	882.15	2+45.18	14.56 LT	881.88	72.4	0.37	GRASS	0.040	N/A	1.6	3.0	4.0

PROPOSED GROUND ELEVATION
EXISTING GROUND ELEVATION

890 888 886 884 882 880 878 876 874

881.55
883.30

1+00 2+00 3+00

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY

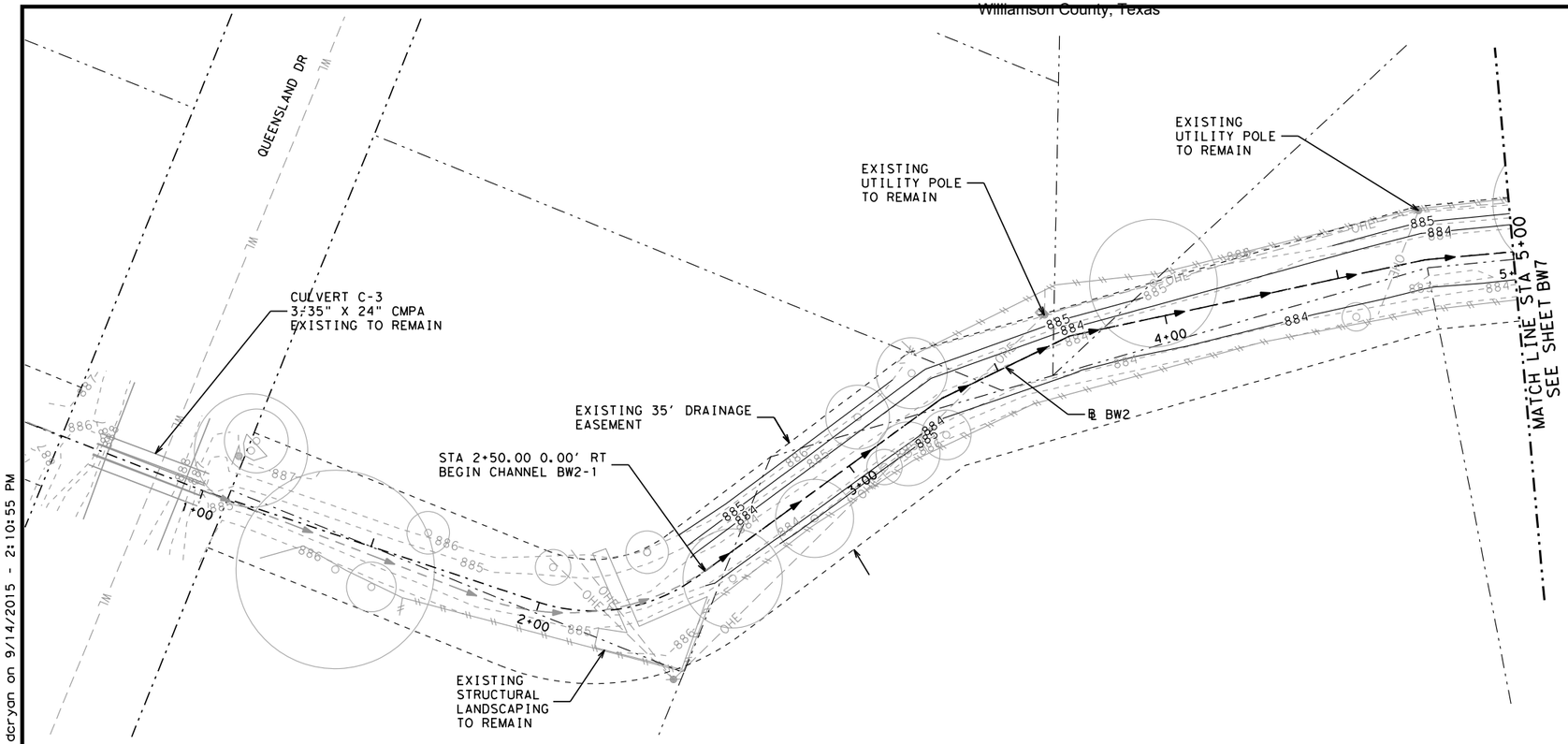
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE - CIP BW3
CHANNEL BW3-1 PLAN AND PROFILE - START TO END

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 40'
DATE	9/14/2015
SHEET NO.	BW5 OF BW16



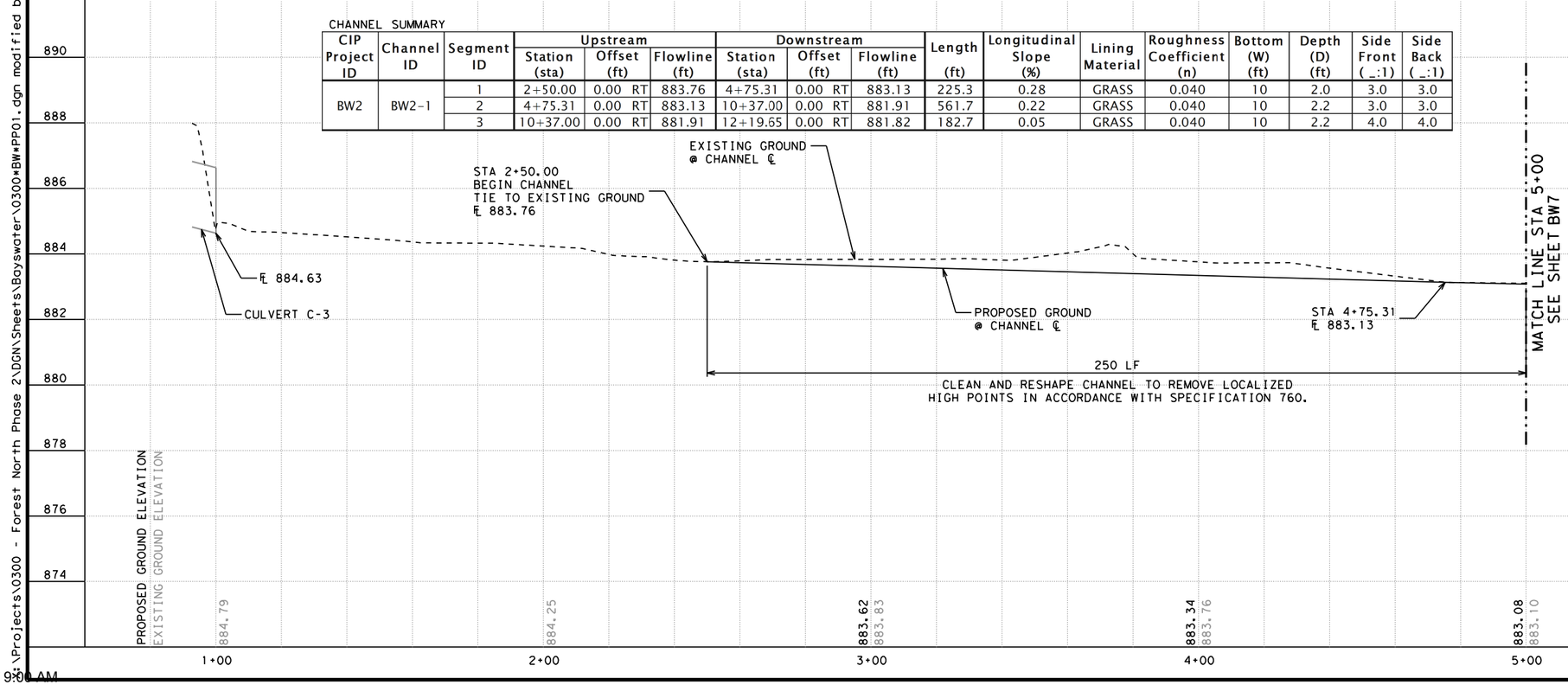
LEGEND
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

0 20 40

NOTES:
1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW2	BW2-1	1	2+50.00	0.00 RT	883.76	4+75.31	0.00 RT	883.13	225.3	0.28	GRASS	0.040	10	2.0	3.0	3.0
		2	4+75.31	0.00 RT	883.13	10+37.00	0.00 RT	881.91	561.7	0.22	GRASS	0.040	10	2.2	3.0	3.0
		3	10+37.00	0.00 RT	881.91	12+19.65	0.00 RT	881.82	182.7	0.05	GRASS	0.040	10	2.2	4.0	4.0



K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE CIP BW2
CHANNEL BW2-1 PLAN AND PROFILE - START TO STA 5+00

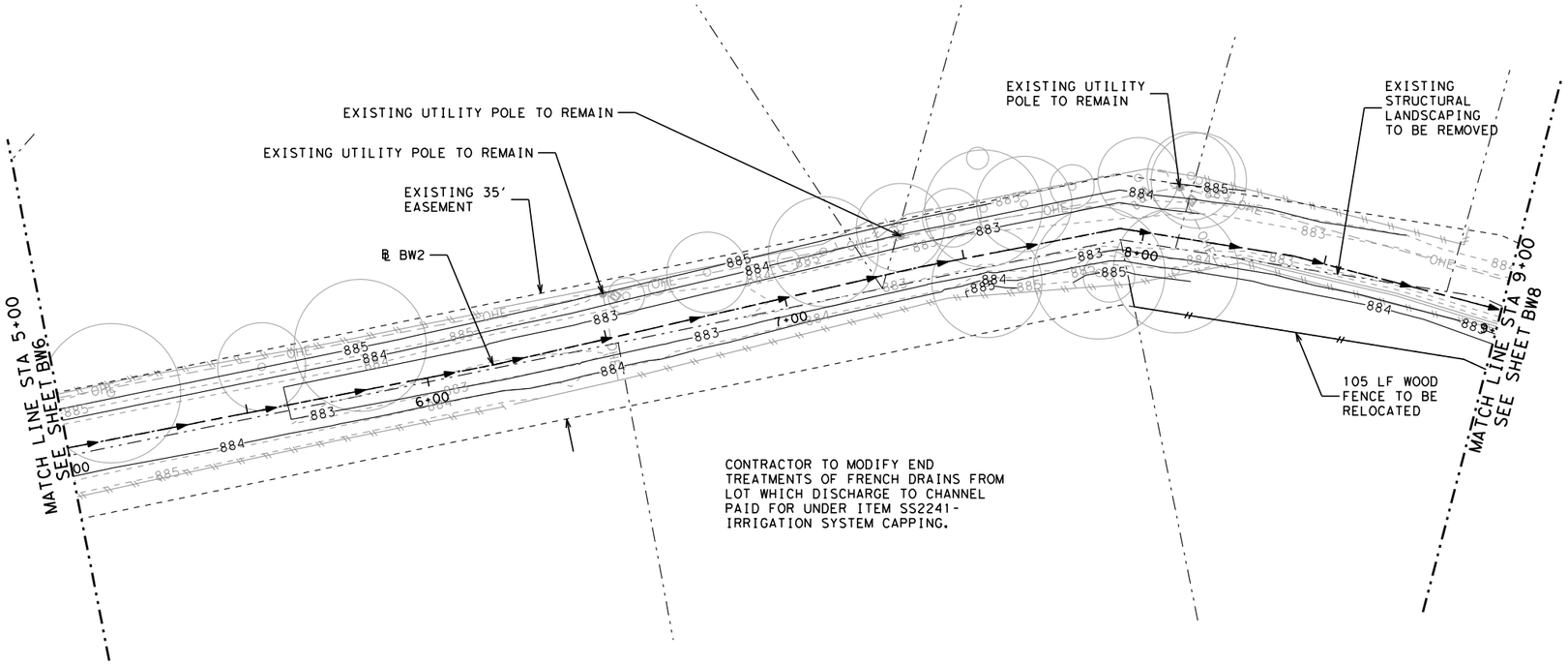
REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 40'
DATE	9/14/2015
SHEET NO.	BW6 OF BW16



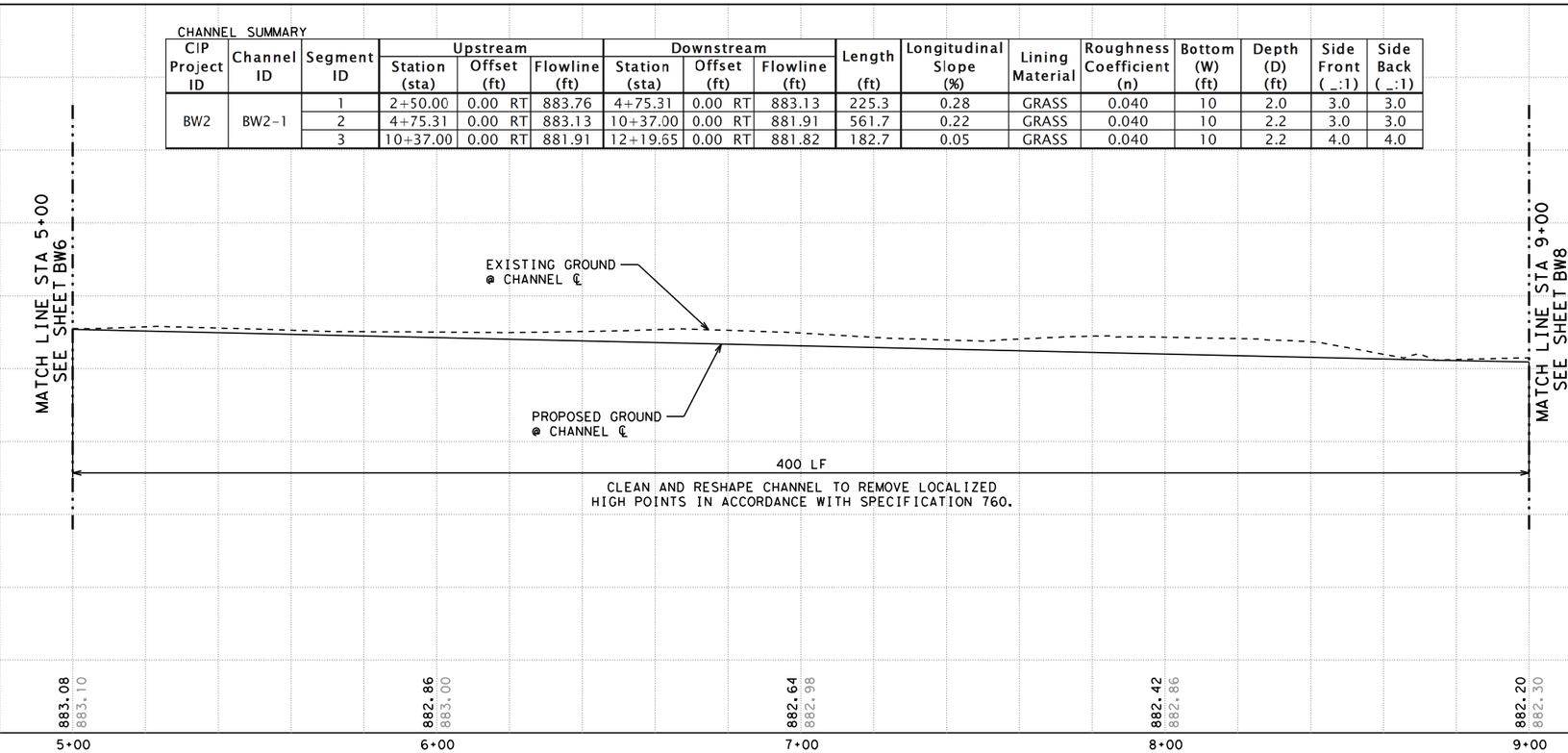
LEGEND
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

0 20 40

NOTES:
1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW2	BW2-1	1	2+50.00	0.00 RT	883.76	4+75.31	0.00 RT	883.13	225.3	0.28	GRASS	0.040	10	2.0	3.0	3.0
		2	4+75.31	0.00 RT	883.13	10+37.00	0.00 RT	881.91	561.7	0.22	GRASS	0.040	10	2.2	3.0	3.0
		3	10+37.00	0.00 RT	881.91	12+19.65	0.00 RT	881.82	182.7	0.05	GRASS	0.040	10	2.2	4.0	4.0



REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

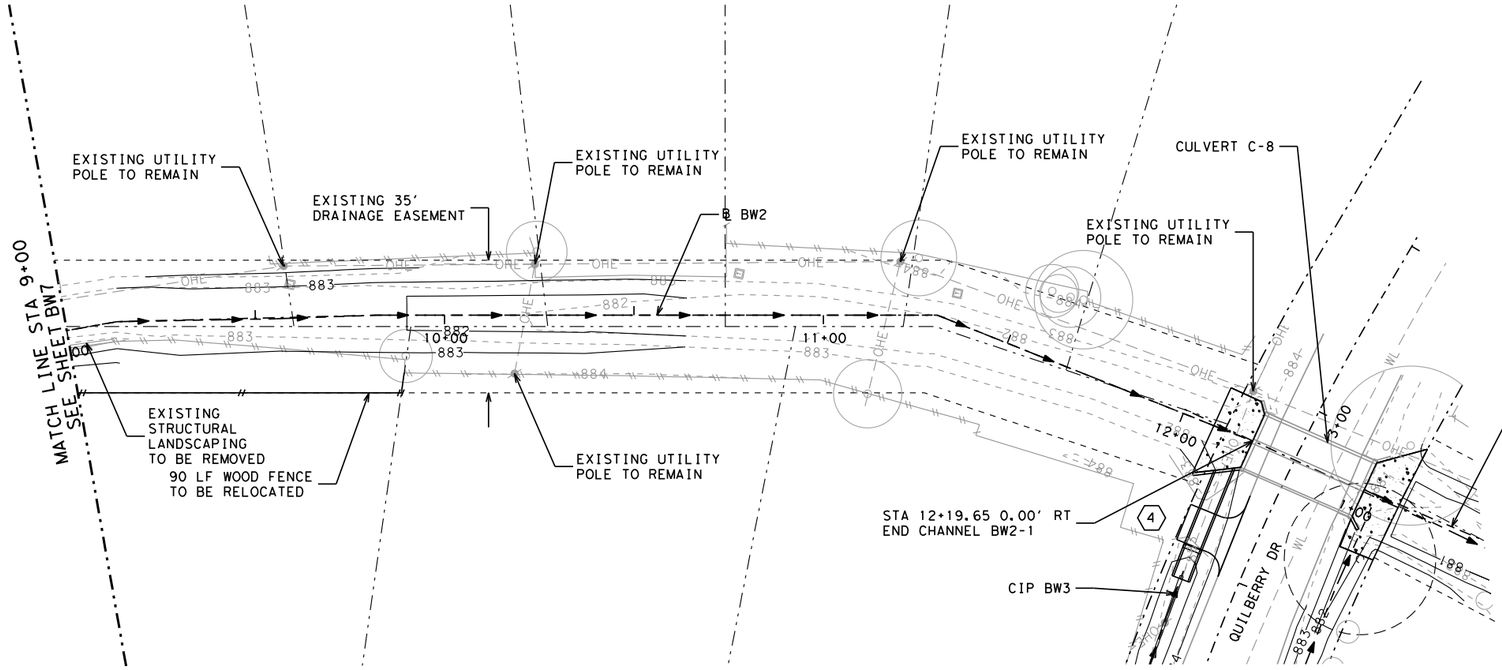
WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE CIP BW2
CHANNEL BW2-1 PLAN AND PROFILE - STA 5+00 TO STA 9+00

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY 1848

SCALE	1" = 40'
DATE	9/14/2015
SHEET NO.	BW7 OF BW16



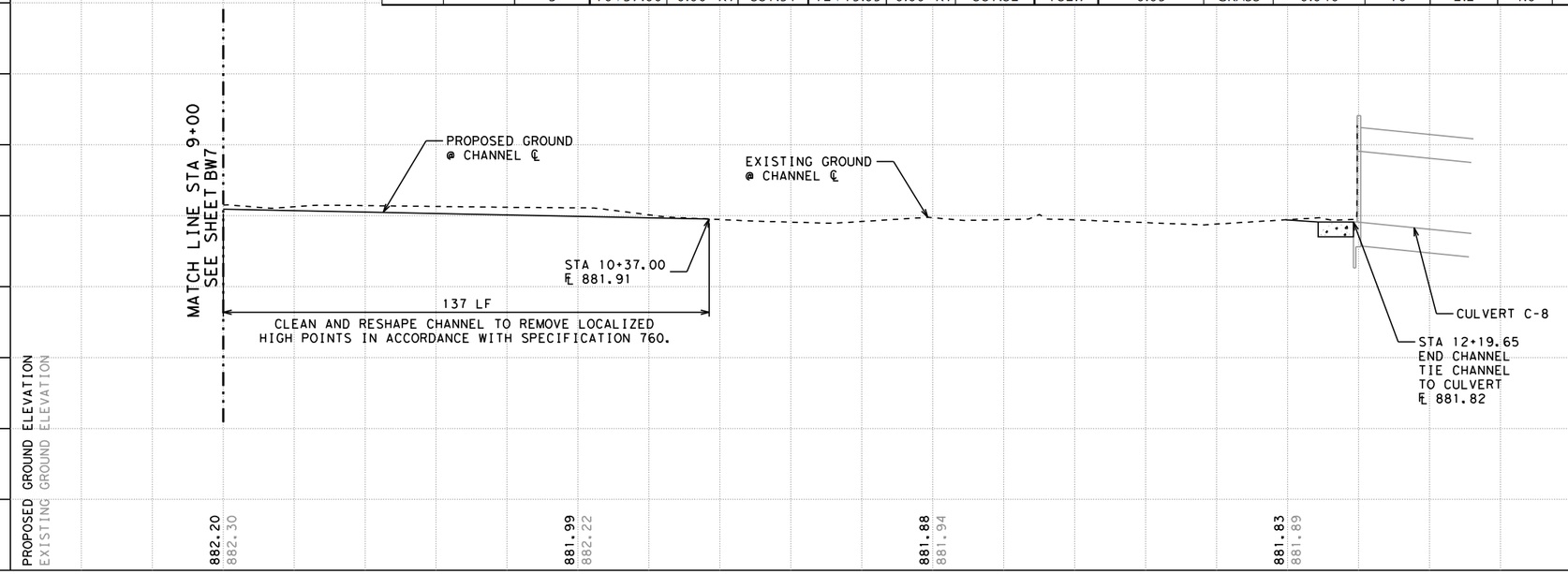
LEGEND
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- (X) DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

0 20 40

NOTES:
1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW2	BW2-1	1	2+50.00	0.00 RT	883.76	4+75.31	0.00 RT	883.13	225.3	0.28	GRASS	0.040	10	2.0	3.0	3.0
		2	4+75.31	0.00 RT	883.13	10+37.00	0.00 RT	881.91	561.7	0.22	GRASS	0.040	10	2.2	3.0	3.0
		3	10+37.00	0.00 RT	881.91	12+19.65	0.00 RT	881.82	182.7	0.05	GRASS	0.040	10	2.2	4.0	4.0



REV. NO.	BY	DATE	REVISION DESCRIPTION

BID 1512-037

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

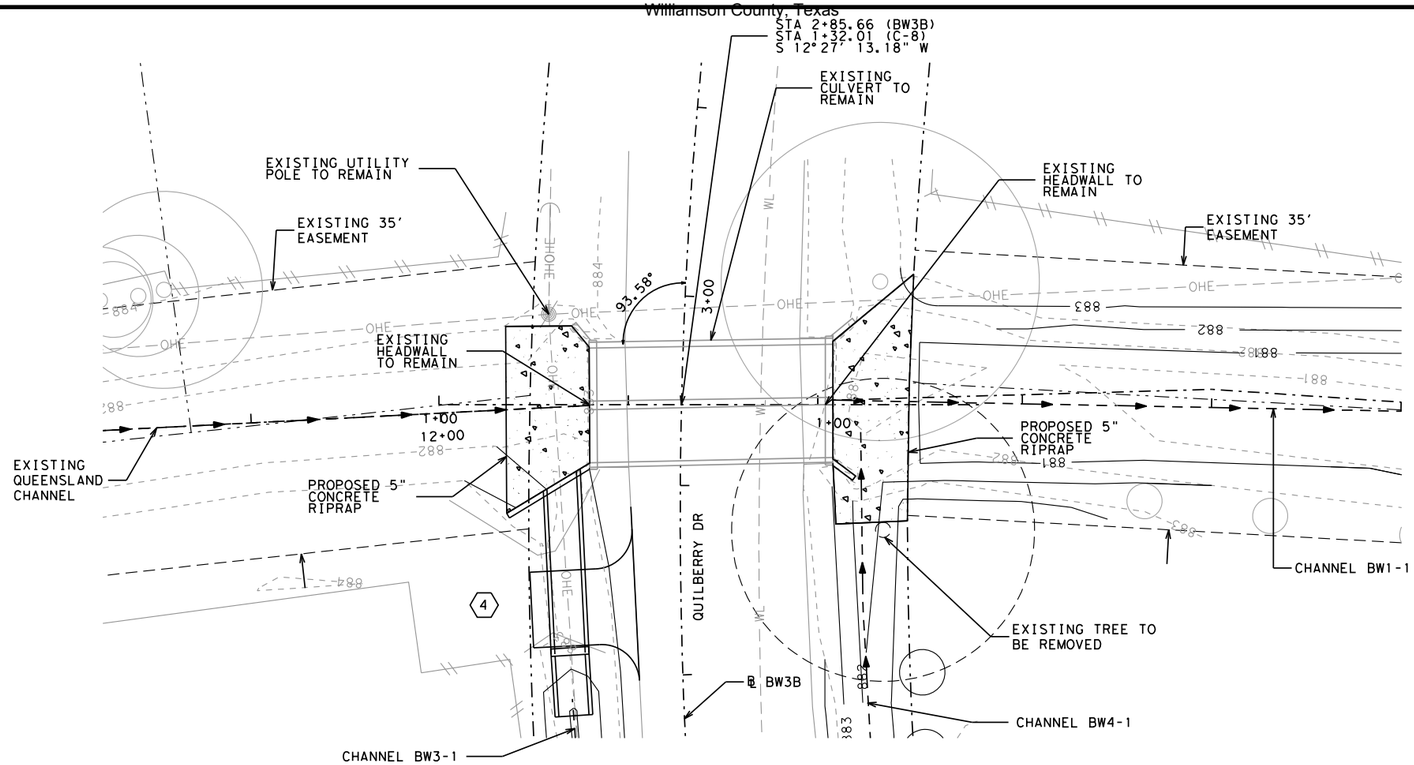
WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE CIP BW2
CHANNEL BW2-1 PLAN AND PROFILE - STA 9+00 TO END

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY 1848

SCALE	1" = 40'
DATE	9/14/2015
SHEET NO.	BW8 OF BW16



LEGEND

- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- (X) DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

N

0 10 20

NOTES:

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2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
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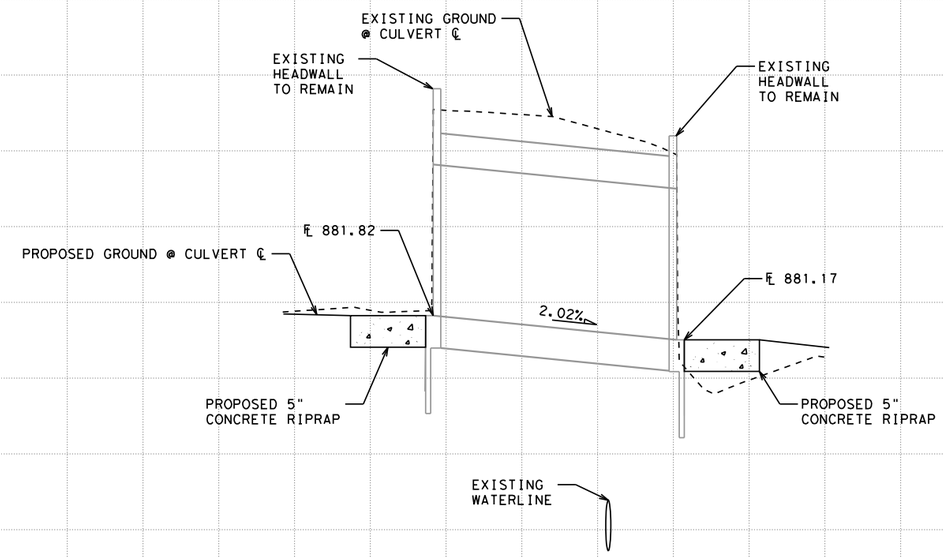

CULVERT C-8
EXIST 2-7' X 2' CBC
33 LF @ 2.02%

FLOW
Q_{25} = 109.1 CFS
Q_{100} = 156.3 CFS

EXISTING HEADWATER
HW_{25} = 883.91
HW_{100} = 884.53

EXISTING TAILWATER
TW_{25} = 883.03
TW_{100} = 883.38

PROPOSED HEADWATER
HW_{25} = 883.91
HW_{100} = 884.53

PROPOSED TAILWATER
TW_{25} = 882.98
TW_{100} = 883.35

REV. NO.	BY	DATE	REVISION DESCRIPTION

BID 1312-037

Charlotte Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS
BAYSWATER ZONE - CIP BW1
CULVERT C-8

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
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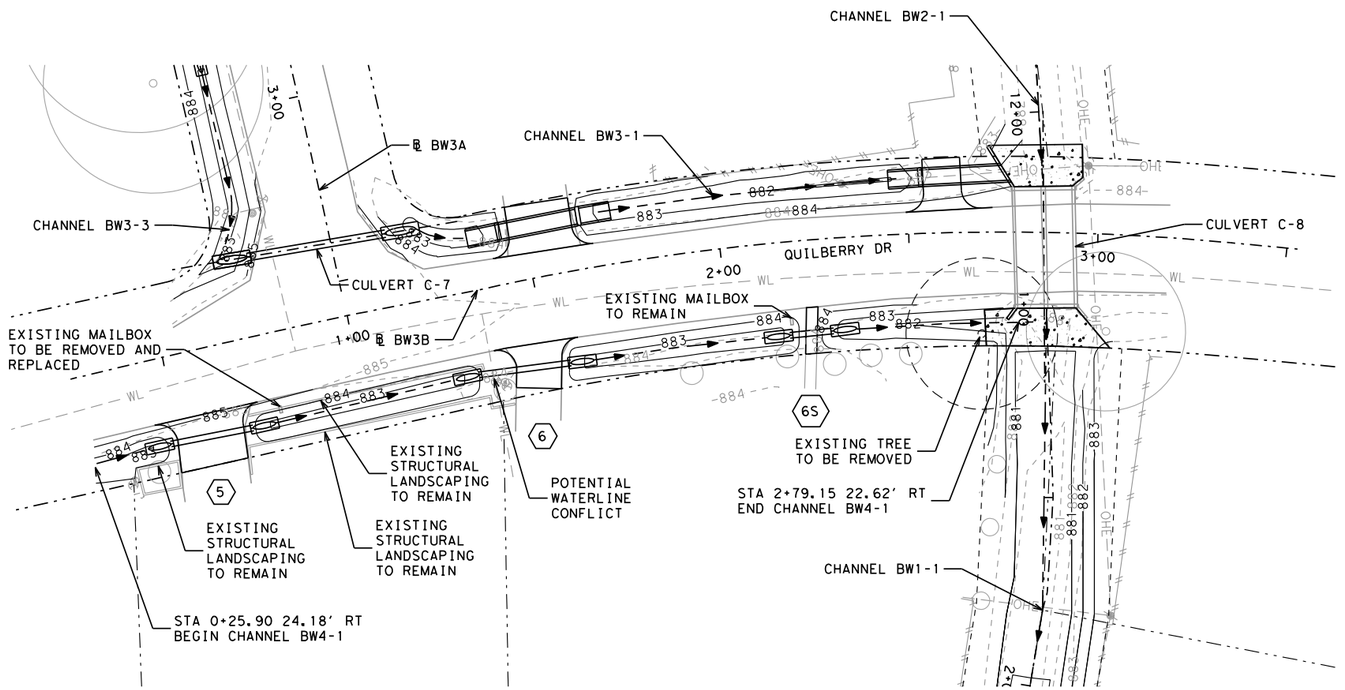
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 20'
DATE	9/14/2015

SHEET NO.
BW9 OF BW16



LEGEND
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- (X) DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

0 20 40

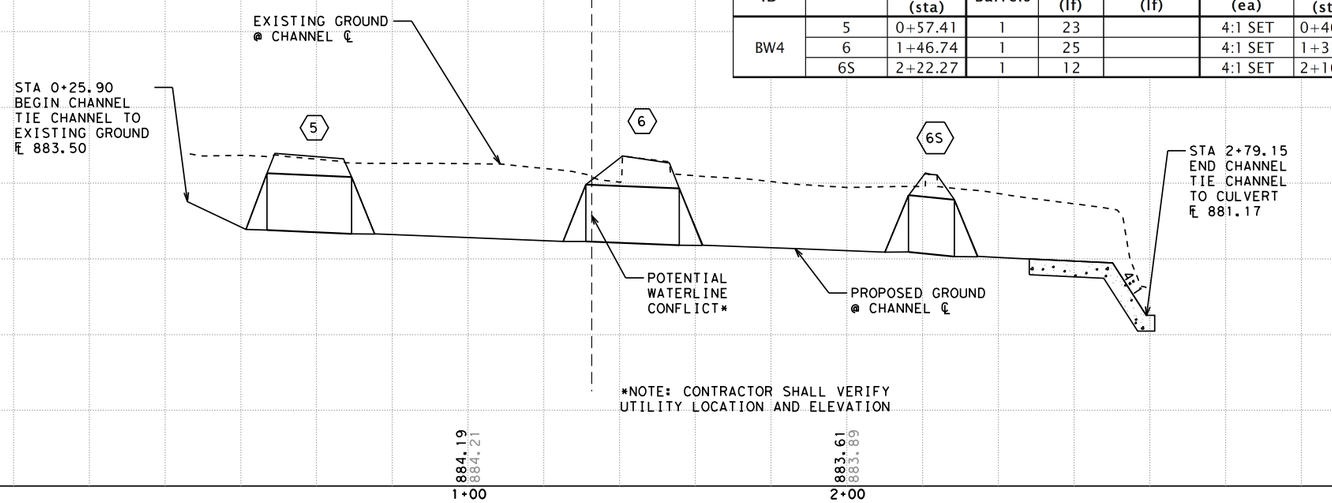
NOTES:
1. ALL STATION AND OFFSET REFERENCES ARE TO THE BASELINE CONTROL UNLESS OTHERWISE NOTED.
2. SEE CHANNEL AND DRIVEWAY SUMMARY SHEET FOR DRIVEWAY AND DRIVEWAY CULVERT INFORMATION.
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW4	BW4-1	1	0+25.90	24.18 RT	883.50	0+40.90	22.72 RT	882.75	15.0	5.00	GRASS	0.040	N/A	1.0	3.0	4.0
		2	0+75.25	23.58 RT	882.65	1+25.10	22.10 RT	882.45	49.9	0.40	GRASS	0.040	N/A	1.5	3.0	4.0
		3	1+61.97	23.81 RT	882.35	2+10.06	24.74 RT	882.17	46.2	0.40	GRASS	0.040	N/A	1.5	3.0	3.0
		4	2+34.40	24.45 RT	882.05	2+70.20	23.02 RT	881.88	35.8	0.47	GRASS	0.040	N/A	1.5	3.0	3.0
		5	2+70.20	23.02 RT	881.88	2+79.15	22.62 RT	880.49	8.9	15.53	CONC	0.010	N/A	1.0	3.0	3.0

DRIVEWAY CULVERT SUMMARY

CIP Project ID	Driveway ID	Station (A) (sta)	Number of Barrels	RCP (CL III) (18 IN) (lf)	CONC BOX CULV (3 FT X 2 FT) (lf)	Upstream End Treatment (ea)	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream End Treatment (ea)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Slope (ft/ft)
BW4	5	0+57.41	1	23		4:1 SET	0+46.90	22.83 RT	882.75	4:1 SET	0+69.25	23.58 RT	882.65	0.004
	6	1+46.74	1	25		4:1 SET	1+31.10	22.00 RT	882.45	4:1 SET	1+55.75	23.81 RT	882.35	0.004
	6S	2+22.27	1	12		4:1 SET	2+16.30	24.64 RT	882.17	4:1 SET	2+28.40	24.45 RT	882.05	0.010



REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

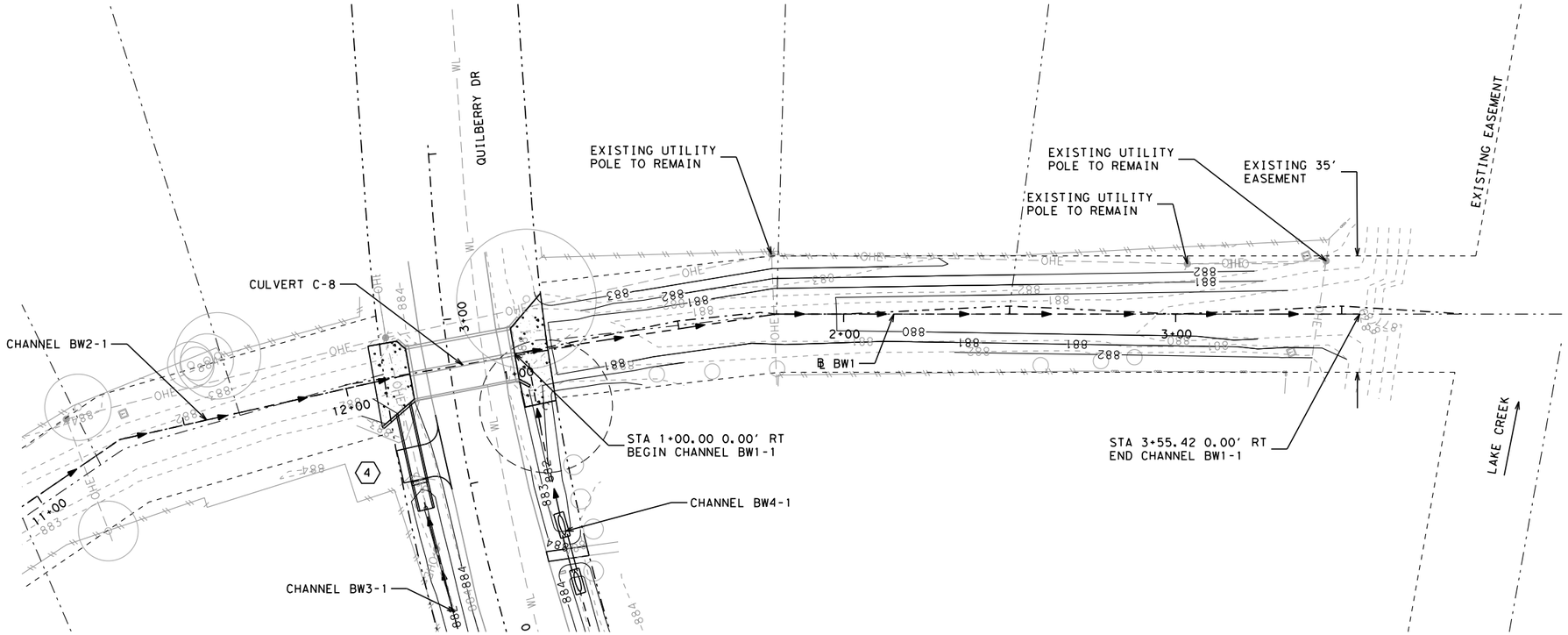
WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE - CIP BW4
CHANNEL BW4-1 PLAN AND PROFILE - START TO END

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	1" = 40'
DATE	9/14/2015
SHEET NO.	BW10 OF BW16



LEGEND
- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- PROPOSED CHANNEL
- EXISTING OVERHEAD UTILITY
- EXISTING FENCE
- EXISTING WASTEWATER LINE
- EXISTING WATERLINE
- CONCRETE RIPRAP
- STONE RIPRAP
- DRIVEWAY ID
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

0 20 40

NOTES:
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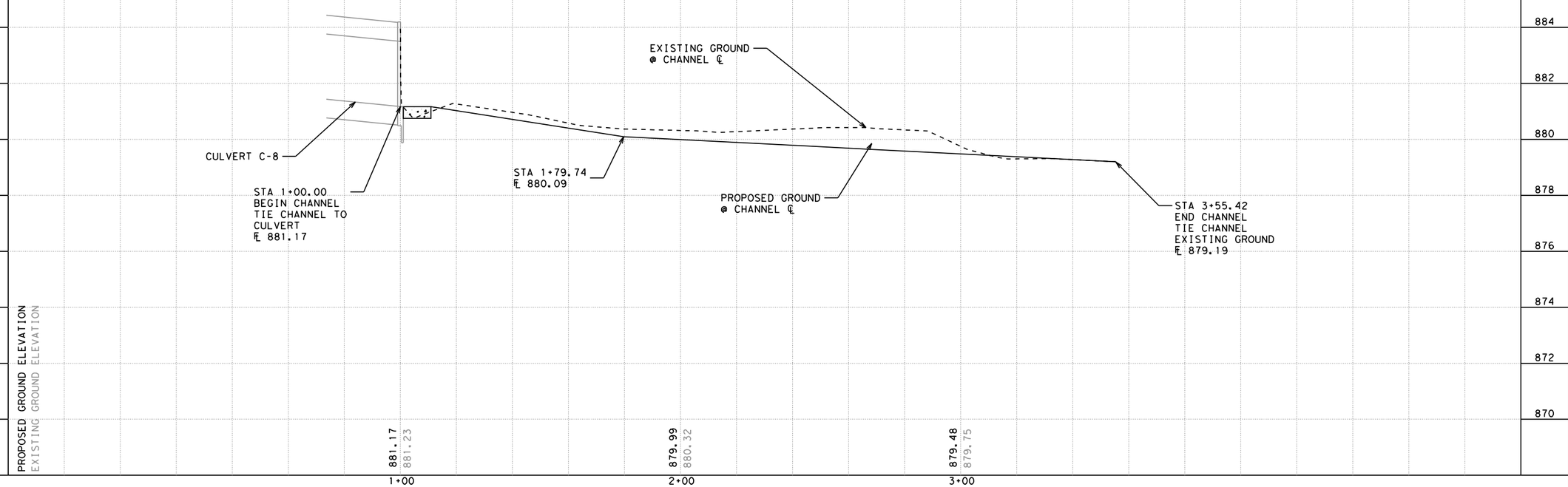
3. EXISTING AND PROPOSED GROUND PROFILES DISPLAYED AT CENTERLINE OF PROPOSED PIPE AND OR CHANNEL.
4. PAVEMENT WILL BE CUT AND RESTORED PER CUTTING AND RESTORING PAVEMENT DETAIL.

CHANNEL SUMMARY

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)
BW1	BW1-1	1	1+00.00	0.00 RT	881.17	1+79.74	0.00 RT	880.09	79.7	1.35	GRASS	0.040	10	1.6	3.0	3.0
		2	1+79.74	0.00 RT	880.09	3+55.42	0.00 RT	879.19	175.7	0.51	GRASS	0.040	10	2.3	3.0	3.0



REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY

FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE - CIP BW1

CHANNEL BW1-1 PLAN AND PROFILE - START TO END

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

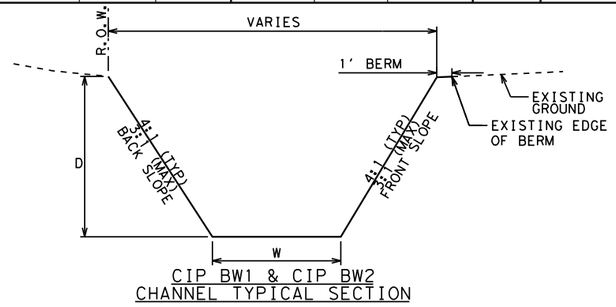
WILLIAMSON COUNTY 1848

SCALE	1" = 40'
DATE	9/14/2015

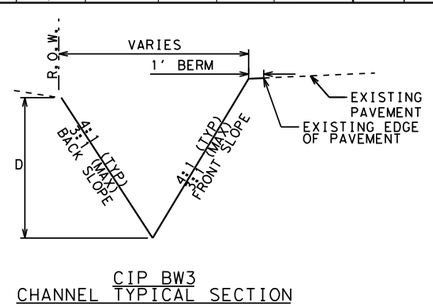
SHEET NO.
BW11 OF BW16

Channel Hydraulics Summary

CIP Project ID	Channel ID	Segment ID	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Length (ft)	Longitudinal Slope (%)	Lining Material	Roughness Coefficient (n)	Bottom (W) (ft)	Depth (D) (ft)	Side Front (_:1)	Side Back (_:1)	Capacity (cfs)	Q_{25} (cfs)	V_{25} (fps)	d_{25} (ft)
BW1	BW1-1	1	1+00.00	0.00 RT	881.17	1+79.74	0.00 RT	880.09	79.7	1.35	GRASS	0.040	10	1.6	3.0	3.0	113.9	112.7	4.80	1.59
		2	1+79.74	0.00 RT	880.09	3+55.42	0.00 RT	879.19	175.7	0.51	GRASS	0.040	10	2.3	3.0	3.0	140.1	112.7	3.39	2.06
BW2	BW2-1	1	2+50.00	0.00 RT	883.76	4+75.31	0.00 RT	883.13	225.3	0.28	GRASS	0.040	10	2.0	3.0	3.0	79.2	77.9	2.46	1.98
		2	4+75.31	0.00 RT	883.13	10+37.00	0.00 RT	881.91	561.7	0.22	GRASS	0.040	10	2.2	3.0	3.0	80.7	77.9	2.26	2.11
		3	10+37.00	0.00 RT	881.91	12+19.65	0.00 RT	881.82	182.7	0.05	GRASS	0.040	10	2.2	4.0	4.0	44.4	77.9	1.25	2.89
BW3	BW3-3	1	1+93.15	23.28 RT	884.72	2+68.00	23.29 RT	882.80	74.9	2.57	GRASS	0.040	N/A	1.5	4.0	3.0	36.9	4.4	2.58	0.61
		2	2+88.00	23.29 RT	882.77	3+38.16	30.47 RT	882.53	50.2	0.48	GRASS	0.040	N/A	2.0	3.0	3.0	27.9	4.4	1.37	0.91
BW3	BW3-1	1	1+22.00	19.10 LT	882.45	1+34.79	13.88 LT	882.20	12.8	1.95	GRASS	0.040	N/A	1.5	3.0	3.0	23.0	17.3	3.18	1.35
		2	1+72.83	14.05 LT	882.15	2+45.18	14.56 LT	881.88	72.4	0.37	GRASS	0.040	N/A	1.6	3.0	4.0	18.2	17.3	2.13	1.52
BW4	BW4-1	1	0+25.90	24.18 RT	883.50	0+40.90	22.72 RT	882.75	15.0	5.00	GRASS	0.040	N/A	1.0	3.0	4.0	17.8	3.6	3.42	0.55
		2	0+75.25	23.58 RT	882.65	1+25.10	22.10 RT	882.45	49.9	0.40	GRASS	0.040	N/A	1.5	3.0	4.0	14.9	3.6	1.33	0.88
		3	1+61.97	23.81 RT	882.35	2+10.06	24.74 RT	882.17	46.2	0.40	GRASS	0.040	N/A	1.5	3.0	3.0	12.6	3.6	1.37	0.94
		4	2+34.40	24.45 RT	882.05	2+70.20	23.02 RT	881.88	35.8	0.47	GRASS	0.040	N/A	1.5	3.0	3.0	13.7	3.6	1.45	0.91
		5	2+70.20	23.02 RT	881.88	2+79.15	22.62 RT	880.49	8.9	15.53	STONE	0.020	N/A	1.0	3.0	3.0	53.4	3.6	9.07	0.36



CIP BW1 & CIP BW2
CHANNEL TYPICAL SECTION



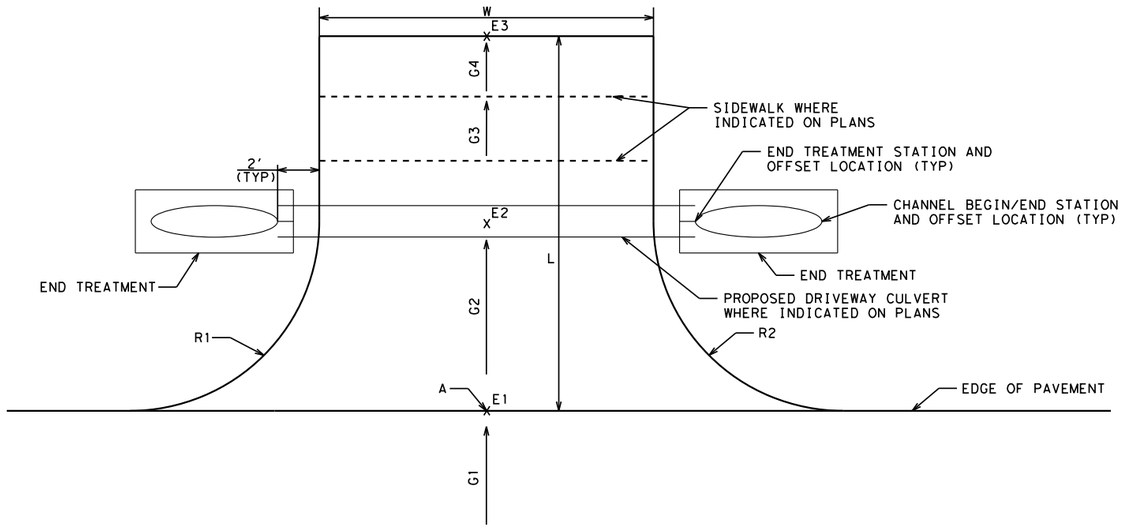
CIP BW3
CHANNEL TYPICAL SECTION

NOTES:

1. CHANNEL EXCAVATION SHALL BE COMPLETED BY OTHERS.

Driveway Culvert Summary

CIP Project ID	Driveway ID	Station (A) (sta)	Number of Barrels	RCP (CL III) (18 IN) (lf)	CONC BOX CULV (3 FT X 2 FT) (lf)	Upstream End Treatment (ea)	Upstream Station (sta)	Upstream Offset (ft)	Upstream Flowline (ft)	Downstream End Treatment (ea)	Downstream Station (sta)	Downstream Offset (ft)	Downstream Flowline (ft)	Slope (ft/ft)	Roughness Coefficient (n)	Area (ft^2)	Wetted Per. (ft)	Hydraulic Radius (ft)	Culvert Flows Q_{25} (cfs)	Culvert Flows d_{25} (ft)	Culvert Flows Capacity (cfs)
BW3	1	2+66.53				NO CROSS DRAINAGE STRUCTURE															
BW3	2S	1+37.00	1	8		4:1 SET	2+74.00	23.29 RT	882.80	4:1 SET	2+82.00	23.29 RT	882.77	0.004	0.012	1.8	4.7	0.375	4.4	1.3	7.0
BW3	3	1+54.00	1		23	4:1 SETB	1+43.00	13.84 LT	882.20	4:1 SETB	1+65.00	14.00 LT	882.15	0.002	0.012	5.8	10.9	0.531	17.3	2.3	22.4
	4	4+09.16	1		24	4:1 SET	2+53.00	14.79 LT	881.88	PW-0	2+75.61	15.66 LT	881.82	0.003	0.012	5.3	10.7	0.499	17.3	2.2	21.4
BW4	5	0+57.41	1	23		4:1 SET	0+46.90	22.83 RT	882.75	4:1 SET	0+69.25	23.58 RT	882.65	0.004	0.012	1.8	4.7	0.375	3.6	1.1	7.6
	6	1+46.74	1	25		4:1 SET	1+31.10	22.00 RT	882.45	4:1 SET	1+55.75	23.81 RT	882.35	0.004	0.012	1.8	4.7	0.375	3.6	1.1	7.2
	6S	2+22.27	1	12		4:1 SET	2+16.30	24.64 RT	882.17	4:1 SET	2+28.40	24.45 RT	882.05	0.010	0.012	1.8	4.7	0.375	3.6	1.0	11.3



DRIVEWAY DETAIL

REV. NO.	BY	DATE	REVISION DESCRIPTION
			BID 1512-037

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE
CHANNEL AND DRIVEWAY SUMMARY

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
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TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015

SHEET NO.
BW12 OF BW16

EXISTING CONDITIONS

Roadway Data: Existing

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	885.13
1	12.78	885.18
2	23.72	885.27
3	41.89	885.42
4	85.10	885.51

Roadway Surface: Paved
Roadway Top Width: 27.15 ft

Site Data: Existing

Inlet Station: 120.00 ft
Inlet Elevation: 882.87 ft
Outlet Station: 163.89 ft
Outlet Elevation: 883.10 ft
Number of Barrels: 1

Tailwater Channel Data: Existing

Tailwater Channel Option: Irregular Channel
Channel Slope: 0.0022 ft/ft

Coord No.	Station (ft)	Elevation (ft)	Mannings' n
1	0.00	885.00	0.040
2	8.33	884.72	0.040
3	11.61	884.38	0.040
4	17.30	883.62	0.040
5	20.00	883.35	0.040
6	20.64	883.32	0.040
7	22.89	883.56	0.040
8	25.57	884.78	0.040
9	29.29	885.03	0.040
10	29.42	885.05	0.040
11	30.92	885.07	0.040
12	40.00	885.09	0.040

Culvert Data Summary: Existing

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Grooved End Projecting
Inlet Depression: NONE

CULVERT SUMMARY TABLE: EXISTING 12" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
7.0	7.0	884.66	1.54	1.79	9-A2t	-1.00	1.02	1.12	0.91	4.93	1.13
8.8	8.8	884.83	1.83	1.96	9-A2t	-1.00	1.14	1.22	1.00	5.73	1.20
10.6	10.6	885.04	2.17	2.17	9-A2t	-1.00	1.25	1.30	1.08	6.52	1.26
12.4	11.4	885.23	2.36	2.28	9-A2t	-1.00	1.29	1.38	1.16	6.72	1.31
14.2	11.7	885.29	2.42	2.32	9-A2t	-1.00	1.30	1.45	1.23	6.93	1.35
16.0	9.1	885.38	1.88	2.52	4-FFf	-1.00	1.16	1.50	1.30	5.15	1.39
* 17.3	9.0	885.41	1.86	2.54	4-FFf	-1.00	1.15	1.50	1.34	5.08	1.41
19.5	8.8	885.44	1.83	2.60	4-FFf	-1.00	1.15	1.50	1.42	4.99	1.44
21.3	8.8	885.46	1.83	2.69	4-FFf	-1.00	1.14	1.50	1.52	4.97	1.38
23.1	8.8	885.48	1.83	2.76	4-FFf	-1.00	1.14	1.50	1.59	4.97	1.35
24.9	8.8	885.49	1.83	2.81	4-FFf	-1.00	1.14	1.50	1.65	4.97	1.34

SUMMARY OF FLOWS AT CROSSING: EXISTING

Headwater Elevation (ft)	Total Discharge (cfs)	12" RCP Discharge (cfs)	Roadway Discharge (cfs)
884.66	7.0	7.0	0.0
884.83	8.8	8.8	0.0
885.04	10.6	10.6	0.0
885.23	12.4	11.4	0.9
885.29	14.2	11.7	2.4
885.38	16.0	9.1	6.8
885.41	17.3	9.0	8.3
885.44	19.5	8.8	10.59
885.46	21.3	8.8	12.48
885.48	23.1	8.8	14.21
885.49	24.9	8.8	16.03
885.18	11.2	11.2	0.00

DOWNSTREAM CHANNEL RATING CURVE: EXISTING

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
7.0	884.22	0.91	1.13	0.12	0.27
8.8	884.32	1.00	1.20	0.14	0.28
10.6	884.40	1.08	1.26	0.15	0.28
12.4	884.48	1.16	1.31	0.16	0.28
14.2	884.55	1.23	1.35	0.17	0.29
16.0	884.61	1.30	1.39	0.18	0.29
17.3	884.66	1.34	1.41	0.18	0.29
19.5	884.74	1.42	1.44	0.20	0.29
21.3	884.83	1.52	1.38	0.21	0.29
23.1	884.91	1.59	1.35	0.22	0.29
24.9	884.96	1.65	1.34	0.23	0.29

PROPOSED CONDITIONS

Roadway Data: Proposed

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	885.13
1	12.78	885.18
2	23.72	885.27
3	41.89	885.42
4	85.10	885.51

Roadway Surface: Paved
Roadway Top Width: 27.00 ft

Site Data: Proposed

Inlet Station: 120.00 ft
Inlet Elevation: 882.53 ft
Outlet Station: 157.11 ft
Outlet Elevation: 882.43 ft
Number of Barrels: 1

Tailwater Channel Data: Proposed

Tailwater Channel Option: Enter Rating Curve
Channel Invert Elevation: 881.89 ft

Culvert Data Summary: Proposed

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: NONE

CULVERT SUMMARY TABLE: PROPOSED 24" RCP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
7.0	7.0	883.99	1.37	1.46	2-M2c	1.06	0.94	0.94	0.63	4.83	0.00
8.8	8.8	884.19	1.57	1.66	2-M2c	1.22	1.06	1.06	0.74	5.22	
10.6	10.6	884.39	1.77	1.86	2-M2c	1.39	1.16	1.16	0.85	5.59	
12.4	12.4	884.58	1.96	2.05	7-M2c	1.59	1.26	1.26	0.91	5.92	
14.2	14.2	884.77	2.16	2.24	7-M2c	2.00	1.35	1.35	0.97	6.27	
16.0	16.0	884.96	2.37	2.43	7-M2c	2.00	1.44	1.44	1.03	6.61	
* 17.3	17.3	885.11	2.55	2.58	7-M2c	2.00	1.50	1.50	1.08	6.86	4.20
19.5	18.5	885.24	2.71	2.71	7-M2c	2.00	1.55	1.55	1.12	7.09	
21.3	18.8	885.29	2.76	2.75	7-M2c	2.00	1.56	1.56	1.13	7.16	
23.1	19.1	885.33	2.80	2.78	7-M2c	2.00	1.57	1.57	1.14	7.21	
24.9	19.3	885.36	2.83	2.81	7-M2c	2.00	1.58	1.58	1.14	7.26	6.53

SUMMARY OF FLOWS AT CROSSING: PROPOSED

Headwater Elevation (ft)	Total Discharge (cfs)	24" RCP Discharge (cfs)	Roadway Discharge (cfs)
883.99	7.0	7.0	0.0
884.19	8.8	8.8	0.0
884.39	10.6	10.6	0.0
884.58	12.4	12.4	0.0
884.77	14.2	14.2	0.0
884.96	16.0	16.0	0.0
885.11	17.3	17.3	0.0
885.24	19.5	18.5	1.0
885.29	21.3	18.8	2.4
885.33	23.1	19.1	4.0
885.36	24.9	19.3	5.5
885.18	18.0	18.0	0.0

DOWNSTREAM CHANNEL RATING CURVE: PROPOSED

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)
7.0	882.52	0.63	0.00
10.8	882.75	0.86	2.23
13.2	882.82	0.93	3.44
17.3	882.97	1.08	4.20
20.5	883.07	1.18	5.51
24.9	883.20	1.31	6.53
30.0	883.30	1.41	9.55

NOTE: HY-8 VERSION 7.30 USED FOR CULVERT HYDRAULIC CALCULATIONS.
* DESIGN FLOW

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS
BAYSWATER ZONE
CULVERT C-7 HYDRAULIC CALCULATIONS

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
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TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE
DATE 9/14/2015
SHEET NO.
BW13 OF BW16

EXISTING CONDITIONS

Roadway Data: Existing

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	884.39
1	22.20	884.43
2	32.50	884.45
3	32.75	884.45
4	42.50	884.47
5	104.00	884.60

Roadway Surface: Paved
Roadway Top Width: 24.00 ft

Site Data: Existing

Inlet Station: 120.00 ft
Inlet Elevation: 881.82 ft
Outlet Station: 152.21 ft
Outlet Elevation: 881.29 ft
Number of Barrels: 2

Tailwater Channel Data: Existing

Tailwater Channel Option: Trapezoidal
Bottom Width: 8.00 ft
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0080 ft/ft
Channel Manning's n: 0.040
Channel Invert Elevation: 881.17 ft

Culvert Data Summary: Existing

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with (90°) Headwall
Inlet Depression: NONE

PROPOSED CONDITIONS

Roadway Data: Proposed

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	0.00	884.39
1	22.20	884.43
2	32.50	884.45
3	32.75	884.45
4	42.50	884.47
5	104.00	884.60

Roadway Surface: Paved
Roadway Top Width: 24.00 ft

Site Data: Proposed

Inlet Station: 120.00 ft
Inlet Elevation: 881.82 ft
Outlet Station: 152.21 ft
Outlet Elevation: 881.29 ft
Number of Barrels: 2

Tailwater Channel Data: Proposed

Tailwater Channel Option: Trapezoidal
Bottom Width: 10.00 ft
Side Slope (H:V): 3.00 (_:1)
Channel Slope: 0.0078 ft/ft
Channel Manning's n: 0.040
Channel Invert Elevation: 881.17 ft

Culvert Data Summary: Proposed

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with (90°) Headwall
Inlet Depression: NONE

CULVERT SUMMARY TABLE: EXISTING 7' X 2' CBC

	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	45.0	45.0	882.97	1.15	0.60	1-S2n	0.40	0.69	0.44	1.19	7.30	2.98
	56.1	56.1	883.15	1.33	0.78	1-S2n	0.45	0.79	0.52	1.33	7.76	3.17
	67.3	67.3	883.32	1.50	0.96	1-S2n	0.51	0.90	0.59	1.46	8.13	3.34
	78.4	78.4	883.48	1.66	1.13	1-S2n	0.57	0.99	0.66	1.57	8.46	3.48
	89.5	89.5	883.64	1.82	1.30	1-S2n	0.61	1.08	0.73	1.68	8.75	3.61
	100.7	100.7	883.79	1.97	1.47	1-S2n	0.66	1.17	0.80	1.78	9.02	3.73
*	109.1	109.1	883.91	2.09	1.60	5-S2n	0.70	1.24	0.85	1.86	9.20	3.81
	122.9	122.9	884.10	2.28	1.82	5-S2n	0.76	1.34	0.93	1.97	9.46	3.94
	134.0	134.0	884.27	2.45	2.00	5-S2n	0.80	1.42	0.99	2.05	9.67	4.03
	145.2	144.8	884.43	2.61	2.18	5-S2n	0.84	1.49	1.05	2.13	9.87	4.12
	156.3	151.3	884.53	2.71	2.33	5-S2n	0.86	1.54	1.08	2.21	9.98	4.20

CULVERT SUMMARY TABLE: PROPOSED 7' X 2' CBC

	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	45.0	45.0	882.97	1.15	0.54	1-S2n	0.40	0.69	0.44	1.12	7.30	3.00
	56.1	56.1	883.15	1.33	0.72	1-S2n	0.45	0.79	0.52	1.27	7.76	3.21
	67.3	67.3	883.32	1.50	0.90	1-S2n	0.51	0.90	0.59	1.40	8.13	3.39
	78.4	78.4	883.48	1.66	1.07	1-S2n	0.57	0.99	0.66	1.52	8.46	3.55
	89.5	89.5	883.64	1.82	1.25	1-S2n	0.61	1.08	0.73	1.63	8.75	3.69
	100.7	100.7	883.79	1.97	1.42	1-S2n	0.66	1.17	0.80	1.73	9.02	3.82
*	109.1	109.1	883.91	2.09	1.56	5-S2n	0.70	1.24	0.85	1.81	9.20	3.91
	122.9	122.9	884.10	2.28	1.78	5-S2n	0.76	1.34	0.93	1.93	9.46	4.05
	134.0	134.0	884.27	2.45	1.97	5-S2n	0.80	1.42	0.99	2.02	9.67	4.15
	145.2	144.8	884.43	2.61	2.15	5-S2n	0.84	1.49	1.05	2.10	9.87	4.24
	156.3	151.3	884.53	2.71	2.30	5-S2n	0.86	1.54	1.08	2.18	9.98	4.33

SUMMARY OF FLOWS AT CROSSING: EXISTING

Headwater Elevation (ft)	Total Discharge (cfs)	7' x 2' CBC Discharge (cfs)	Roadway Discharge (cfs)
882.97	45.0	45.0	0.0
883.15	56.1	56.1	0.0
883.32	67.3	67.3	0.0
883.48	78.4	78.4	0.0
883.64	89.5	89.5	0.0
883.79	100.7	100.7	0.0
883.91	109.1	109.1	0.0
884.10	122.9	122.9	0.0
884.27	134.0	134.0	0.0
884.43	145.2	144.8	0.2
884.53	156.3	151.3	4.7
884.43	144.8	144.8	0.0

DOWNSTREAM CHANNEL RATING CURVE: EXISTING

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
45.0	882.36	1.19	2.98	0.59	0.57
56.1	882.50	1.33	3.17	0.66	0.57
67.3	882.63	1.46	3.34	0.73	0.58
78.4	882.74	1.57	3.48	0.79	0.59
89.5	882.85	1.68	3.61	0.84	0.59
100.7	882.95	1.78	3.73	0.89	0.60
109.1	883.03	1.86	3.81	0.93	0.60
122.9	883.14	1.97	3.94	0.98	0.60
134.0	883.22	2.05	4.03	1.02	0.61
145.2	883.30	2.13	4.12	1.07	0.61
156.3	883.38	2.21	4.20	1.10	0.61

SUMMARY OF FLOWS AT CROSSING: PROPOSED

Headwater Elevation (ft)	Total Discharge (cfs)	7' x 2' CBC Discharge (cfs)	Roadway Discharge (cfs)
882.97	45.0	45.0	0.0
883.15	56.1	56.1	0.0
883.32	67.3	67.3	0.0
883.48	78.4	78.4	0.0
883.64	89.5	89.5	0.0
883.79	100.7	100.7	0.0
883.91	109.1	109.1	0.0
884.10	122.9	122.9	0.0
884.27	134.0	134.0	0.0
884.43	145.2	144.8	0.2
884.53	156.3	151.3	4.7
884.43	144.8	144.8	0.0

DOWNSTREAM CHANNEL RATING CURVE: PROPOSED

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
45.0	882.29	1.12	3.00	0.55	0.56
56.1	882.44	1.27	3.21	0.62	0.57
67.3	882.57	1.40	3.39	0.68	0.58
78.4	882.69	1.52	3.55	0.74	0.58
89.5	882.80	1.63	3.69	0.79	0.59
100.7	882.90	1.73	3.82	0.84	0.59
109.1	882.98	1.81	3.91	0.88	0.60
122.9	883.10	1.93	4.05	0.94	0.60
134.0	883.18	2.01	4.15	0.98	0.60
145.2	883.27	2.10	4.24	1.02	0.61
156.3	883.35	2.18	4.33	1.06	0.61

NOTE: HY-8 VERSION 7.30 USED FOR CULVERT HYDRAULIC CALCULATIONS.
* DESIGN FLOW

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte Gilpin

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER

9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

BAYSWATER ZONE
CULVERT C-8 HYDRAULIC CALCULATIONS

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
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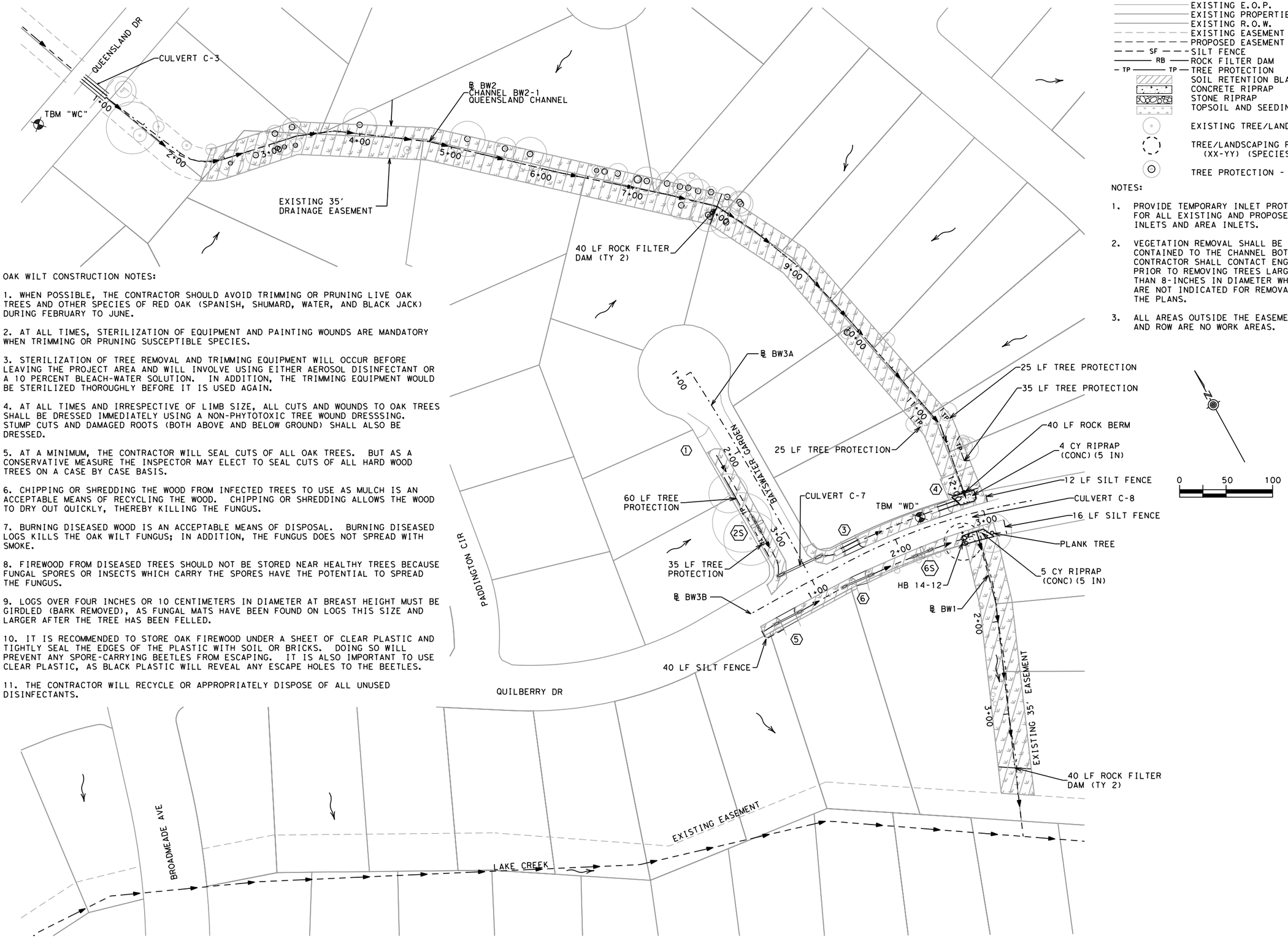
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015
SHEET NO.	BW14 OF BW16



LEGEND

- EXISTING E.O.P.
- EXISTING PROPERTIES
- EXISTING R.O.W.
- EXISTING EASEMENT
- PROPOSED EASEMENT
- SF — SILT FENCE
- RB — ROCK FILTER DAM
- TP — TP — TREE PROTECTION
- SOIL RETENTION BLANKET
- CONCRETE RIPRAP
- STONE RIPRAP
- TOPSOIL AND SEEDING (4")
- EXISTING TREE/LANDSCAPING
- TREE/LANDSCAPING REMOVAL (XX-YY) (SPECIES-SIZE)
- TREE PROTECTION - PLANK

NOTES:

1. PROVIDE TEMPORARY INLET PROTECTION FOR ALL EXISTING AND PROPOSED CURB INLETS AND AREA INLETS.
2. VEGETATION REMOVAL SHALL BE CONTAINED TO THE CHANNEL BOTTOM. CONTRACTOR SHALL CONTACT ENGINEER PRIOR TO REMOVING TREES LARGER THAN 8-INCHES IN DIAMETER WHICH ARE NOT INDICATED FOR REMOVAL ON THE PLANS.
3. ALL AREAS OUTSIDE THE EASEMENTS AND ROW ARE NO WORK AREAS.

OAK WILT CONSTRUCTION NOTES:

1. WHEN POSSIBLE, THE CONTRACTOR SHOULD AVOID TRIMMING OR PRUNING LIVE OAK TREES AND OTHER SPECIES OF RED OAK (SPANISH, SHUMARD, WATER, AND BLACK JACK) DURING FEBRUARY TO JUNE.

2. AT ALL TIMES, STERILIZATION OF EQUIPMENT AND PAINTING WOUNDS ARE MANDATORY WHEN TRIMMING OR PRUNING SUSCEPTIBLE SPECIES.

3. STERILIZATION OF TREE REMOVAL AND TRIMMING EQUIPMENT WILL OCCUR BEFORE LEAVING THE PROJECT AREA AND WILL INVOLVE USING EITHER AEROSOL DISINFECTANT OR A 10 PERCENT BLEACH-WATER SOLUTION. IN ADDITION, THE TRIMMING EQUIPMENT WOULD BE STERILIZED THOROUGHLY BEFORE IT IS USED AGAIN.

4. AT ALL TIMES AND IRRESPECTIVE OF LIMB SIZE, ALL CUTS AND WOUNDS TO OAK TREES SHALL BE DRESSED IMMEDIATELY USING A NON-PHYTOTOXIC TREE WOUND DRESSSING. STUMP CUTS AND DAMAGED ROOTS (BOTH ABOVE AND BELOW GROUND) SHALL ALSO BE DRESSED.

5. AT A MINIMUM, THE CONTRACTOR WILL SEAL CUTS OF ALL OAK TREES. BUT AS A CONSERVATIVE MEASURE THE INSPECTOR MAY ELECT TO SEAL CUTS OF ALL HARD WOOD TREES ON A CASE BY CASE BASIS.

6. CHIPPING OR SHREDDING THE WOOD FROM INFECTED TREES TO USE AS MULCH IS AN ACCEPTABLE MEANS OF RECYCLING THE WOOD. CHIPPING OR SHREDDING ALLOWS THE WOOD TO DRY OUT QUICKLY, THEREBY KILLING THE FUNGUS.

7. BURNING DISEASED WOOD IS AN ACCEPTABLE MEANS OF DISPOSAL. BURNING DISEASED LOGS KILLS THE OAK WILT FUNGUS; IN ADDITION, THE FUNGUS DOES NOT SPREAD WITH SMOKE.

8. FIREWOOD FROM DISEASED TREES SHOULD NOT BE STORED NEAR HEALTHY TREES BECAUSE FUNGAL SPORES OR INSECTS WHICH CARRY THE SPORES HAVE THE POTENTIAL TO SPREAD THE FUNGUS.

9. LOGS OVER FOUR INCHES OR 10 CENTIMETERS IN DIAMETER AT BREAST HEIGHT MUST BE GIRDLED (BARK REMOVED), AS FUNGAL MATS HAVE BEEN FOUND ON LOGS THIS SIZE AND LARGER AFTER THE TREE HAS BEEN FELLED.

10. IT IS RECOMMENDED TO STORE OAK FIREWOOD UNDER A SHEET OF CLEAR PLASTIC AND TIGHTLY SEAL THE EDGES OF THE PLASTIC WITH SOIL OR BRICKS. DOING SO WILL PREVENT ANY SPORE-CARRYING BEETLES FROM ESCAPING. IT IS ALSO IMPORTANT TO USE CLEAR PLASTIC, AS BLACK PLASTIC WILL REVEAL ANY ESCAPE HOLES TO THE BEETLES.

11. THE CONTRACTOR WILL RECYCLE OR APPROPRIATELY DISPOSE OF ALL UNUSED DISINFECTANTS.

REV. NO.	BY	DATE	REVISION DESCRIPTION

STATE OF TEXAS
CHARLOTTE A. GILPIN
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LICENSED PROFESSIONAL ENGINEER
9/14/2015

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WILLIAMSON COUNTY
1848

SCALE	1" = 100'
DATE	9/14/2015

SHEET NO.
BW15 OF BW16

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°, 15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (C.Y.)	Class "C" Conc (Curb) (2) (C.Y.)	Class "C" Conc (Wingwall) (3) (C.Y.)	Total Wingwall Area (S.F.)
DRIVEWAY BW3 (Both)	1 ~ 4'x 2'	1'	SCP-4	SETB-PD	0°	4:1	8"	5"	0.250'	2.667'	N/A	N/A	N/A	N/A	N/A	0.0	0.0	5.2	N/A
DRIVEWAY BW4 (Lt)	1 ~ 4'x 2'	1'	SCP-4	SETB-PD	0°	4:1	8"	5"	0.000'	2.417'	N/A	N/A	N/A	N/A	N/A	0.0	0.0	2.3	N/A
DRIVEWAY BW4 (Rt)	1 ~ 4'x 2'	1'	SCP-4	PW-1	30°	2:1	8"	5"	0.000'	2.667'	N/A	N/A	6.158'	5.581'	N/A	0.0	0.0	3.0	33

NOTES:
Skew Angle = 0° for SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standards.
30° Maximum for Safety End Treatment

SL:1 = Horizontal:1 Vertical
Side Slope at culvert for Flared or Straight Wingwalls. Channel Slope for Parallel Wingwalls. Slope shall be 3:1 or flatter for Safety End Treatments.

T = Box Culvert Top Slab Thickness. Dimension can be found on the applicable Box Culvert Standard.

U = Box Culvert Wall Thickness. Dimension can be found on the applicable Box Culvert Standard.

C = Curb Height.

See applicable wing or end treatment standards for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of Wingwall.
A = Distance from Face of Curb to End of Wingwall (Not applicable to Parallel or Straight Wingwalls).
B = Offset of End of Wingwall (Not applicable to Parallel or Straight Wingwalls).
Lw = Length of Longest Wingwall.
Ltw = Length of Culvert Toewall (Not applicable when using Riprap Apron).
Atw = Length of Anchor Toewall (Applicable to Safety End Treatment only).
Total Wingwall Area = Wingwall area in S.F. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) The wall heights shown will be rounded to the nearest Foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the RAC standard, quantities shown must be increased by a factor of 2. If Class "S" concrete is required for the top slab of the culvert, the curb concrete shall also be Class "S". Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wing, footing, culvert toewall (if any), anchor toewall (if any) and wingwall toewall. Riprap apron, culvert and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor shall have the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it shall be the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

Charlotte A. Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
		WILLIAMSON		BW16

DATE: 12/17/2015 9:00 AM
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets", the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation — Traffic Operations Division Standard

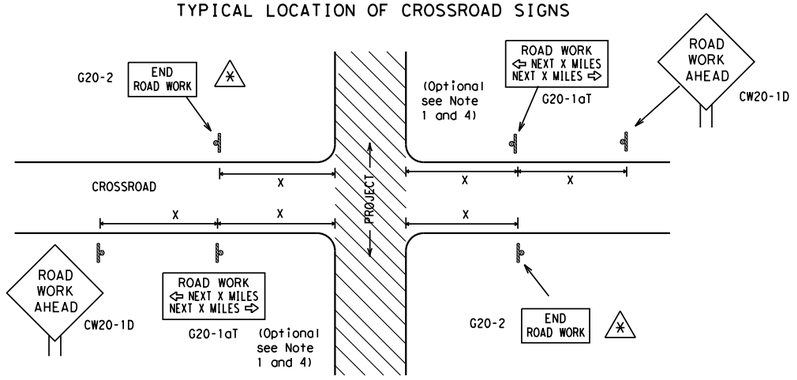
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-13

FILE: bc-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 5-10 9-07 7-13	DIST	COUNTY		SHEET NO.
95				DT-1

DATE:
FILE:

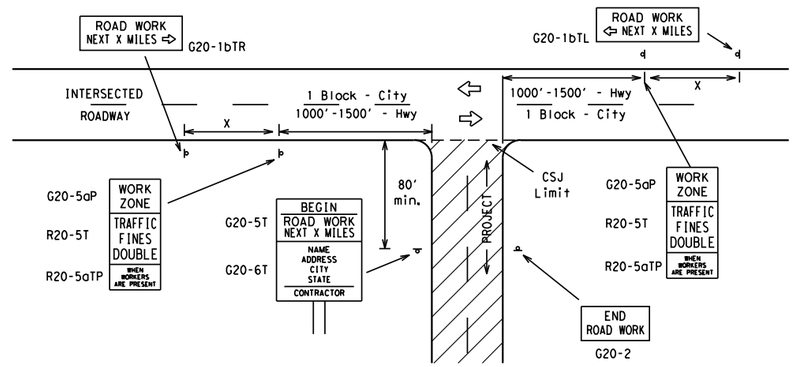
TYPICAL LOCATION OF CROSSROAD SIGNS



✱ May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign Spacing "X" Δ
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✱	✱[3]

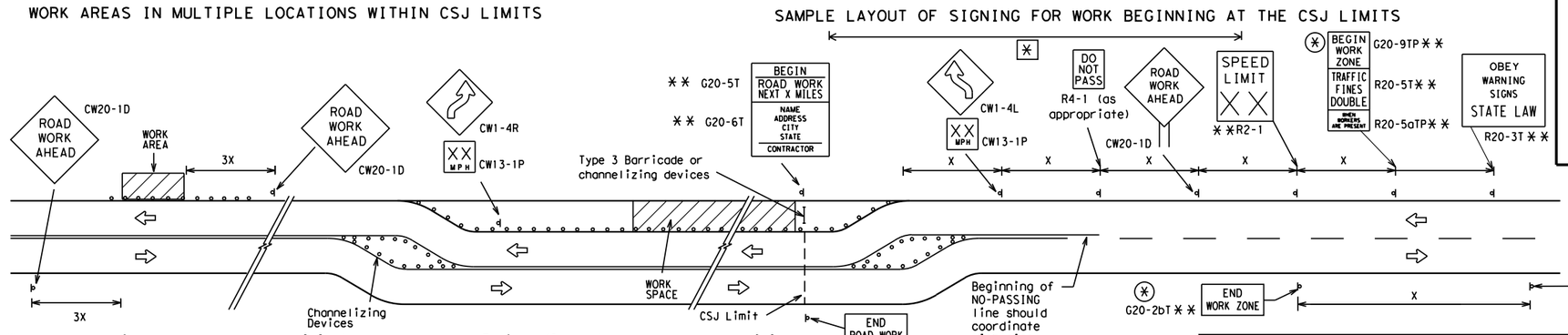
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

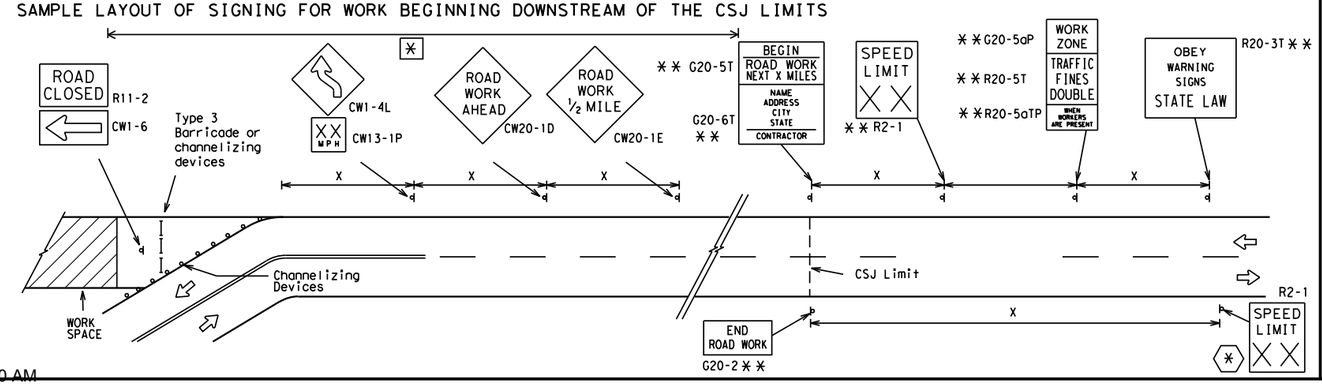
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

✱ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✱✱ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

✱ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

✱ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-13

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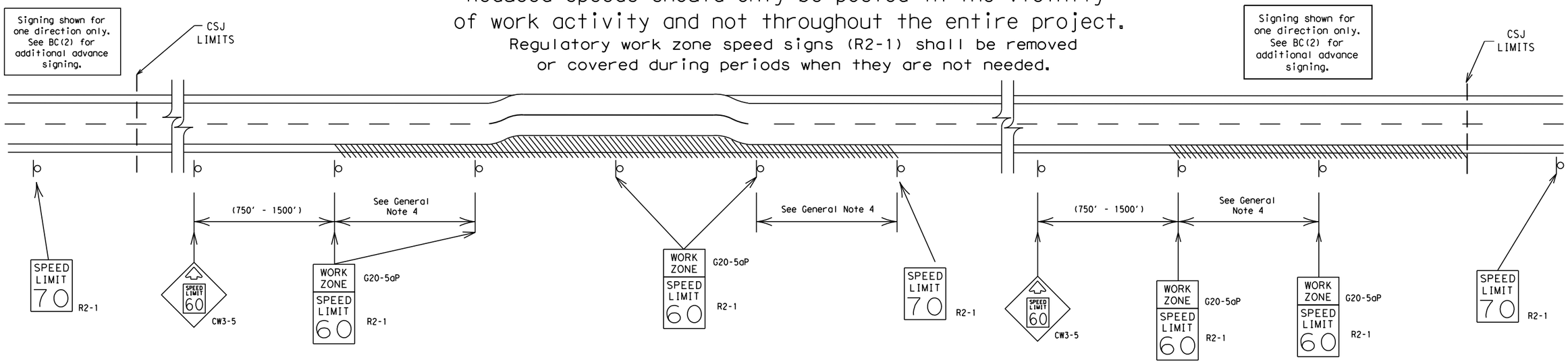
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the travelled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

SHEET 3 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-13

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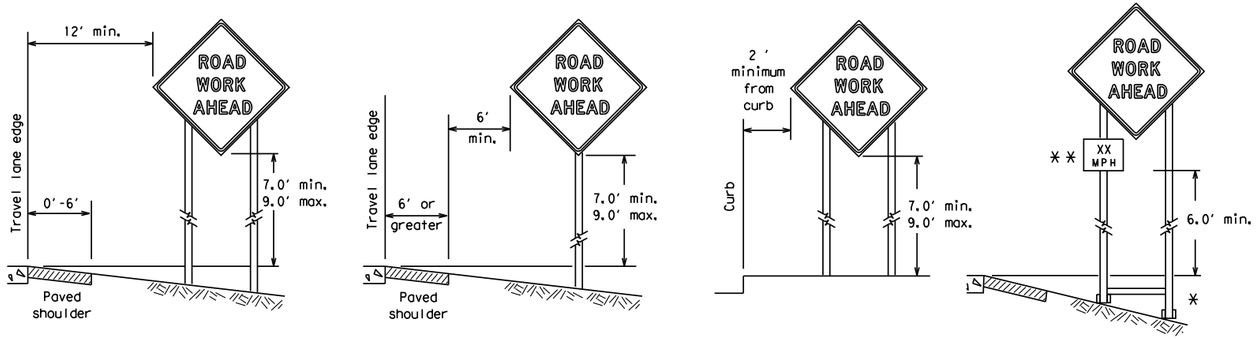
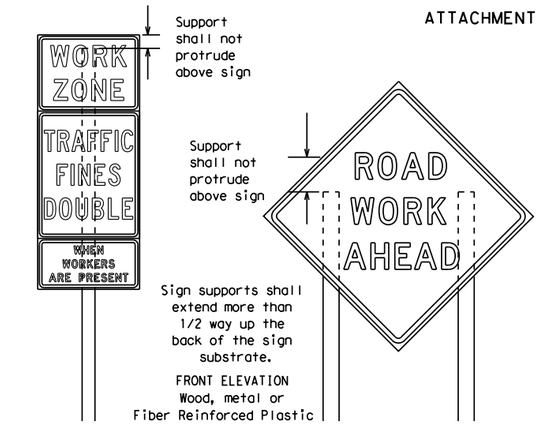
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



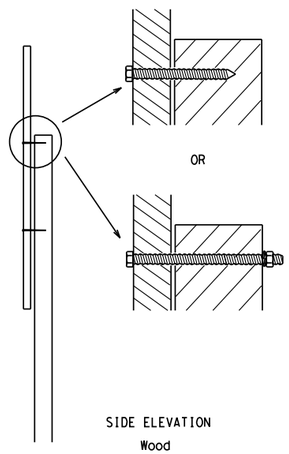
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or Fiber Reinforced Plastic



SIDE ELEVATION
Wood

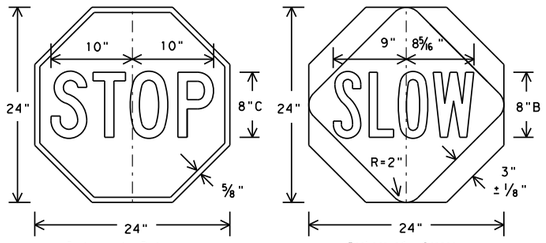
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-13

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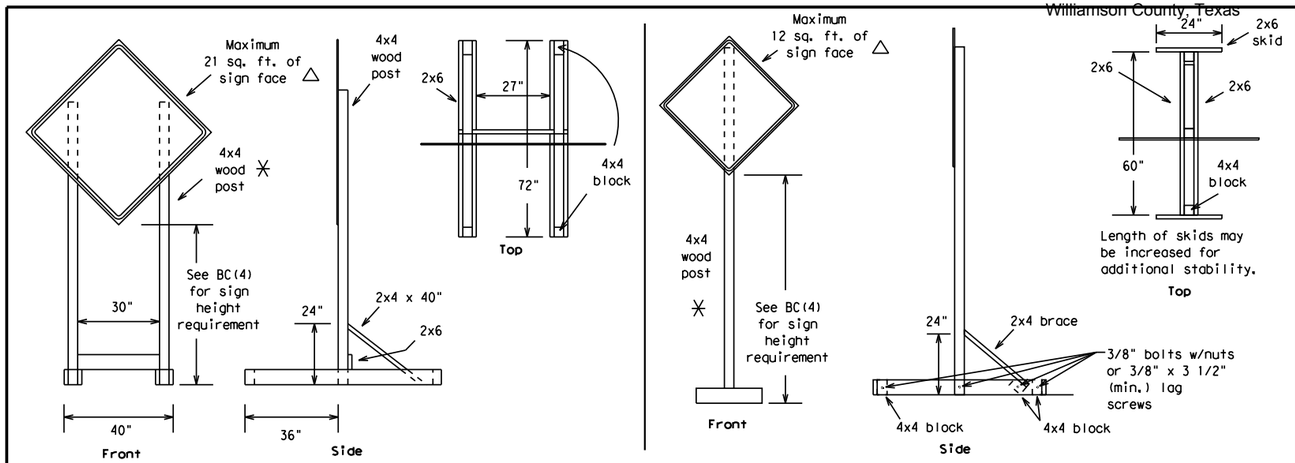
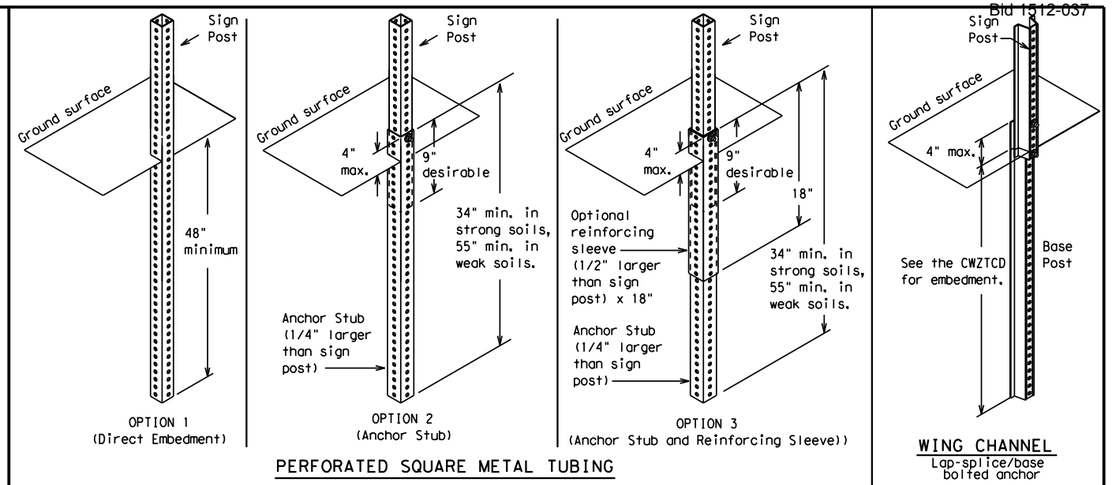


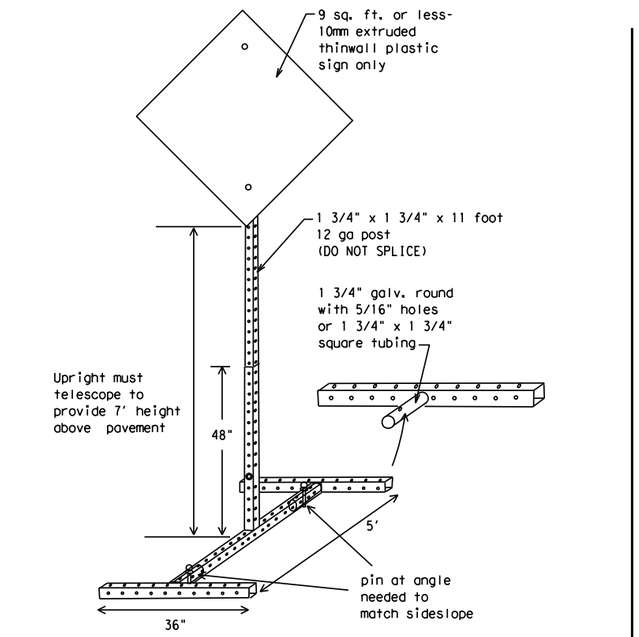
SKID MOUNTED WOOD SIGN SUPPORTS

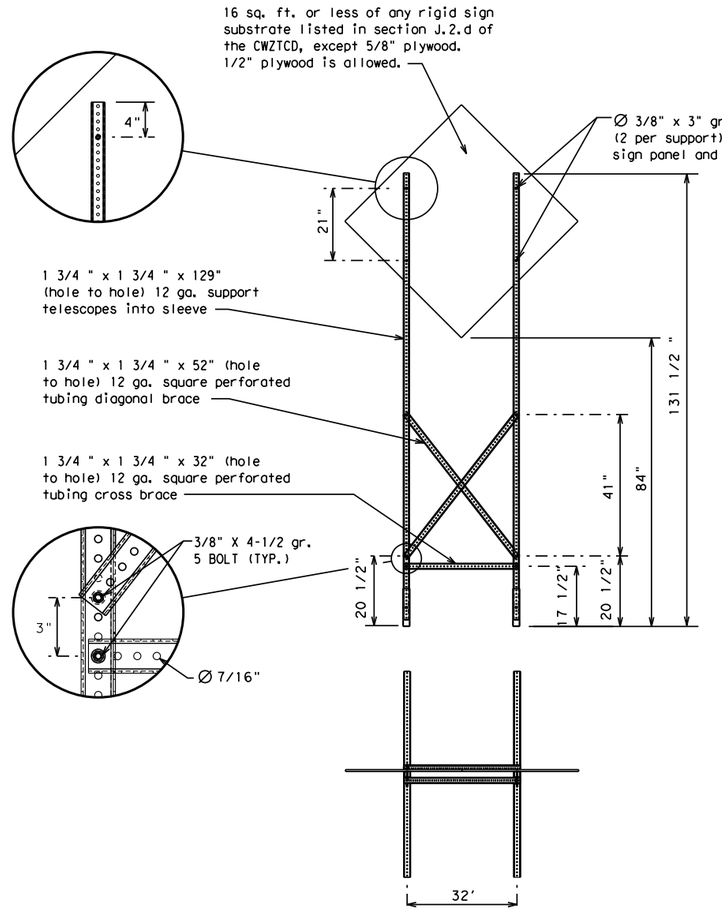
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

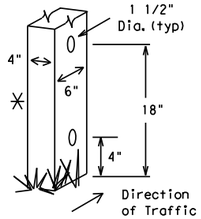


GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.

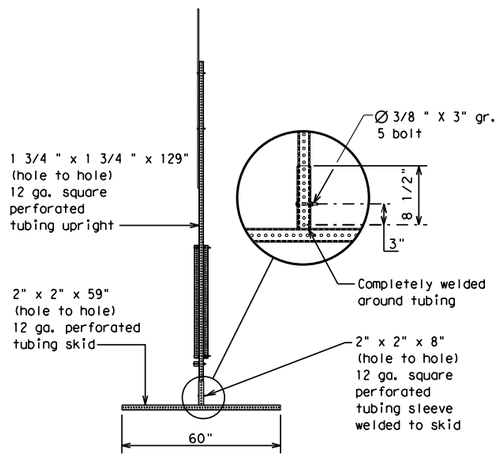






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

□ See BC(4) for definition of "Work Duration."

✳ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation

Traffic Operations Division Standard

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-13

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

** Advance Notice List

TUE-FRI XX AM- X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-13

FILE: bc-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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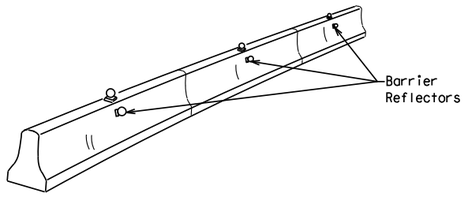
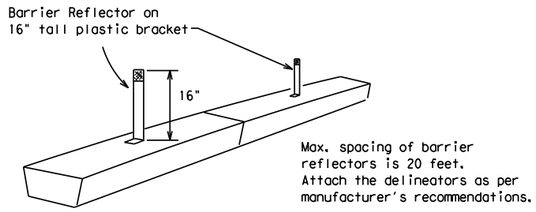
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

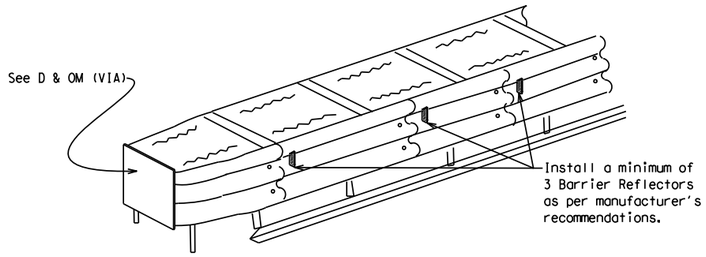


CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

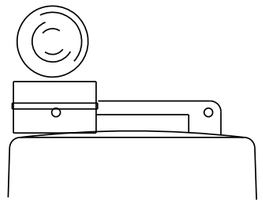


DELINEATION OF END TREATMENTS

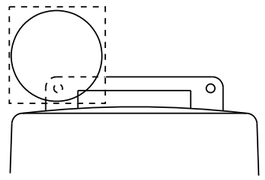
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

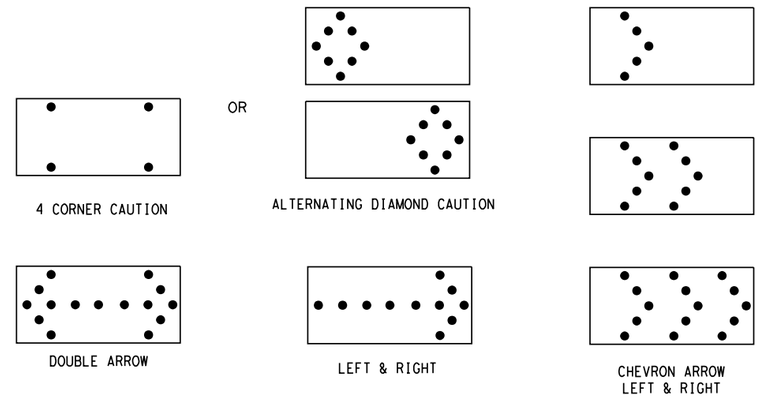
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-13

FILE: bc-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

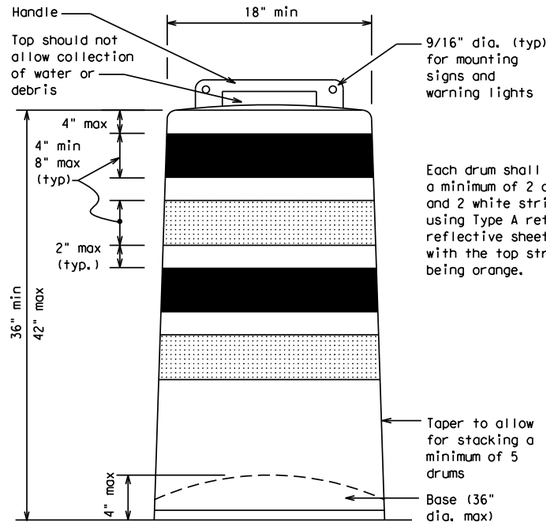
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

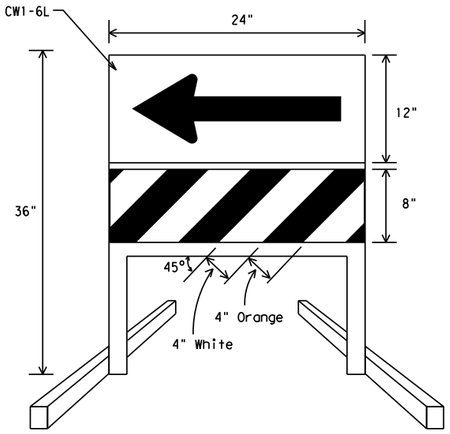
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

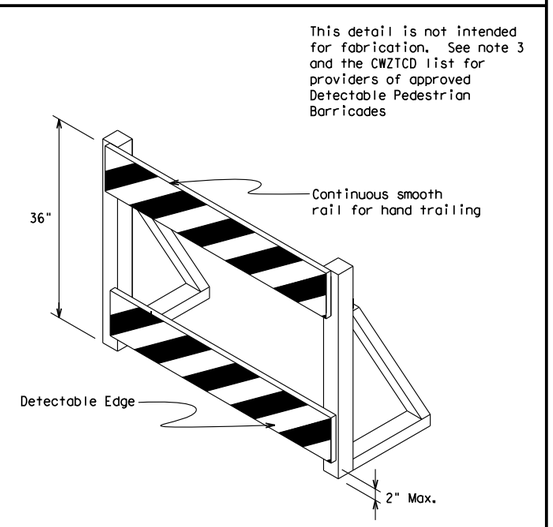
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.





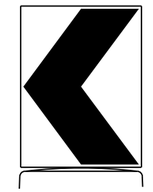
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

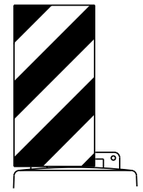


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-13

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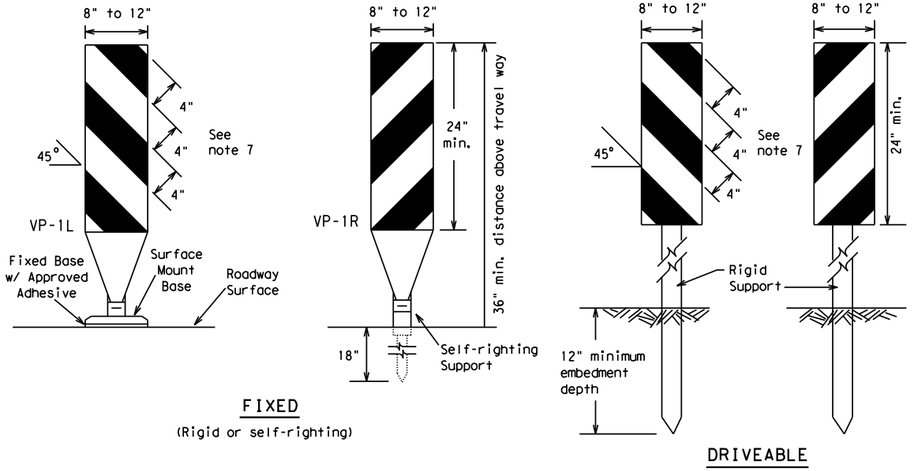
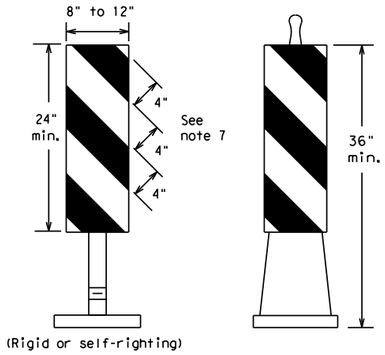


FIXED

(Rigid or self-righting)

DRIVEABLE

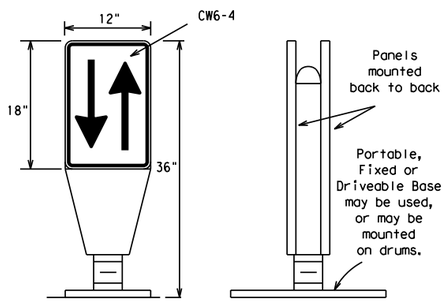


(Rigid or self-righting)

PORTABLE

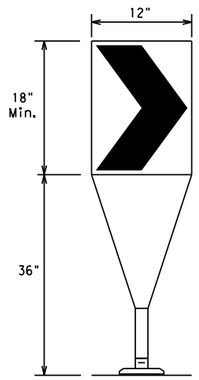
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



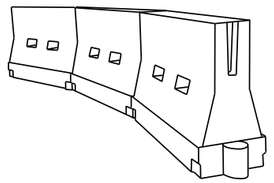
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-13

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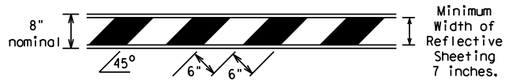
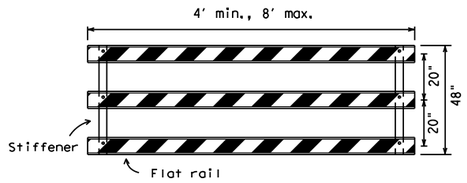
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



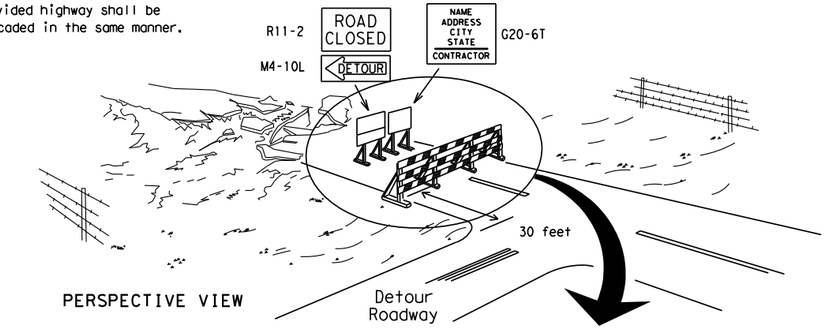
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

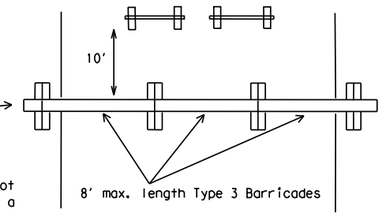
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

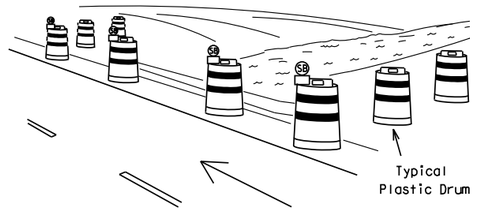
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

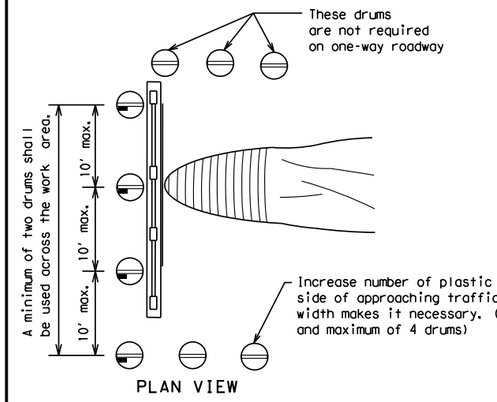
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

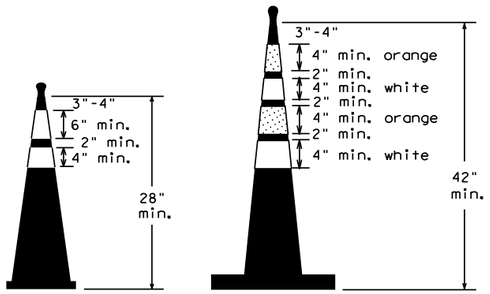
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

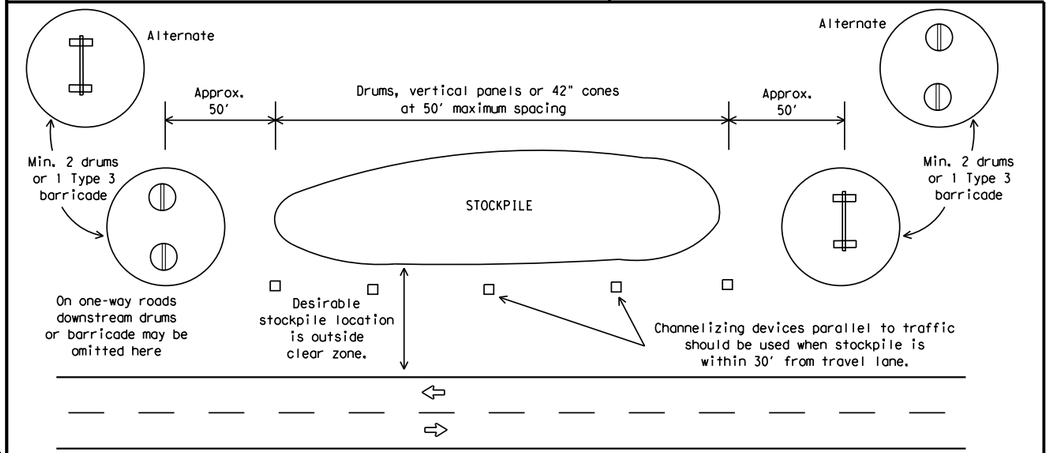
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



28" Cones shall have a minimum weight of 9 1/2 lbs.

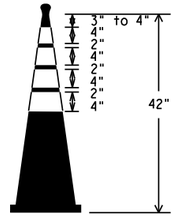
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-13

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

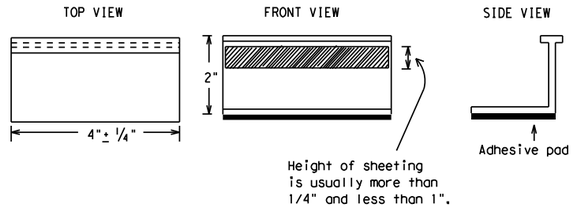
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

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Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-13

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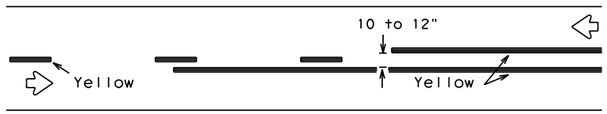
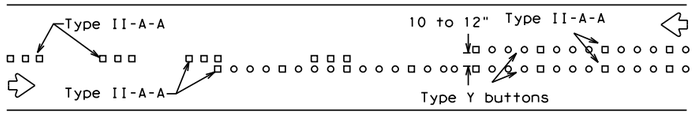
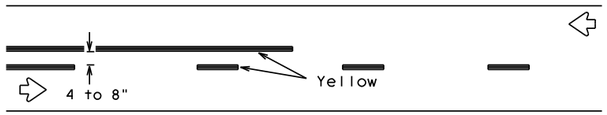
PAVEMENT MARKING PATTERNS



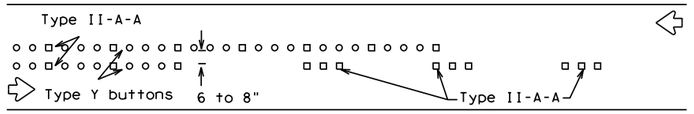
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



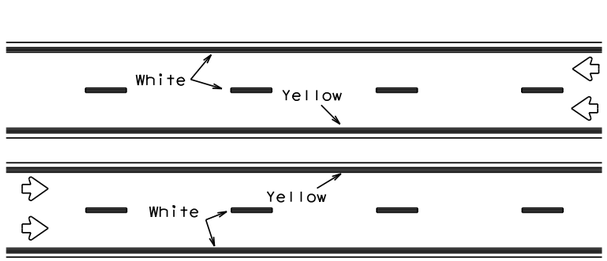
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



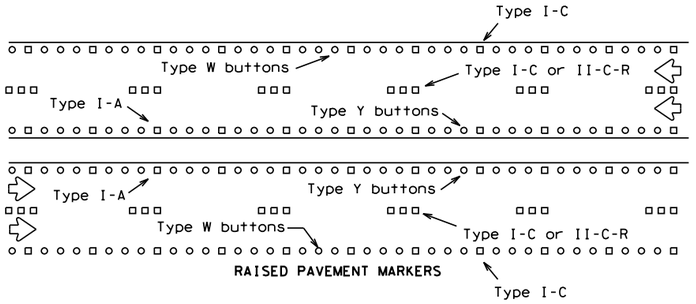
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



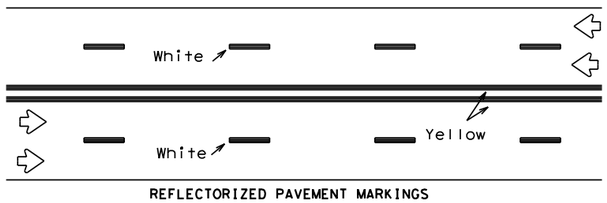
REFLECTORIZED PAVEMENT MARKINGS



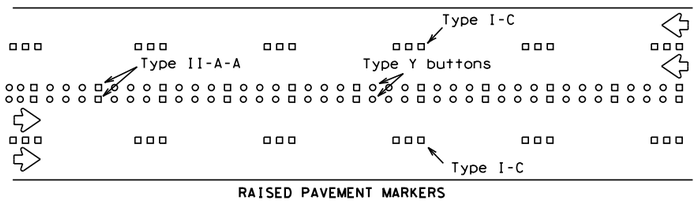
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



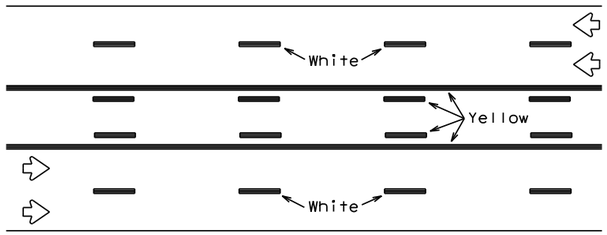
REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



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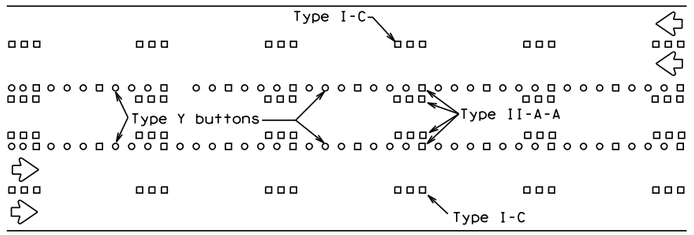


RAISED PAVEMENT MARKERS

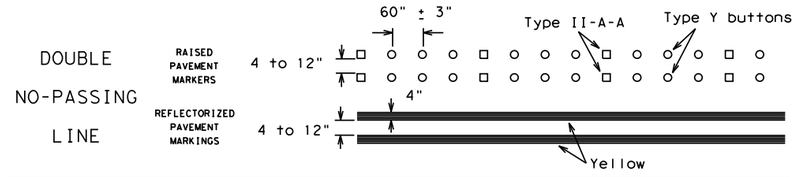
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

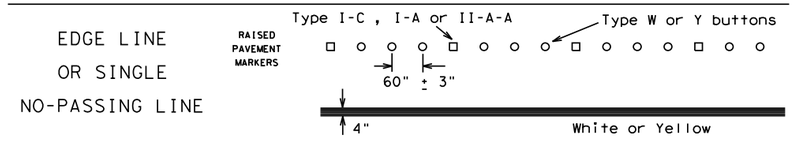
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

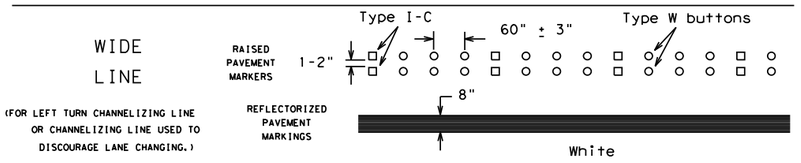


EDGE LINE OR SINGLE NO-PASSING LINE



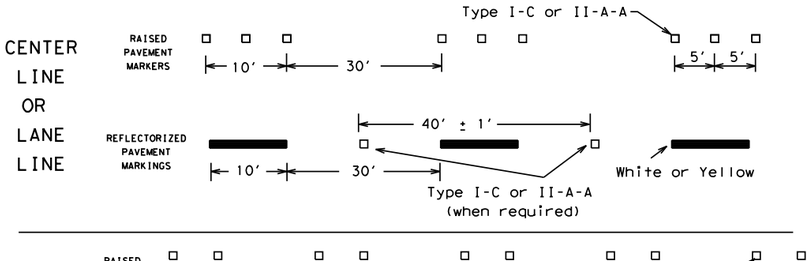
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

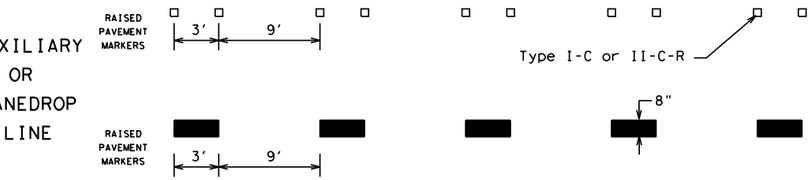


BROKEN LINES

CENTER LINE OR LANE LINE

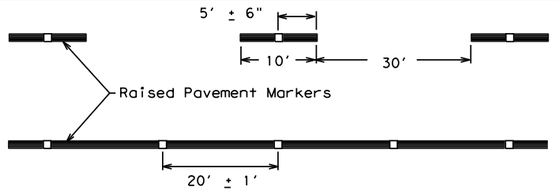


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-13

FILE: bc-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
1-97 11-02 7-13	DIST	COUNTY		SHEET NO.
2-98 9-07				DT12

106

DATE: 12/17/2015 9:00 AM
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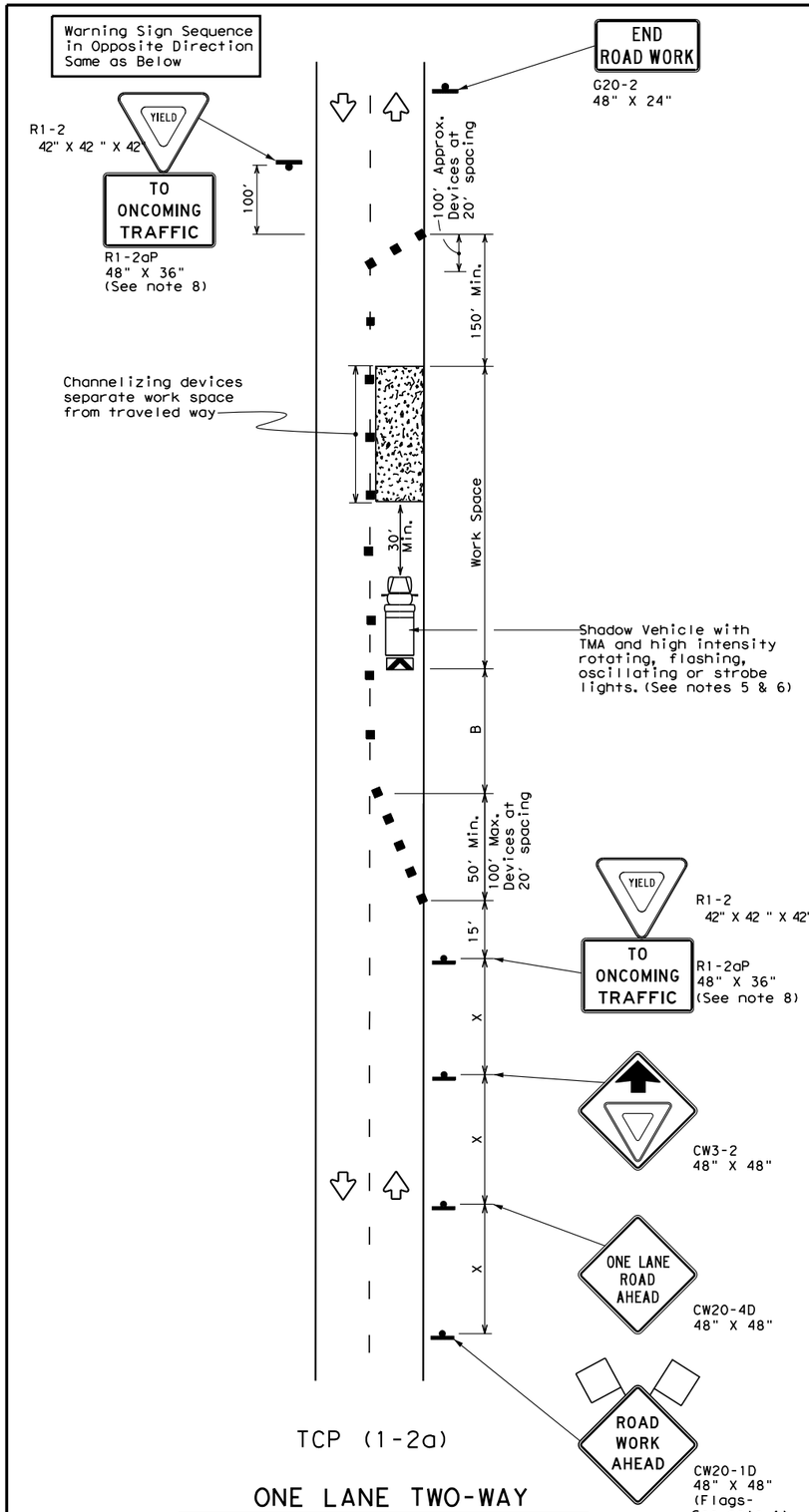
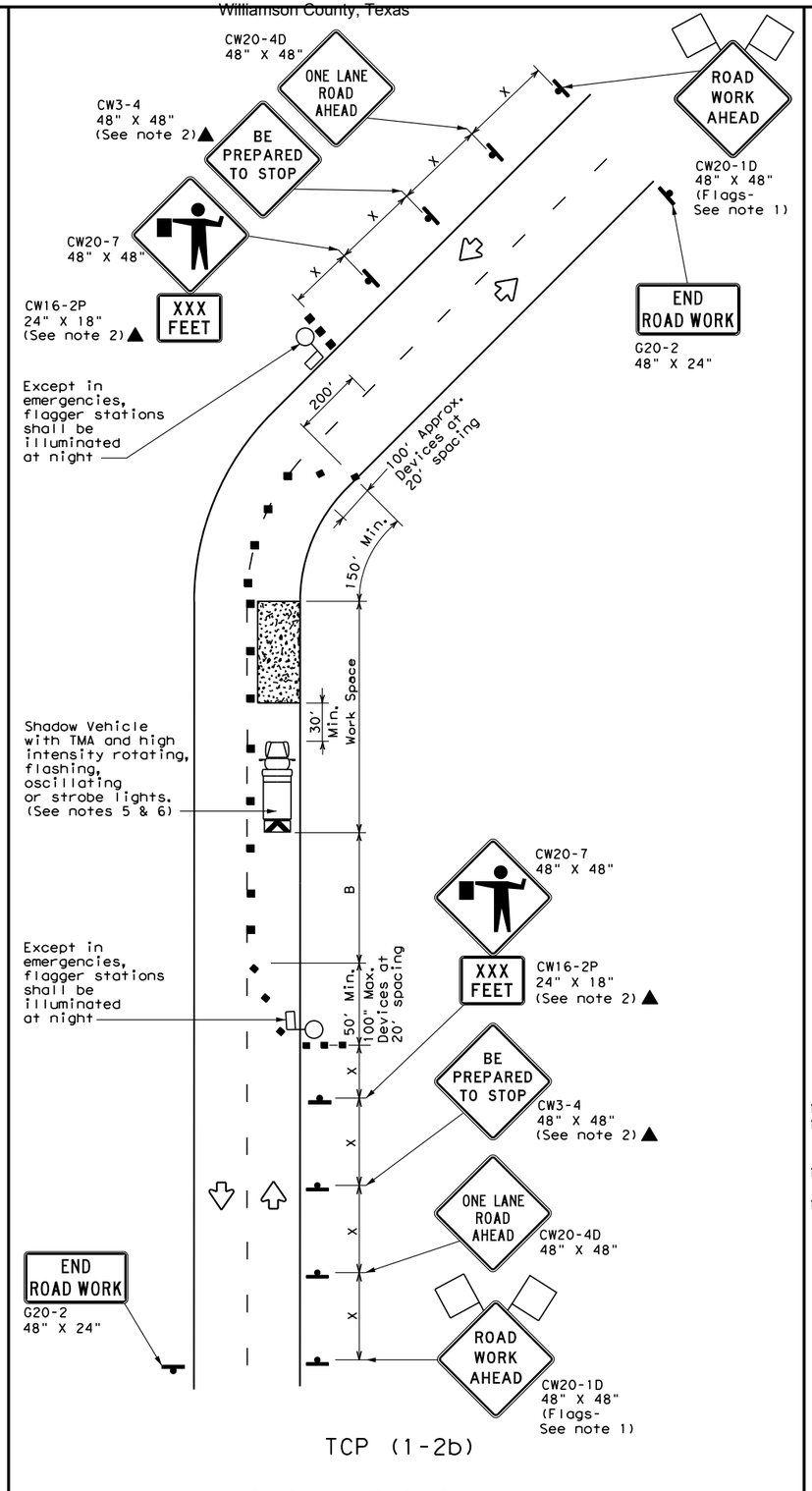


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-12

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

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4-90 2-12
2-94
1-97
4-98

CONT	SECT	JOB	HIGHWAY

DIST	COUNTY	SHEET NO.

DT13

DATE:
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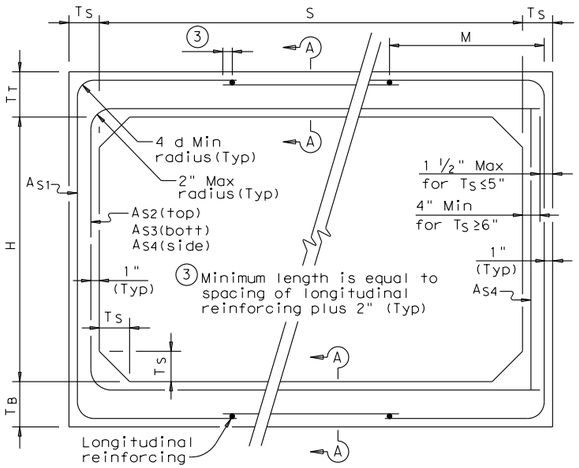
BOX DATA

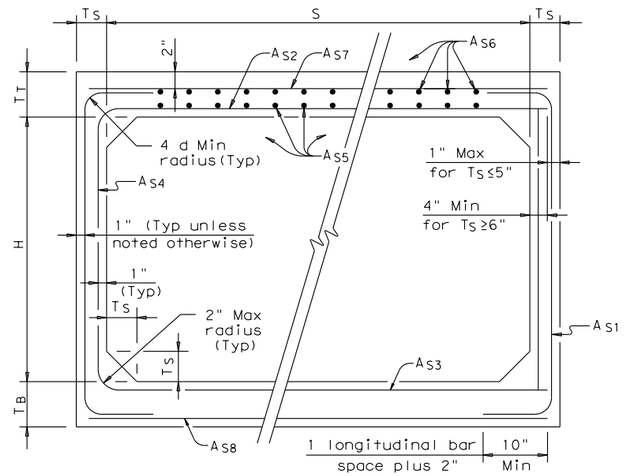
SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (in^2/ft) ②								① Lift Weight (Tons)
S (ft)	H (ft)	T_T (in)	T_B (in)	T_S (in)	(ft)	(in)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}	
4	2	7.5	6	5	<2	-	0.18	0.27	0.15	0.12	0.18	0.18	0.18	0.14	4.5
4	2	5	5	5	2<3	38	0.18	0.19	0.17	0.12	-	-	-	-	3.6
4	2	5	5	5	3-5	38	0.13	0.13	0.13	0.12	-	-	-	-	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	-	-	-	-	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	-	-	-	-	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	-	-	-	-	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	-	-	-	-	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	-	-	-	-	3.6
4	3	7.5	6	5	<2	-	0.18	0.31	0.18	0.12	0.18	0.18	0.18	0.14	5.0
4	3	5	5	5	2<3	38	0.15	0.23	0.20	0.12	-	-	-	-	4.1
4	3	5	5	5	3-5	38	0.12	0.16	0.16	0.12	-	-	-	-	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	-	-	-	-	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	-	-	-	-	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	-	-	-	-	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	-	-	-	-	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	-	-	-	-	4.1
4	4	7.5	6	5	<2	-	0.18	0.33	0.20	0.12	0.18	0.18	0.18	0.14	5.5
4	4	5	5	5	2<3	38	0.12	0.26	0.23	0.12	-	-	-	-	4.6
4	4	5	5	5	3-5	38	0.12	0.18	0.18	0.12	-	-	-	-	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	-	-	-	-	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	-	-	-	-	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	-	-	-	-	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	-	-	-	-	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	-	-	-	-	4.6

① For Box Length = 8'-0"

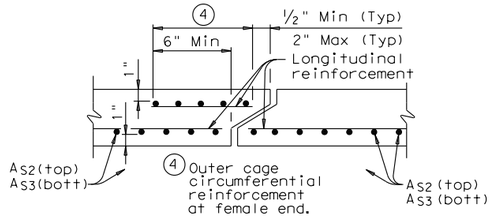
② A_{S1} thru A_{S4}, A_{S7} and A_{S8} are minimum required areas of reinforcement per linear foot of box length. A_{S6} and A_{S5} are minimum required areas of reinforcement per linear foot of box width.



FILL HEIGHT 2 FT AND GREATER



FILL HEIGHT LESS THAN 2 FT



SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)

GENERAL NOTES:

Designs shown conform to ASTM C1577.

Refer to ASTM C1577 for information or details not shown.

All concrete shall be Class "H" Concrete with a minimum compressive strength of 5,000 psi.

See SCP-MD standard sheet for miscellaneous details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Shop plans for alternate designs shall be submitted in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: scp04sts.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
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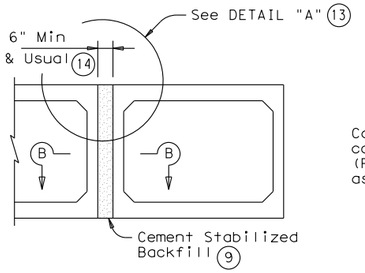
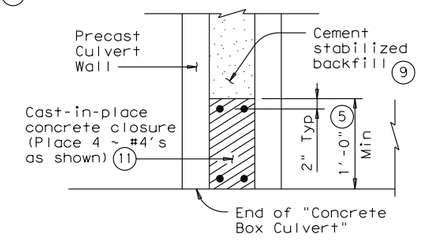
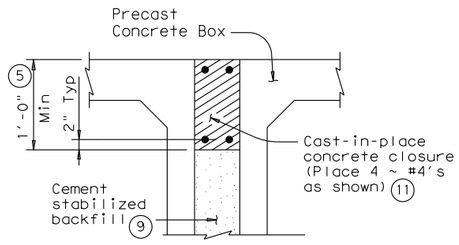


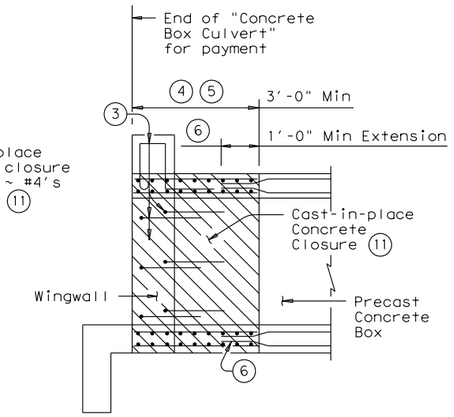
MULTIPLE UNIT PLACEMENT



SECTION B-B

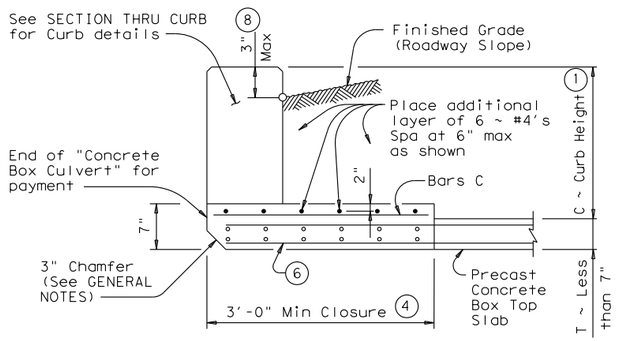


DETAIL "A" (13)

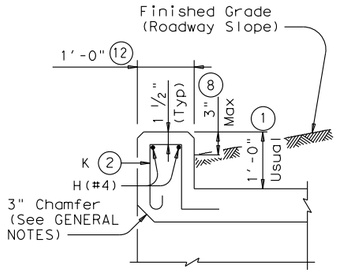


WINGWALL CONNECTION

(Also applies to Safety End Treatment)

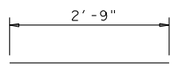


SECTION THRU TOP SLABS LESS THAN 7"

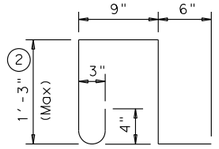


SECTION THRU CURB

(10) QUANTITIES PER FOOT OF CURB	
Reinforcing Steel	4.18 Lb
Concrete	0.037 CY



BARS C ~ #4
(Spa = 1'-0" Max)



BARS K ~ #4
(Spa = 1'-0" Max)
(Length = 4'-3")

1. 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 traffic rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Curb, Wingwall or Safety End Treatment reinforcing shall extend into concrete closure. Any reinforcing that does not fit into the closure shall be bent or trimmed as necessary.
4. Cast-in-place concrete closure shall be 3'-0" min. Boxes shall be cast short or broken back in the field. All reinforcing in the closure shall be the same size and spacing as in the precast box section. Except where shown otherwise, the cast-in-place closure shall be flush with the inside and outside faces of the precast box section.
5. For multiple unit placements the length of the closure for the interior walls may be adjusted as necessary. The length of the top slab, bottom slab, and exterior wall closure shall not be less than 3'-0". See Section B-B detail when interior walls are cast full length.
6. Precast box reinforcing shall extend a minimum of 1'-0" into concrete closure (Typ).
7. Bands of reinforcing matching the inside and outside face reinforcing shall be placed in the gaps of the top and bottom slabs. A band matching the outside face reinforcing of the wall shall be placed in the gaps of the walls (placed in the outside face only). The bands shall be tack welded to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, curbs shall project no more than 3" above finished grade.
   - For structures with bridge rail, curbs shall be flush with finished grade.

   Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement Stabilized Backfill between boxes is considered part of the Box Culvert for payment.
10. All curb concrete and reinforcing is considered part of the Box Culvert for payment.
11. Any additional concrete and reinforcing required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
12. 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in DETAIL "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

GENERAL NOTES:

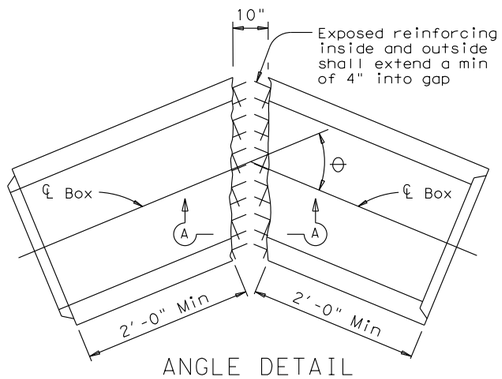
Designed according to AASHTO LRFD Specifications.

All closure concrete shall be Class "C" with a minimum compressive strength of 3600 psi and shall be placed according to the Item, "Concrete Substructures".

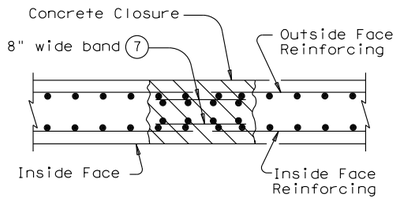
Any additional concrete required for the closures shall be considered as subsidiary to the Concrete Box Culvert.

Refer to the Single Box Culverts Precast standard for details not shown.

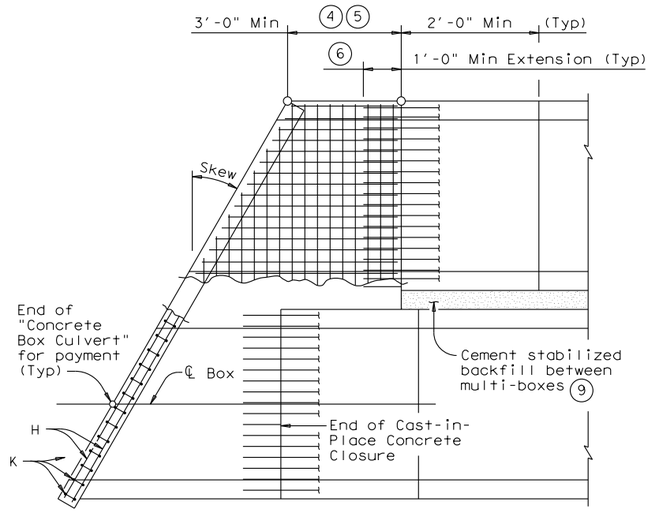
The bottom edge of the top slab closure shall be chamfered 3 inches at the entrance.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

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	DIST	COUNTY		SHEET NO.
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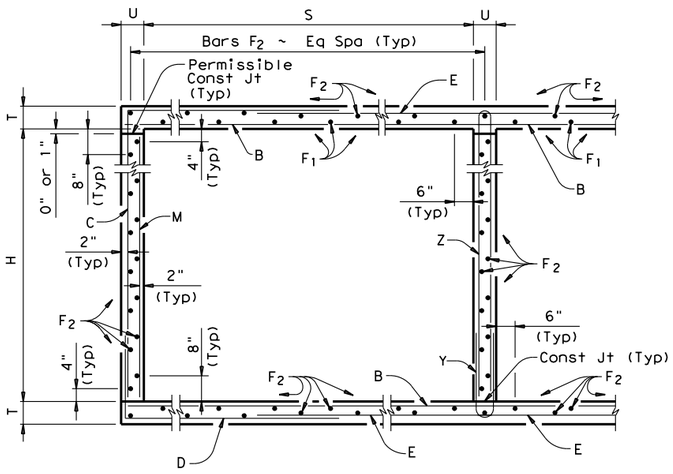
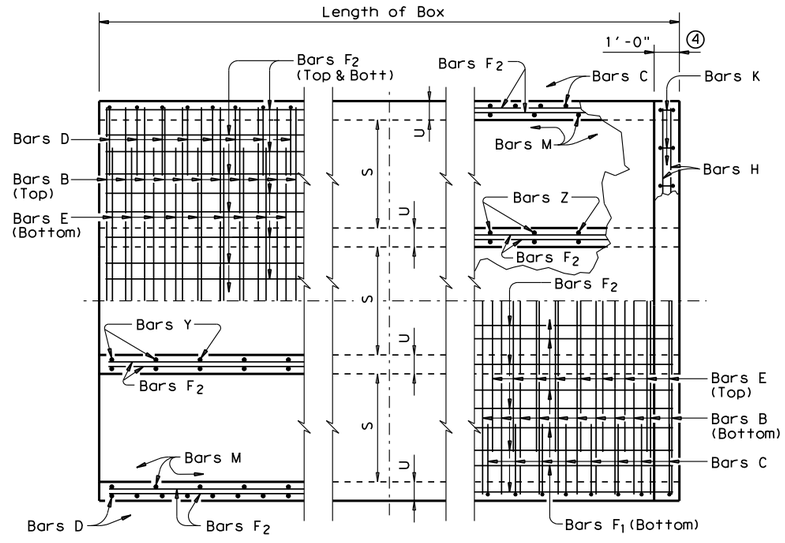


TYPICAL SECTION



BOTTOM SLAB TOP SLAB

PART PLANS

① 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.

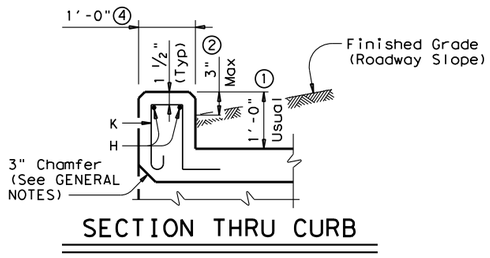
② For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs shall project no more than 3" above finished grade.
- For structures with bridge rail, curbs shall be flush with finished grade.
Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

③ For curbs less than 1'-0" high, tilt bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, bars K may be omitted.

④ 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.

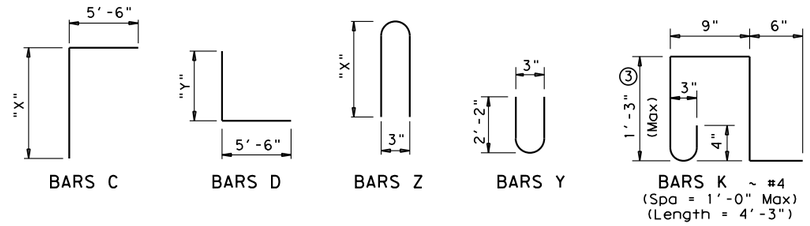
Deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be used to replace conventional reinforcement shown at the Contractor's option. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes.

Example Conversion: Replacement of No. 6 Gr 60 at 6" Spacing with WWR.
WWR required = (0.44 sq in/ 0.5') x (60 ksi/70 ksi) = 0.754 sq in/ft.
If D30.6 wire is used to meet the 0.754 sq in/ft requirement in this example, the required spacing = (0.306 sq in/ 0.754 sq in/ft) x 12 in/ft = 4.87" Max spacing.
Required lap length for the provided D30.6 wire is 2'-2" (Lap required for uncoated No. 5 bars, as shown in Item 440).



SECTION THRU CURB

H	Bar Dimensions	
	"X"	"Y"
3'-0"	3'-5"	2'-2"
4'-0"	4'-5"	2'-2"
5'-0"	5'-5"	2'-2"
6'-0"	6'-5"	2'-2"
7'-0"	7'-5"	2'-2"



GENERAL NOTES:
Designed according to AASHTO LRFD Specifications.
Designed to the maximum fill height shown.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" with these exceptions: use Class "S" for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.
Class "C" concrete shall have a minimum compressive strength of 3,600 psi. Class "S" concrete shall have a minimum compressive strength of 4,000 psi.
The use of permanent forms is not allowed.
The bottom edge of the top slab shall be chamfered 3" at the entrance.
Reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.
Construction joints shown at the flow line may be raised a maximum of 6" at the Contractor's option. If this option is used, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.
See standard MC-MD for skewed ends, angle sections and lengthening details.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
7'-0" SPAN
0' TO 10' FILL

MC-7-10

FILE: mc710ste.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-12: Added WWR	DIST	COUNTY		SHEET NO. DT16

DATE: 12/17/2015 9:00 AM
FILE:

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B					Bars C & D						Bars E					Bars F_1 ~#4				Bars F_2 ~#4 at 1'-6" Max			Bars M~#4 at 1'-6" Max			Bars Y & Z~#4 at 10" Max					Bars H 4~#4		Bars K	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bar C Length	Bar C Wt	Bar D Length	Bar D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Length	Wt	No.	Length	Wt	No.	Bar Y Length	Bar Y Wt	Bar Z Length	Bar Z Wt	Length	Weight	No.	Weight
2	7'-0"	3'-0"	7"	7"	194	#5	5"	15'- 6"	3,136	162	#4	6"	8'-11"	965	7'- 8"	830	194	#5	5"	8'- 0"	1,619	20	8"	39'-9"	531	54	39'-9"	1,434	56	3'- 0"	112	49	4'- 6"	147	7'- 0"	229	15'- 6"	41	34	97
3	7'-0"	3'-0"	7"	7"	194	#5	5"	23'- 1"	4,671	162	#4	6"	8'-11"	965	7'- 8"	830	194	#5	5"	15'- 7"	3,153	30	8"	39'-9"	797	77	39'-9"	2,045	56	3'- 0"	112	98	4'- 6"	295	7'- 0"	458	23'- 1"	62	48	136
4	7'-0"	3'-0"	7"	7"	194	#5	5"	30'- 8"	6,205	162	#4	6"	8'-11"	965	7'- 8"	830	194	#5	5"	23'- 2"	4,688	40	8"	39'-9"	1,062	100	39'-9"	2,655	56	3'- 0"	112	147	4'- 6"	442	7'- 0"	687	30'- 8"	82	64	182
5	7'-0"	3'-0"	7"	7"	194	#5	5"	38'- 3"	7,740	162	#4	6"	8'-11"	965	7'- 8"	830	194	#5	5"	30'- 9"	6,222	50	8"	39'-9"	1,328	123	39'-9"	3,266	56	3'- 0"	112	196	4'- 6"	589	7'- 0"	916	38'- 3"	102	80	227
6	7'-0"	3'-0"	7"	7"	194	#5	5"	45'-10"	9,274	162	#4	6"	8'-11"	965	7'- 8"	830	194	#5	5"	38'- 4"	7,756	60	8"	39'-9"	1,593	146	39'-9"	3,877	56	3'- 0"	112	245	4'- 6"	736	7'- 0"	1,146	45'-10"	122	94	267
2	7'-0"	4'-0"	7"	7"	194	#5	5"	15'- 6"	3,136	162	#4	6"	9'-11"	1,073	7'- 8"	830	194	#5	5"	8'- 0"	1,619	20	8"	39'-9"	531	54	39'-9"	1,434	56	4'- 0"	150	49	4'- 6"	147	9'- 0"	295	15'- 6"	41	34	97
3	7'-0"	4'-0"	7"	7"	194	#5	5"	23'- 1"	4,671	162	#4	6"	9'-11"	1,073	7'- 8"	830	194	#5	5"	15'- 7"	3,153	30	8"	39'-9"	797	77	39'-9"	2,045	56	4'- 0"	150	98	4'- 6"	295	9'- 0"	589	23'- 1"	62	48	136
4	7'-0"	4'-0"	7"	7"	194	#5	5"	30'- 8"	6,205	162	#4	6"	9'-11"	1,073	7'- 8"	830	194	#5	5"	23'- 2"	4,688	40	8"	39'-9"	1,062	100	39'-9"	2,655	56	4'- 0"	150	147	4'- 6"	442	9'- 0"	884	30'- 8"	82	64	182
5	7'-0"	4'-0"	7"	7"	194	#5	5"	38'- 3"	7,740	162	#4	6"	9'-11"	1,073	7'- 8"	830	194	#5	5"	30'- 9"	6,222	50	8"	39'-9"	1,328	123	39'-9"	3,266	56	4'- 0"	150	196	4'- 6"	589	9'- 0"	1,178	38'- 3"	102	80	227
6	7'-0"	4'-0"	7"	7"	194	#5	5"	45'-10"	9,274	162	#4	6"	9'-11"	1,073	7'- 8"	830	194	#5	5"	38'- 4"	7,756	60	8"	39'-9"	1,593	146	39'-9"	3,877	56	4'- 0"	150	245	4'- 6"	736	9'- 0"	1,473	45'-10"	122	94	267
2	7'-0"	5'-0"	7"	7"	194	#5	5"	15'- 6"	3,136	162	#4	6"	10'-11"	1,181	7'- 8"	830	194	#5	5"	8'- 0"	1,619	20	8"	39'-9"	531	60	39'-9"	1,593	56	5'- 0"	187	49	4'- 6"	147	11'- 0"	360	15'- 6"	41	34	97
3	7'-0"	5'-0"	7"	7"	194	#5	5"	23'- 1"	4,671	162	#4	6"	10'-11"	1,181	7'- 8"	830	194	#5	5"	15'- 7"	3,153	30	8"	39'-9"	797	85	39'-9"	2,257	56	5'- 0"	187	98	4'- 6"	295	11'- 0"	720	23'- 1"	62	48	136
4	7'-0"	5'-0"	7"	7"	194	#5	5"	30'- 8"	6,205	162	#4	6"	10'-11"	1,181	7'- 8"	830	194	#5	5"	23'- 2"	4,688	40	8"	39'-9"	1,062	110	39'-9"	2,921	56	5'- 0"	187	147	4'- 6"	442	11'- 0"	1,080	30'- 8"	82	64	182
5	7'-0"	5'-0"	7"	7"	194	#5	5"	38'- 3"	7,740	162	#4	6"	10'-11"	1,181	7'- 8"	830	194	#5	5"	30'- 9"	6,222	50	8"	39'-9"	1,328	135	39'-9"	3,585	56	5'- 0"	187	196	4'- 6"	589	11'- 0"	1,440	38'- 3"	102	80	227
6	7'-0"	5'-0"	7"	7"	194	#5	5"	45'-10"	9,274	162	#4	6"	10'-11"	1,181	7'- 8"	830	194	#5	5"	38'- 4"	7,756	60	8"	39'-9"	1,593	160	39'-9"	4,248	56	5'- 0"	187	245	4'- 6"	736	11'- 0"	1,800	45'-10"	122	94	267
2	7'-0"	6'-0"	7"	7"	194	#5	5"	15'- 6"	3,136	162	#4	6"	11'-11"	1,290	7'- 8"	830	194	#5	5"	8'- 0"	1,619	20	8"	39'-9"	531	66	39'-9"	1,752	56	6'- 0"	224	49	4'- 6"	147	13'- 0"	426	15'- 6"	41	34	97
3	7'-0"	6'-0"	7"	7"	194	#5	5"	23'- 1"	4,671	162	#4	6"	11'-11"	1,290	7'- 8"	830	194	#5	5"	15'- 7"	3,153	30	8"	39'-9"	797	93	39'-9"	2,469	56	6'- 0"	224	98	4'- 6"	295	13'- 0"	851	23'- 1"	62	48	136
4	7'-0"	6'-0"	7"	7"	194	#5	5"	30'- 8"	6,205	162	#4	6"	11'-11"	1,290	7'- 8"	830	194	#5	5"	23'- 2"	4,688	40	8"	39'-9"	1,062	120	39'-9"	3,186	56	6'- 0"	224	147	4'- 6"	442	13'- 0"	1,277	30'- 8"	82	64	182
5	7'-0"	6'-0"	7"	7"	194	#5	5"	38'- 3"	7,740	162	#4	6"	11'-11"	1,290	7'- 8"	830	194	#5	5"	30'- 9"	6,222	50	8"	39'-9"	1,328	147	39'-9"	3,903	56	6'- 0"	224	196	4'- 6"	589	13'- 0"	1,702	38'- 3"	102	80	227
6	7'-0"	6'-0"	7"	7"	194	#5	5"	45'-10"	9,274	162	#4	6"	11'-11"	1,290	7'- 8"	830	194	#5	5"	38'- 4"	7,756	60	8"	39'-9"	1,593	174	39'-9"	4,620	56	6'- 0"	224	245	4'- 6"	736	13'- 0"	2,128	45'-10"	122	94	267
2	7'-0"	7'-0"	7"	7"	194	#5	5"	15'- 6"	3,136	162	#4	6"	12'-11"	1,398	7'- 8"	830	194	#5	5"	8'- 0"	1,619	20	8"	39'-9"	531	66	39'-9"	1,752	56	7'- 0"	262	49	4'- 6"	147	15'- 0"	491	15'- 6"	41	34	97
3	7'-0"	7'-0"	7"	7"	194	#5	5"	23'- 1"	4,671	162	#4	6"	12'-11"	1,398	7'- 8"	830	194	#5	5"	15'- 7"	3,153	30	8"	39'-9"	797	93	39'-9"	2,469	56	7'- 0"	262	98	4'- 6"	295	15'- 0"	982	23'- 1"	62	48	136
4	7'-0"	7'-0"	7"	7"	194	#5	5"	30'- 8"	6,205	162	#4	6"	12'-11"	1,398	7'- 8"	830	194	#5	5"	23'- 2"	4,688	40	8"	39'-9"	1,062	120	39'-9"	3,186	56	7'- 0"	262	147	4'- 6"	442	15'- 0"	1,473	30'- 8"	82	64	182
5	7'-0"	7'-0"	7"	7"	194	#5	5"	38'- 3"	7,740	162	#4	6"	12'-11"	1,398	7'- 8"	830	194	#5	5"	30'- 9"	6,222	50	8"	39'-9"	1,328	147	39'-9"	3,903	56	7'- 0"	262	196	4'- 6"	589	15'- 0"	1,964	38'- 3"	102	80	227
6	7'-0"	7'-0"	7"	7"	194	#5	5"	45'-10"	9,274	162	#4	6"	12'-11"	1,398	7'- 8"	830	194	#5	5"	38'- 4"	7,756	60	8"	39'-9"	1,593	174	39'-9"	4,620	56	7'- 0"	262	245	4'- 6"	736	15'- 0"	2,455	45'-10"	122	94	267

QUANTITIES					
Per foot of Barrel		Curb		Total	
Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
0.875	225.1	1.2	138	36.2	9,141
1.267	333.2	1.7	198	52.4	13,524
1.660	441.2	2.3	264	68.7	17,910
2.052	549.2	2.9	329	85.0	22,297
2.445	657.2	3.4	389	101.2	26,678
0.940	230.4	1.2	138	38.8	9,353
1.354	340.1	1.7	198	55.9	13,801
1.768	449.7	2.3	264	73.0	18,253
2.182	559.4	2.9	329	90.2	22,705
2.596	669.1	3.4	389	107.2	27,151
1.005	239.6	1.2	138	41.4	9,722
1.440	352.3	1.7	198	59.3	14,289
1.876	464.9	2.3	264	77.3	18,860
2.312	577.6	2.9	329	95.4	23,431
2.747	690.1	3.4	389	113.3	27,994
1.069	248.9	1.2	138	44.0	10,093
1.527	364.5	1.7	198	62.8	14,778
1.984	480.1	2.3	264	81.7	19,468
2.441	595.7	2.9	329	100.5	24,157
2.899	711.3	3.4	389	119.4	28,840
1.134	254.2	1.2	138	46.6	10,304
1.613	371.4	1.7	198	66.2	15,055
2.092	488.7	2.3	264	86.0	19,810
2.571	605.9	2.9	329	105.7	24,565
3.050	723.1	3.4	389	125.4	29,313

Deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be used to replace conventional reinforcement shown at the Contractor's option. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes.

Example Conversion: Replacement of No. 6 Gr 60 at 6" Spacing with WWR.
WWR required = (0.44 sq in/ 0.5') x (60 ksi/70 ksi) = 0.754 sq in/ft.
If D30.6 wire is used to meet the 0.754 sq in/ft requirement in this example, the required spacing = (0.306 sq in/ 0.754 sq in/ft) x 12 in/ft = 4.87" Max spacing.
Required lap length for the provided D30.6 wire is 2'-2" (Lap required for uncoated No. 5 bars, as shown in Item 440).

HL93 LOADING SHEET 2 OF 2

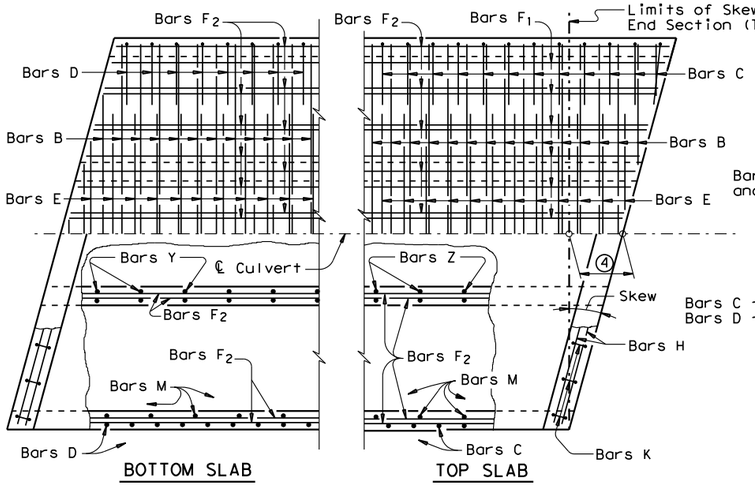
Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
7'-0" SPAN
0' TO 10' FILL

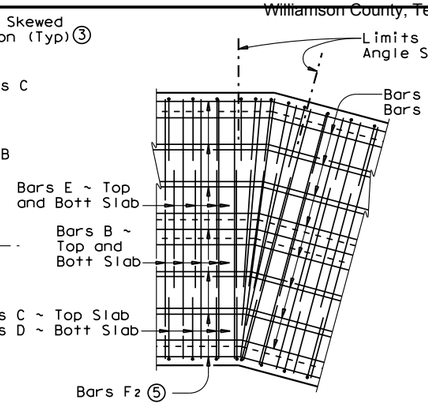
MC-7-10

FILE: mc710ste.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
10-12: Added WWR	DIST	COUNTY		SHEET NO.
				DT-17

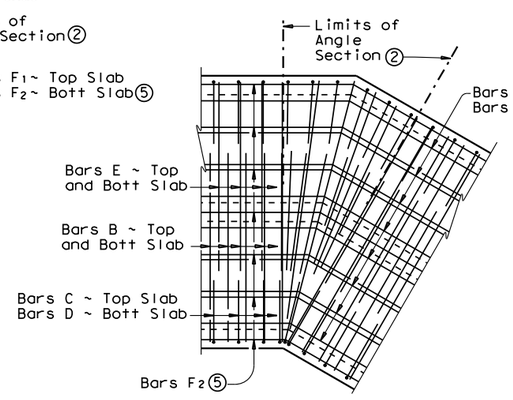
DATE: 12/17/2015 9:00 AM
FILE:



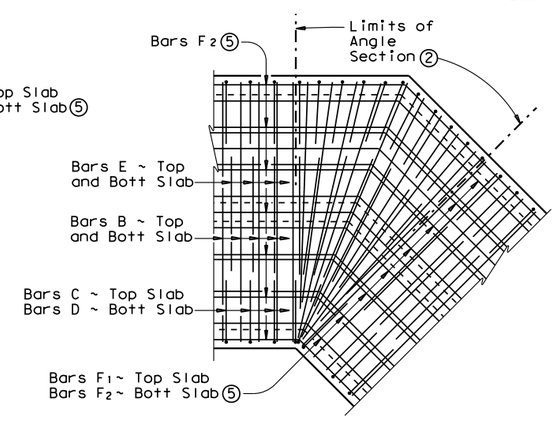
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° ⑦



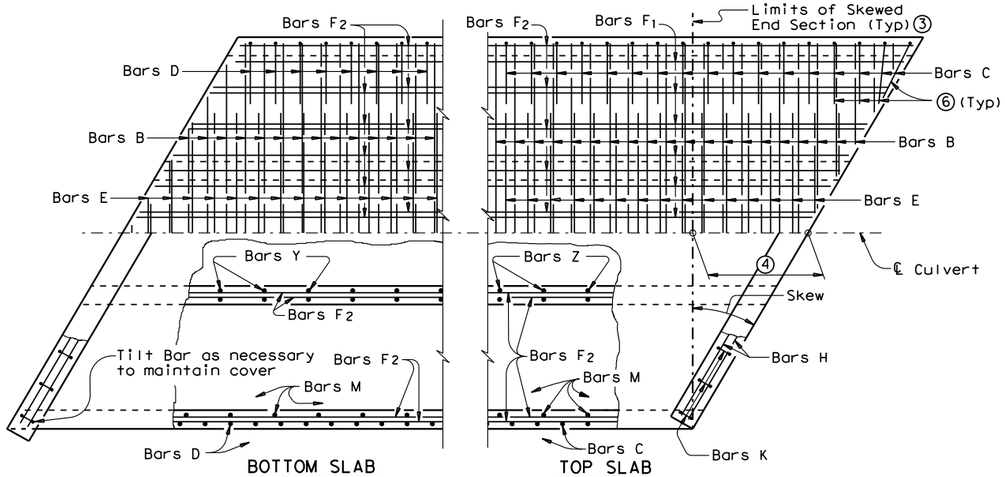
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



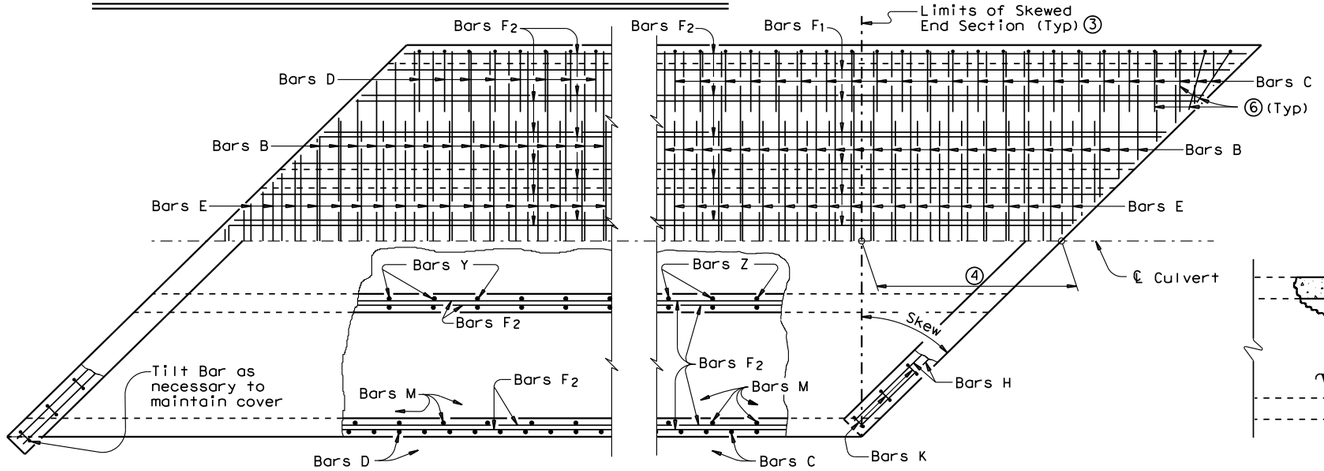
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



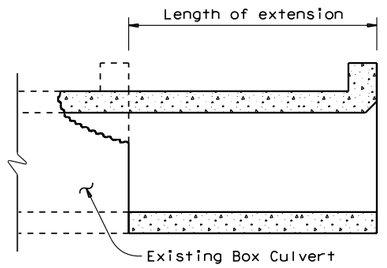
PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



LENGTHENING DETAIL ①

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

All reinforcing steel shall be Grade 60.

All concrete shall be Class "C" with these exceptions: use Class "S" for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

Class "C" concrete shall have a minimum compressive strength of 3,600 psi. Class "S" concrete shall have a minimum compressive strength of 4,000 psi.

Refer to Multiple Box Culverts Cast-in-Place standard for details of straight sections of culvert. For skewed sections and angle sections refer to Multiple Box Culverts Cast-in-Place standard for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown. For Skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume and reinforcing steel weight by dividing the values shown on the culvert standards by the cosine of the skew angle.

The use of permanent forms is not allowed.

Laps for Bars H, when required, shall be 1'-9" for uncoated bars and 2'-7" for epoxy coated.

① For box culverts with less than 2'-0" of fill, the top slab shall be broken back to provide a minimum 1'-10" lap of the existing longitudinal bars with the longitudinal bars in the extension. If the depth of fill is 2'-0" or greater, the top slab shall be broken back to provide a 1'-0" minimum embedment of existing longitudinal reinforcing into the extension. Alternatively, if the fill height is greater than 2'-0", the existing curb may be left in place and 2'-0" long #6 bars shall be drilled and grouted 1'-0" into the existing top slab at 1'-6" center to center spacing. Wings and apron shall be broken back as necessary to install the extension. Exposed wingwall and apron reinforcing may be removed or cleaned and included in the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, horizontal and vertical transitions shall be formed as directed by the Engineer. Bottom slabs shall match to maintain an uninterrupted flow line. Existing and new reinforcing shall be field bent into transition maintaining specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, the "H" dimension may be adjusted to provide a smooth riding surface.

② When the spacing between Bars B or Bars E becomes less than half of the normal spacing, bars shall be cut to avoid fouling

③ The length of Bars B and E will vary in the skewed end sections

④ [One half of overall width] x [Tan of the skew angle]

⑤ Bars F1 and F2 shall be continuous through the angle section. They shall be bent to remain parallel to the walls of the Box Culvert.

⑥ When necessary to avoid fouling in acute corners, the slab extension leg of Bars C and Bars D may be shortened to a minimum of 1'-6" for skews of 30° and 45°.

⑦ For skews of 15° or less, the contractor has the option of placing Bars B, C, D and E parallel to the skewed end while maintaining spacing along centerline box. Lengths of Bars B and E shown on the standards shall be increased to accommodate the skew.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.
				DT18

DATE: 12/17/2015 9:00 AM
FILE:

TABLE OF DIMENSIONS & REINFORCING STEEL
(Wings for One Structure End)

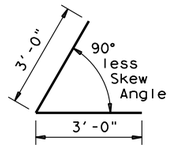
Dimensions					Variable Reinforcing				Estimated ④ Quantities per ft of wing (2~Wings)		Estimated Quantities per ft of Toewall (1~Toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'- 2"	1'- 2"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'- 2"	1'- 2"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'- 9"	1'- 7"	1'- 2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'- 9"	1'- 7"	1'- 2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'- 4"	2'- 0"	1'- 4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'- 4"	2'- 0"	1'- 4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'- 0"	2'- 3"	1'- 9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'- 0"	2'- 3"	1'- 9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'- 6"	2'- 8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'- 6"	2'- 8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'- 0"	2'-10"	2'- 2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'- 5"	3'- 0"	2'- 5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'- 2"	3'- 6"	2'- 8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'- 8"	3'- 9"	2'-11"	1'- 0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'- 2"	4'- 0"	3'- 2"	1'- 2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'- 5"	3'- 5"	1'- 4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'- 6"	4'-10"	3'- 8"	1'- 6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'- 0"	3'-11"	1'- 7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING (2~Wings)

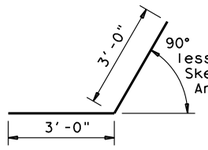
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

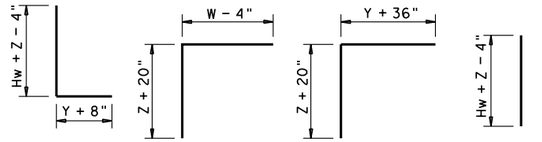
Bar	Size	No	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)

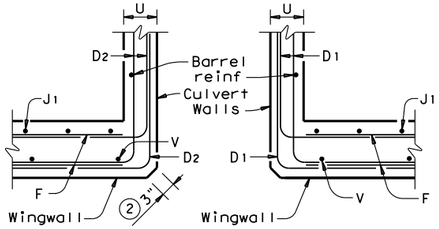
Hw = H + T + C
Lw = (Hw) (SL) ÷ Cosine θ for Ty PW-1
= (Hw - 1') (SL) ÷ Cosine θ for Ty PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ Cosine θ for Ty PW-2 and Hw < 4'

For Cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ Cosine θ

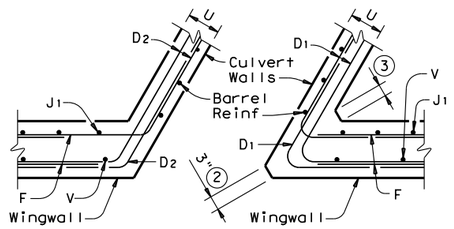
For Precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ Cosine θ
Total Wingwall Area (Two Wings ~ SF)
= (2)(Hw)(Lw) for Ty PW-1
= (2)(Hw)(Lw) - 6 SF for Ty PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Ty PW-2 and Hw < 4'

Hw = Height of Wingwall
Lw = Length of Wingwall
Ltw = Culvert Toewall Length
N = Number of Culvert Spans
SL:1 = Channel Slope ratio. (Horizontal: 1 Vertical, Usual value is 2:1)
θ = Culvert Skew

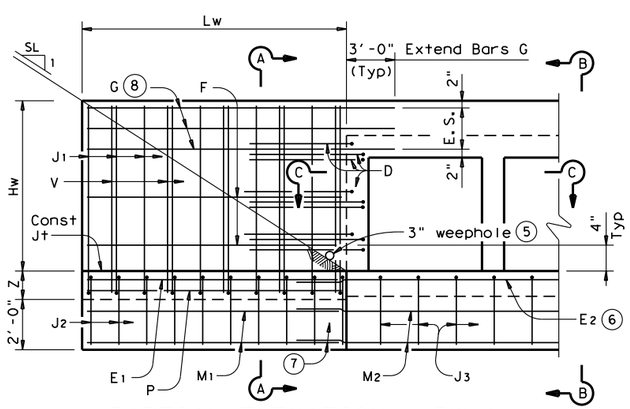
See applicable box culvert standard for S, H, T and U values.



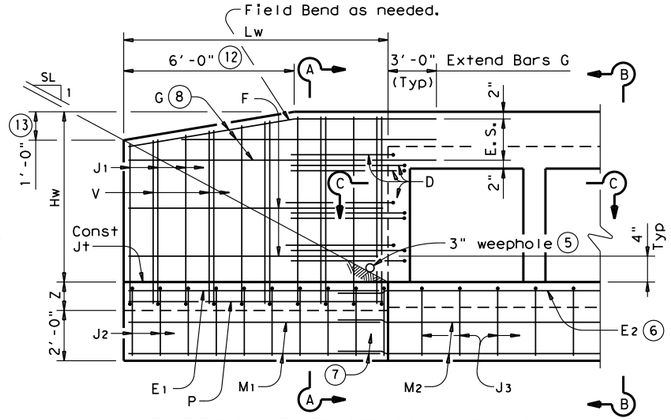
SECTION C-C



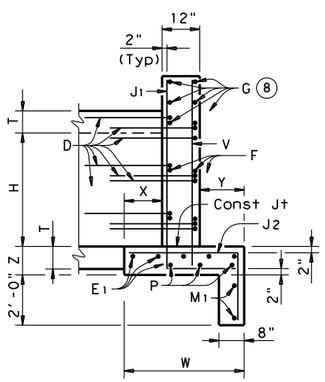
SECTION C-C



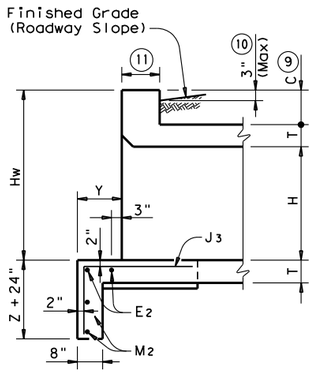
PARTIAL ELEVATION - PW-1



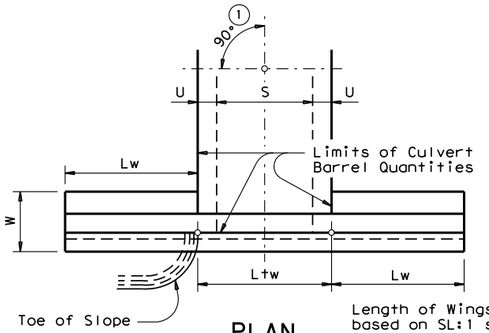
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing Wing Reinf)

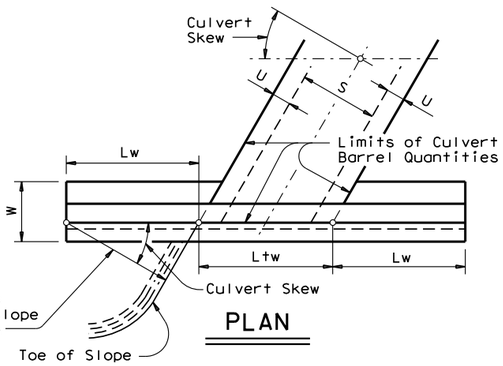


SECTION B-B
(Showing Wing Reinf)



PLAN

DETAILS FOR
NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR
SKEWED BOX CULVERTS
(Showing 30° Skew)

1. Skew Angle = 0°
2. At discharge end, chamfer may be ¾".
3. For 15° Skew ~ 1"
   For 30° Skew ~ 2"
   For 45° Skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Bars G equally spaced at 8" maximum, place as shown. Provide at least two pair Bars G per wing.
9. 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, curbs cannot project more than 3" above finished grade.
    - For structures with bridge rail, build curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-0" typical when RAC standard is referenced elsewhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Provide Class "C" Concrete (f'c = 3,600 psi Min) and Grade 60 reinforcing steel.

Provide 1 ¼" Min clear cover to reinforcing steel.

Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.

See BCS sheet for wingwall type and additional dimensions and information.

The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.

Type PW-2 can only be used for applications without a railing mounted to the wingwall.

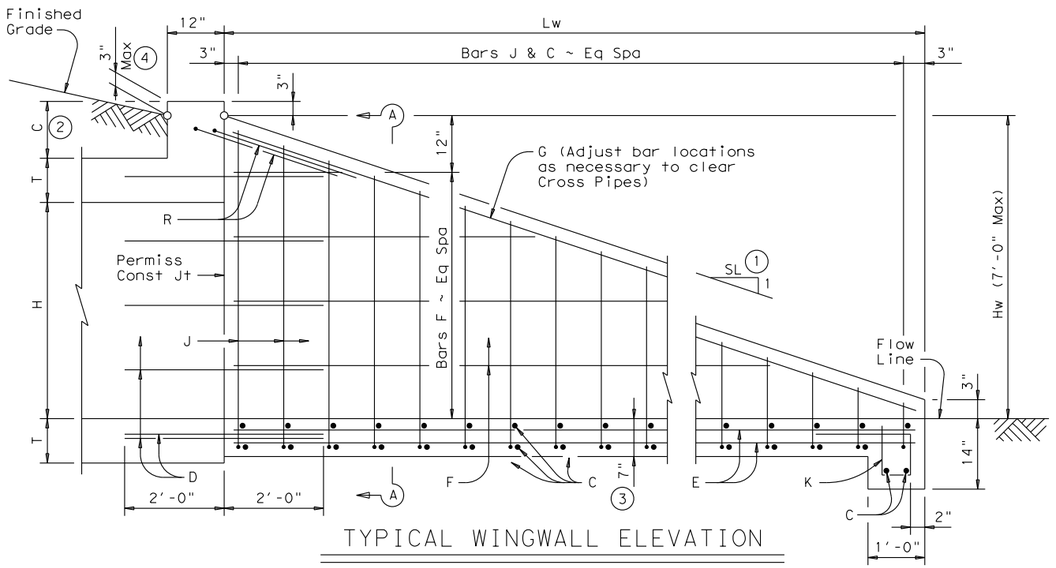
Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW

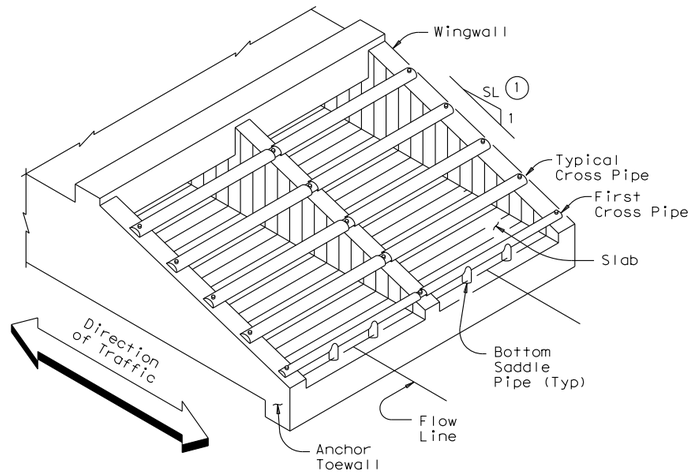
FILE: pwstde01.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-10: Reinforcing Quantities. 01-12: PW-1 & PW-2.	DIST	COUNTY		SHEET NO.
				DT19

DATE: 12/17/2015 9:00 AM
FILE:



TYPICAL WINGWALL ELEVATION

(Cross Pipes not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing Bolted Anchor Option)

Formulas: (All values are in Feet)

Hw = H + T + C - 0.250'

Lw = (Hw - 0.250') (SL)

For Cast-in-place culverts:

Atw = (N) (S) + (N + 1) (U)

For Precast culverts:

Atw = (N) (2U + S) + (N - 1) (0.500')

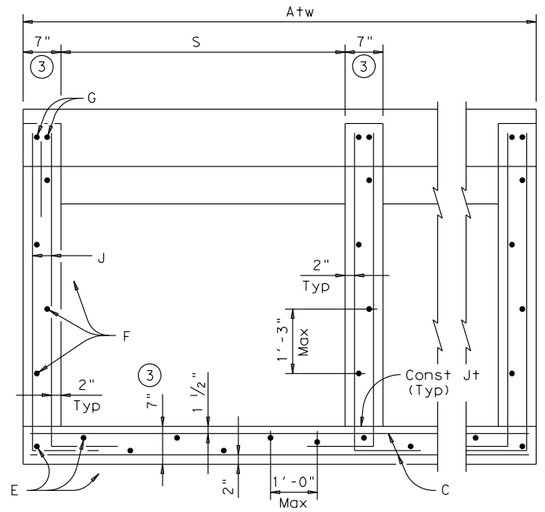
Total Wingwall Area (S.F.)
= (0.5) (Hw + 0.250') (Lw) (N + 1)

Total Concrete Volume (C.Y.)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.000') (1.167' - 0.583')] ÷ (27)

Total Reinforcing (Lbs)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K) (Hw) (N + 1) ($\sqrt{Lw}$)

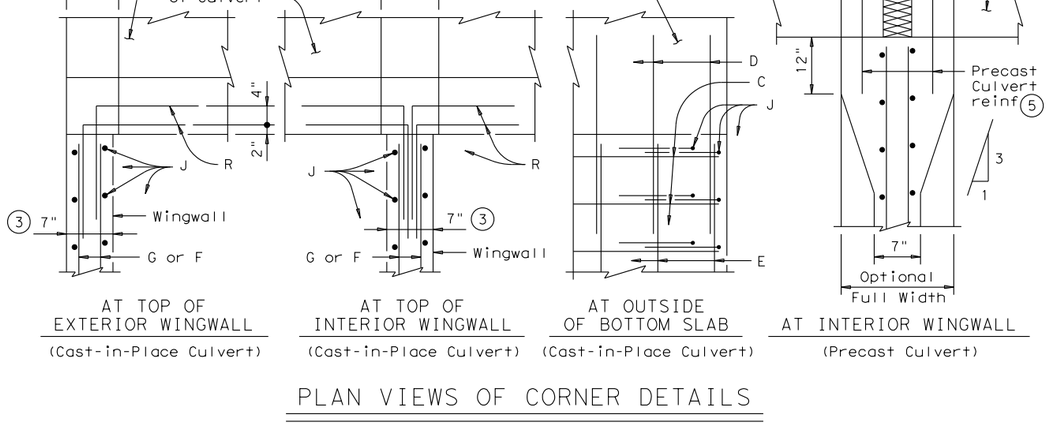
C = Height of Curb above top of Top Slab
Hw = Height of Wingwall
K = Constant Value for use in formulas
Slope SL:1 K
6:1 ~ 10.41
Atw = Anchor Toewall Length
Lw = Length of Wingwall
N = Number of Culvert Barrels
S = Clear Span of each Barrel
SL:1 = Side Slope Ratio (Horizontal : 1 Vertical)

See applicable box culvert standard for H, S, T, and U values.



SECTION A-A

(Showing typical Wingwall and Wing Slab reinforcing)
(Pipe Runners not shown for clarity)



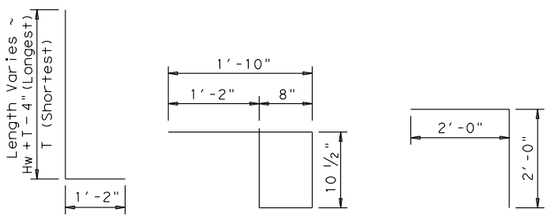
AT TOP OF EXTERIOR WINGWALL (Cast-in-Place Culvert)

AT TOP OF INTERIOR WINGWALL (Cast-in-Place Culvert)

AT OUTSIDE OF BOTTOM SLAB (Cast-in-Place Culvert)

AT INTERIOR WINGWALL (Precast Culvert)

PLAN VIEWS OF CORNER DETAILS



BARS J BARS K (Length = 4'-3") BARS R

TABLE OF REINFORCING BAR SIZES & SPACING		
Bar	Size	Spacing
C	#4	10" Max
D	#4	match F & E
E	#4	1'- 0" Max
F	#4	1'- 3" Max
G	#6	Shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	Shown

(1) Slope will be 6:1 or flatter.

(2) 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard.

(3) Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.

(4) For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) For Culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into Wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the "Wingwall Connection Detail" on the SCP-MD standard.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.

All reinforcing steel shall be Grade 60. All reinforcing shall be adjusted as necessary to provide a minimum clear cover of 1 ¼".

The quantities for concrete, reinforcing steel, and Cross Pipes resulting from the formulas given herein are for Contractor's information only.

Cross Pipes, Sleeve Pipes, and Saddle Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except the concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

See BCS standard sheet for additional dimensions and information.

Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the Safety End Treatments.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

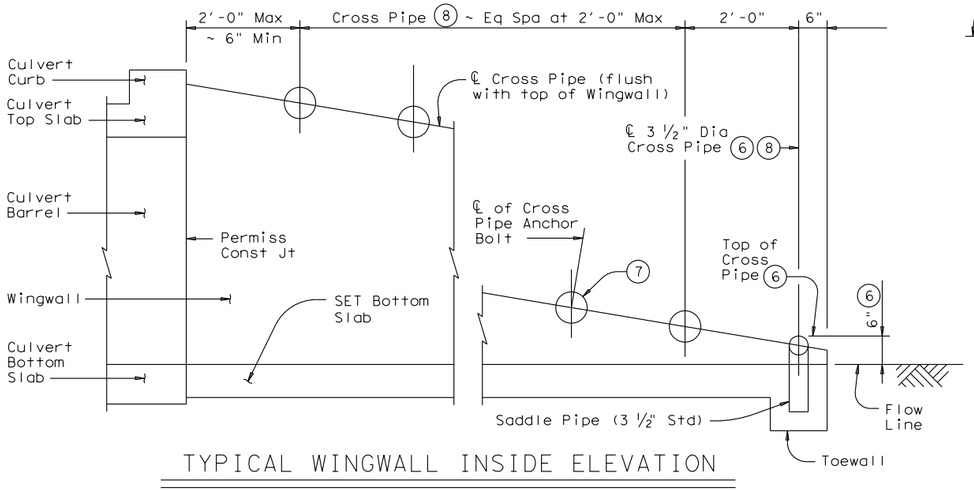
SAFETY END TREATMENT

FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

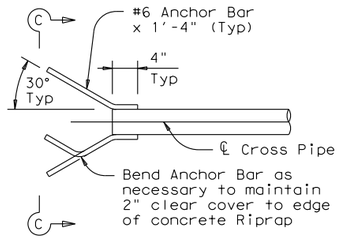
FILE: setbpdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2010 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

DATE: 12/17/2015 9:00 AM
FILE:

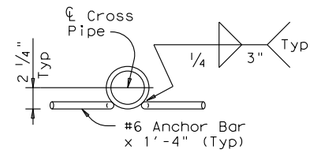


TYPICAL WINGWALL INSIDE ELEVATION

(Showing installation of Cross Pipes)

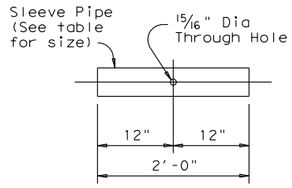


PART PLAN



SECTION C-C

OPTIONAL ANCHOR BAR DETAILS



SLEEVE PIPE DETAILS (9)

REQUIRED PIPE SIZES (8)		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)
First Pipe	3 ½" STD	2 ½" STD
30" to 42"	4" STD	3" STD
48" to 72"	5" STD	4" STD
78" to 120"	6" STD	5" STD

STANDARD PIPE SIZES		
Pipe Size	Pipe O.D.	Pipe I.D.
2 ½" STD	2.875"	2.469"
3" STD	3.500"	3.068"
3 ½" STD	4.000"	3.548"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"
6" STD	6.625"	6.065"

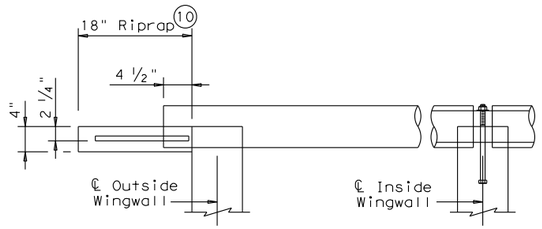
(6) The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.

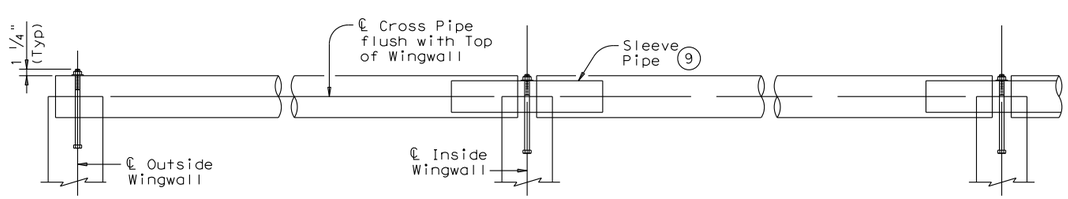
(7) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that concrete does not flow into this Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(8) Cross Pipes and Sleeve Pipes (if required) shall be as shown in the REQUIRED PIPE SIZES table. Saddle Pipes for the 3 ½" first Cross Pipe shall also be 3 ½".

(9) At Contractor's option, the Cross Pipe may be continuous across the Inside Wingwalls. If such option is selected, the Sleeve Pipe shall be omitted and a 15⁄16" diameter through hole made in the Cross Pipe to accept the anchor bolt at the centerline of each Interior Wingwall.

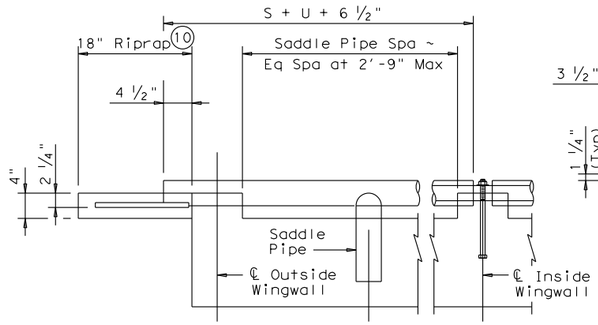
(10) Riprap will be required when using the optional Anchor Bar details and shall be included in the Price Bid for Safety End Treatment. Such Riprap shall be concrete Riprap in accordance with Item 432, "Riprap".

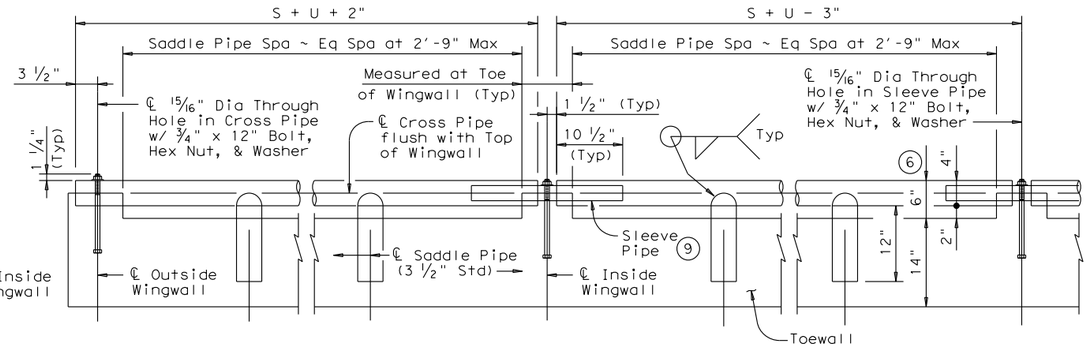




SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE detail.)





SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: setbpdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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REVISIONS				
	DIST	COUNTY		SHEET NO.
				DT24

DATE: 12/17/2015 9:00 AM
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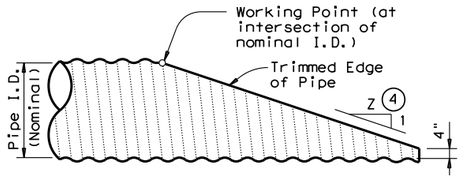
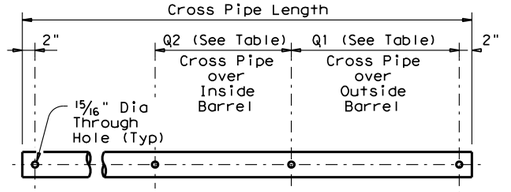
DATE:
FILE:



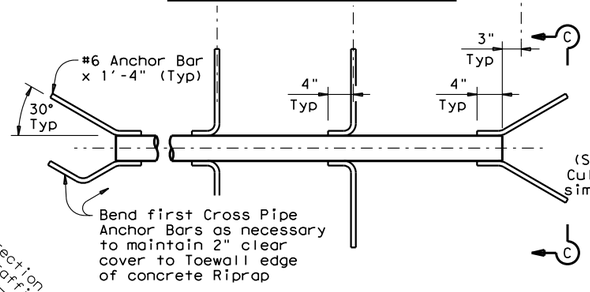
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

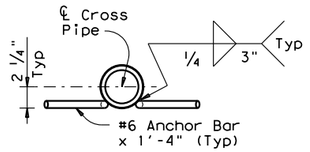
(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)



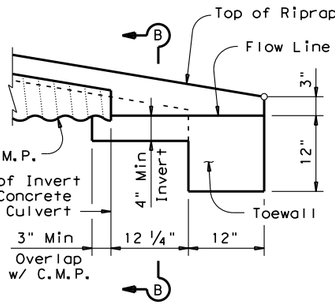
PIPE W/ BOLTED ANCHOR



PIPE W/ ANCHOR BARS

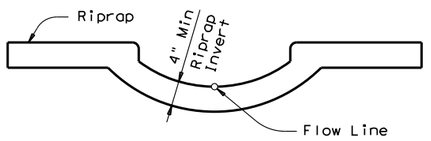


SECTION C-C



DETAIL "A"

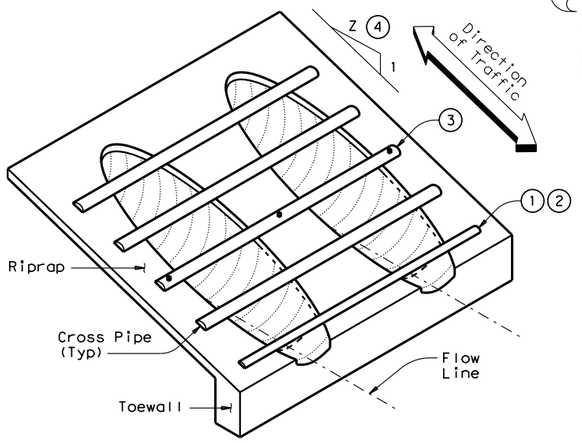
(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



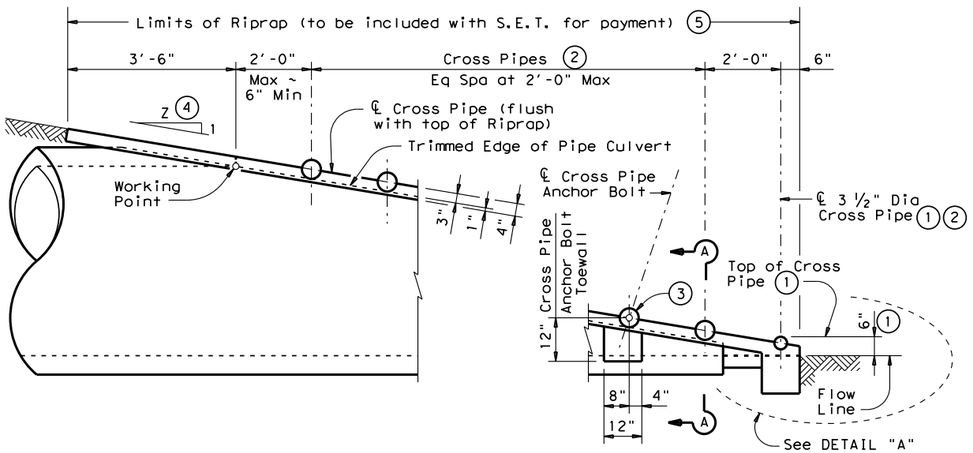
SECTION B-B

(Cross Pipes not shown for clarity.)

CROSS PIPE DETAILS

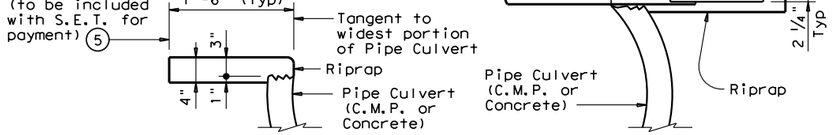


ISOMETRIC VIEW OF TYPICAL INSTALLATION



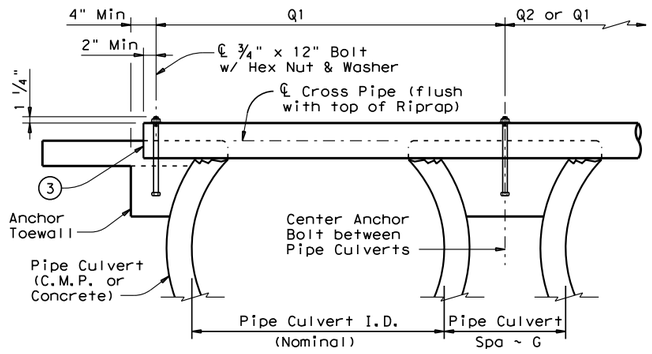
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)



SHOWING TYPICAL PIPE CULVERT & RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES 2

Nominal Culvert I.D.	4:1 Conc Riprap (CY) 6	6:1 Conc Riprap (CY) 6	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
12"	0.5	0.6	9"	N/A	2'- 1"	1'- 9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.6	0.7	11"	N/A	2'- 5"	2'- 2"		
18"	0.6	0.8	1'- 2"	N/A	2'-10"	2'- 8"		
21"	0.7	0.9	1'- 4"	N/A	3'- 2"	3'- 1"		
24"	0.8	0.9	1'- 7"	N/A	3'- 6"	3'- 7"		
27"	0.8	1.0	1'- 8"	N/A	3'-10"	3'-11"	3 or more Pipe Culverts	3 1/2" Std (4.000" O.D.)
30"	0.9	1.1	1'-10"	N/A	4'- 2"	4'- 4"	2 or more Pipe Culverts	
33"	1.0	1.2	1'-11"	4'- 2"	4'- 5"	4'- 8"	All Pipe Culverts	
36"	1.1	1.3	2'- 1"	4'- 5"	4'- 9"	5'- 1"	All Pipe Culverts	4" Std (4.500" O.D.)
42"	1.2	1.5	2'- 4"	4'-11"	5'- 5"	5'-10"		
48"	1.4	1.7	2'- 7"	5'- 5"	6'- 0"	6'- 7"	All Pipe Culverts	5" Std (5.563" O.D.)
54"	1.6	2.0	3'- 0"	5'-11"	6'- 9"	7'- 6"		
60"	1.7	2.2	3'- 3"	6'- 5"	7'- 4"	8'- 3"		
66"	-	2.4	3'- 3"	6'-11"	7'-10"	8'- 9"		
72"	-	2.7	3'- 4"	7'- 5"	8'- 5"	9'- 4"		

1. The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
2. Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 1/2" Standard Pipe (4" O.D.).
3. The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.
4. Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is prefered where fits within R.O.W., 4:1 permitted where shown on plans.
5. Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".
6. Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

Texas Department of Transportation

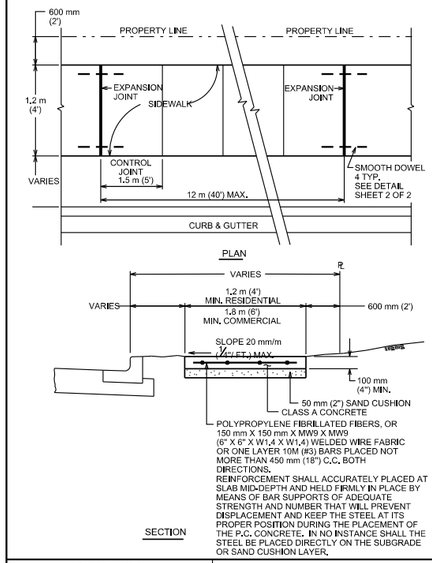
Bridge Division Standard

SAFETY END TREATMENT

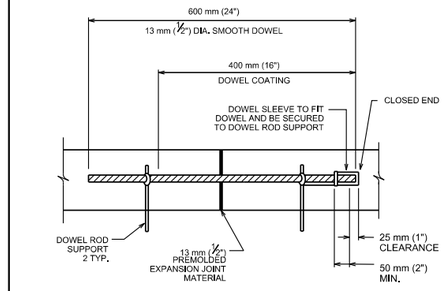
FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD (MOD)

FILE: setppdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
				DT22

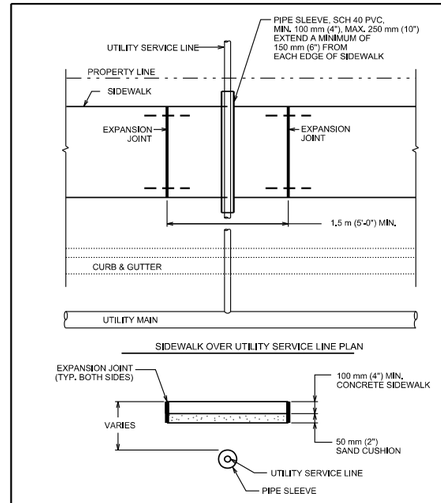


CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS		SIDEWALK	
RECORD COPY SIGNED BY BILL GARDNER	03/26/08 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 432S-1 1 OF 3



DOWEL DETAIL

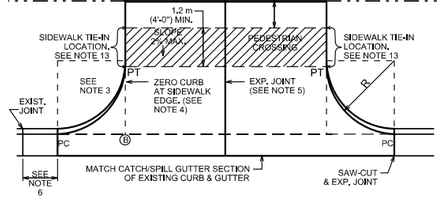
CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS		SIDEWALK	
RECORD COPY SIGNED BY BILL GARDNER	03/26/08 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 432S-1 2 OF 3



SECTION OF SIDEWALK OVER UTILITY SERVICE LINES

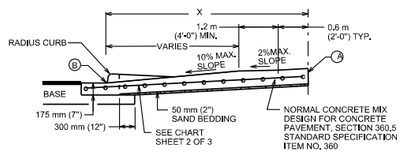
NOTES:
1. THIS STANDARD APPLIES TO THE INSTALLATION OF NEW UTILITIES OR UTILITIES BEING REPLACED BY A NEW LINE.
2. NO JOINTS IN UTILITY SERVICE PIPE TO BE LOCATED INSIDE PVC PIPE SLEEVE.

CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS		SIDEWALK	
RECORD COPY SIGNED BY BILL GARDNER	03/26/08 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 432S-1 3 OF 3



PLAN

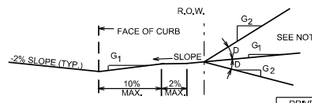
NOTE: ALL DRIVEWAYS SHALL BE SLOPED TOWARDS THE STREET FROM THE R.O.W. LINE. ELEVATION OF POINT (A) ABOVE POINT (B) IS, TYPICALLY A MINIMUM OF 150 mm (6") PLUS 20 mm/m (¼" RISE/FOOT) OVER DISTANCE "X" IN METERS (FEET).



CROSS SECTION

CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS		TYPE II DRIVEWAY	
RECORD COPY SIGNED BY CUONG TRAN	02/24/10 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 433S-2 1 OF 2

USE	THICKNESS	REINFORCEMENT
DRIVEWAYS FOR PASSENGER VEHICLE PARKING LOTS	150 mm (6") MIN.	125 mm (5") MIN. CONCRETE WITH ONE LAYER OF 13M (#4) BARS PLACED ON CHAIRS AT MIDDEPTH OF SLAB AT NO MORE THAN 450 mm (18") O.C. BOTH DIRECTIONS
ALL OTHERS	175 mm (7") MIN.	125 mm (5") MIN. CONCRETE WITH ONE LAYER OF 13M (#4) BARS PLACED ON CHAIRS AT MIDDEPTH OF SLAB AT NO MORE THAN 450 mm (18") O.C. BOTH DIRECTIONS



ALLOWABLE GRADES

DRIVEWAY VOLUME (ADT)	D=GRADE CHANGE STD.	MAX
>1500	0%	3%
500-1500	3%	6%
< 500	6%	15%

NOTES:
1. ALL TYPE II DRIVEWAYS SHALL HAVE RADIUS ENDS.
2. DRIVEWAY WIDTHS AND RADII DIMENSIONS, ONE/TWO WAY TRAVEL REQUIREMENTS, AND GEOMETRIC LAY-OUT ARE HIGHLY VARIABLE, SUBJECT TO SITE SPECIFIC CONDITIONS AND REQUIREMENTS. SEE TRANSPORTATION CRITERIA MANUAL, SECTION 5 "DRIVEWAYS".
3. THE DRIVEWAY EDGE SHALL BE SMOOTHLY TRANSITITIONED INTO THE SIDEWALK TIE-IN LOCATION BEGINNING AT THE RADIUS PC LINE.
4. "ZERO" CURB AT PT OR SIDEWALK EDGE, WHICHEVER IS ENCOUNTERED FIRST.
5. PLACE AN EXPANSION JOINT DOWN THE CENTER OF DRIVEWAY ALL DRIVEWAYS.
6. IF DIMENSION IS LESS THAN 1.5 METERS (5 FEET), REMOVE CURB AND GUTTER TO EXISTING JOINT AND POUR MONOLITHICALLY WITH DRIVEWAY.
7. IF THE BASE IS OVER-EXCAVATED WHERE THE CURB AND GUTTER WERE REMOVED, BACKFILL WITH CONCRETE MONOLITHICALLY WITH THE DRIVEWAY.
8. TYPE II DRIVEWAYS ARE TO BE LOCATED NO CLOSER TO THE CORNER OF INTERSECTING RIGHT OF WAY THAN 60% OF PARCEL FRONTAGE AT 30 METERS (100 FEET), WHICHEVER IS LESS.
9. DRIVEWAY SHALL NOT BE CONSTRUCTED WITHIN THE CURB RETURN OF A STREET INTERSECTION.
10. WHILE THE PROPERTY OWNER REMAINS RESPONSIBLE FOR GRADE BREAKS WITHIN PRIVATE PROPERTY, THE FIRE DEPARTMENT SHALL BE CONSULTED WHERE THE DRIVEWAY IS ESSENTIAL TO EMERGENCY VEHICLE ACCESS AND "G2 IS GREATER THAN 15%.
11. USE 12 MM (1/2") ASPHALT BOARD OR OTHER APPROVED MATERIAL FOR CURB AND GUTTER EXPANSION JOINTS. SIDEWALK, AT THE R.O.W. LINE AND AT MIDWIDTH, SEE NOTE 5.
12. SEE TRANSPORTATION CRITERIA MANUAL, SECTION 5 FOR OTHER DRIVEWAY REQUIREMENTS.
13. THE SIDEWALK, REGARDLESS OF ITS LOCATION WITH RESPECT TO THE CURB OR PROPERTY LINE, SHALL BE CONNECTED TO THE DRIVEWAY AT THESE LOCATIONS.
14. WATER METER BOXES AND WASTEWATER CLEAN OUTS ARE PROHIBITED FROM BEING LOCATED IN DRIVEWAY AREAS.

CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS		TYPE II DRIVEWAY	
RECORD COPY SIGNED BY CUONG TRAN	02/24/10 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 433S-2 2 OF 2

BID 1312-037

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte A. Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

MISCELLANEOUS DETAILS

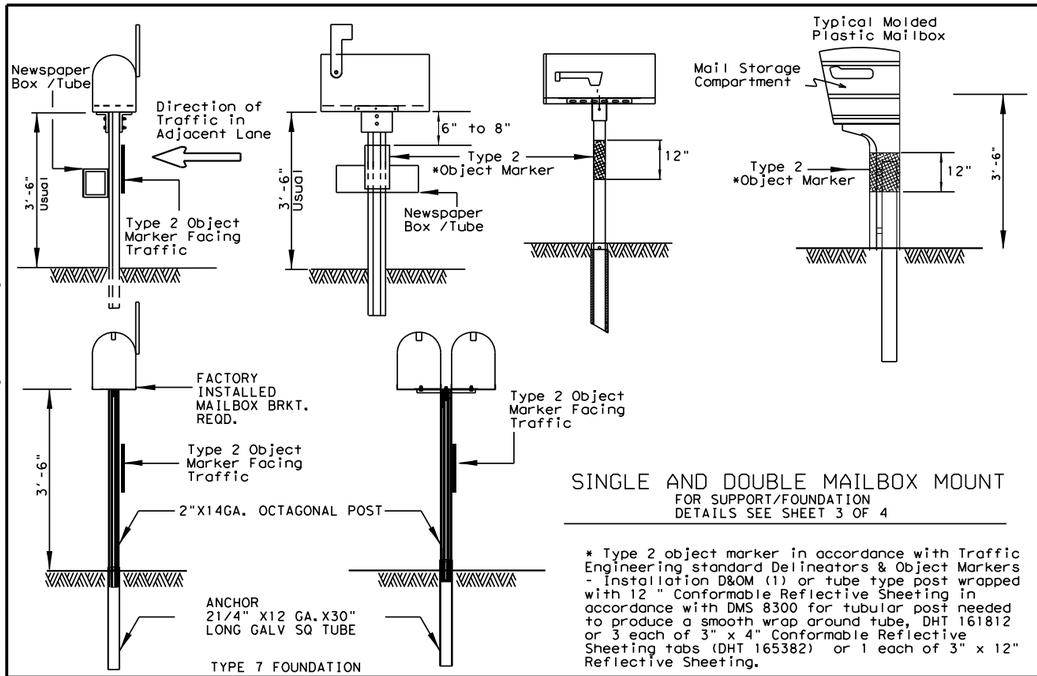
K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015

SHEET NO.
DT23 OF DT34

DATE:
FILE:



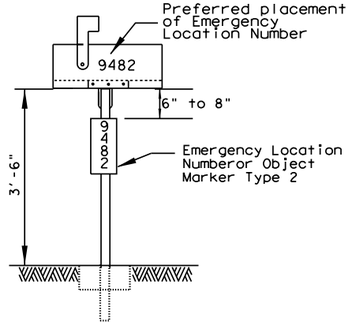
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

* Type 2 object marker in accordance with Traffic Engineering standard Delineators & Object Markers - Installation D&OM (1) or tube type post wrapped with 12 " Conformable Reflective Sheeting in accordance with DMS 8300 for tubular post needed to produce a smooth wrap around tube, DHT 161812 or 3 each of 3" x 4" Conformable Reflective Sheeting tabs (DHT 165382) or 1 each of 3" x 12" Reflective Sheeting.

Note: Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Pedestrian Facilities Curb ramps standard *PED-XX for pedestrian facilities.

*PED-XX: XX is the standard year for example PED- 12 , PED-13,etc.



PLACEMENT OF EMERGENCY LOCATION NUMBER

Location Number shall be placed on: 1. A yellow, type A plate with class 1 flat surface reflective sheeting in accordance with DMS 8600. The color of numbers shall be black. or 2: A green or blue plate with white numbers attached to post beside the object marker. Other contrasting color configuration, as approved , may be used. (Use Same type plate as used for the type 2 Object Marker. Recommended sign size is 6" by 15")

MAILBOX SIZES

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
SIZE	LENGTH	WIDTH	HEIGHT	MAXIMUM WEIGHT	
	INCHES			POUNDS	
SMALL	19 1/2	6	7	5	5
MEDIUM	22 1/2	8	11 1/2	7	7
LARGE	23 1/2*	11 1/2*	13 1/2*	10	10

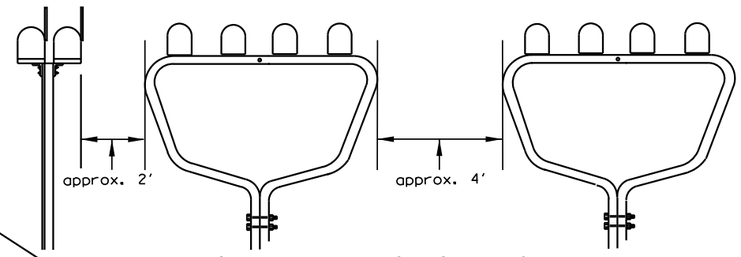
* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 1/2	11 1/2		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

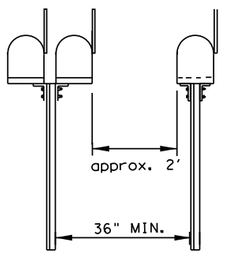
Mailboxes shall be made of light weight sheet metal or light weight plastic. Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



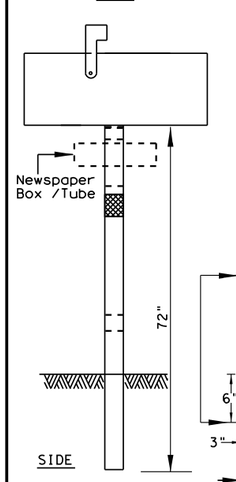
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

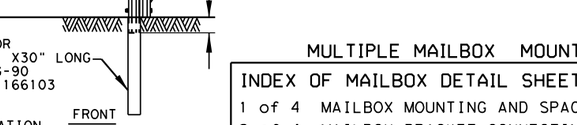


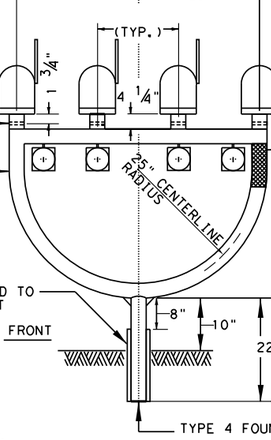
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

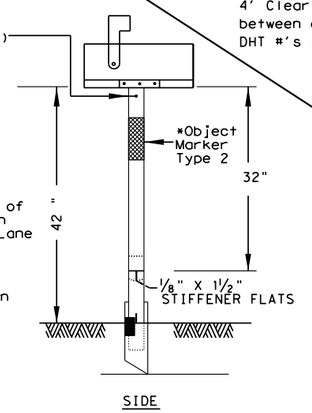
SINGLE & DOUBLE MAILBOX PLACEMENT

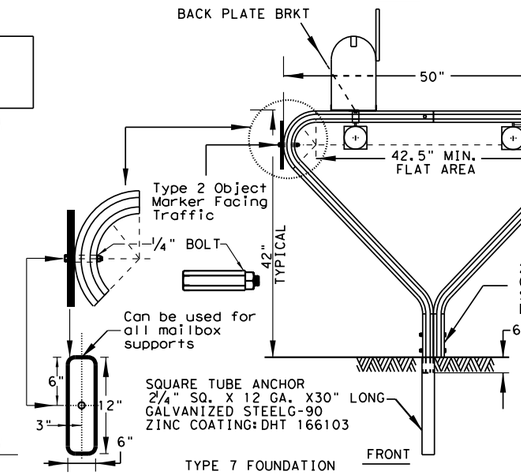


FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4









DOUBLE AND MULTIPLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

NEWSPAPER RECEPTACLE

A light weight receptacle for newspaper delivery can be attached to mailbox posts as shown on this page if the receptacle:

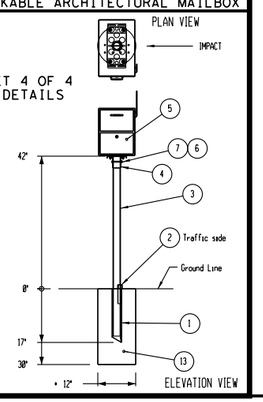
- Does not touch the mailbox.
- Does not present a hazard to traffic or delivery of the mail.
- Does not extend beyond the front of the mailbox.
- Does not display advertising, except the publication title.
- Newspaper receptacles on separate supports are prohibited.

MULTIPLE MAILBOX MOUNT

INDEX OF MAILBOX DETAIL SHEETS

LOCKABLE ARCHITECTURAL MAILBOX

SEE SHEET 4 OF 4 FOR DETAILS



SHEET 1 OF 4

Texas Department of Transportation — Maintenance Division Standard

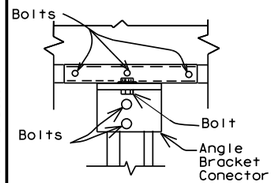
MAILBOX MOUNTING AND SPACING

MB-14(1)

FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				DT24

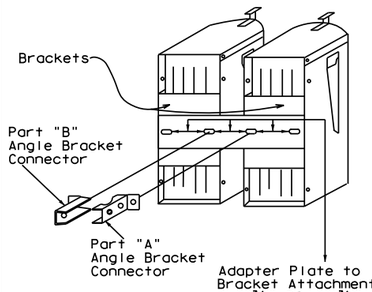
12/17/2015 9:00 AM

DATE:
FILE:



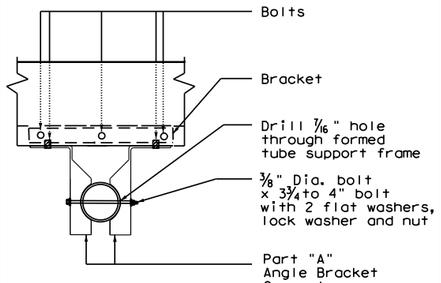
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

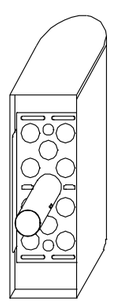


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

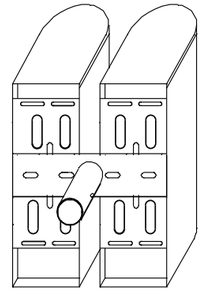


MULTIPLE MAILBOX



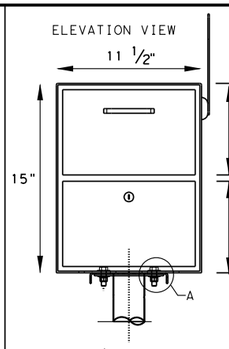
To be used with 2 3/8" OD RR or thinwall Steel posts.

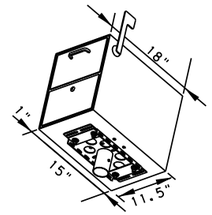
WELDED SINGLE MAILBOXBRACKET



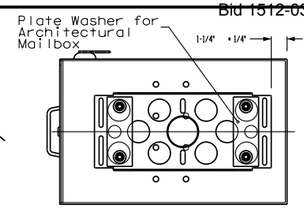
To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



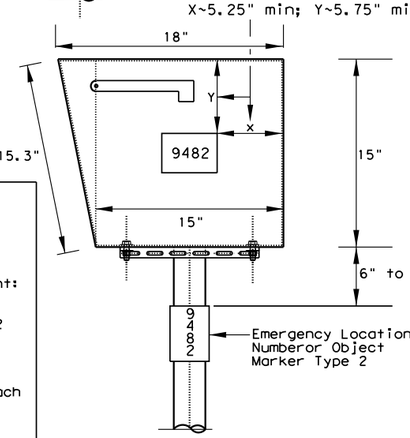


ISOMETRIC VIEW



PLAN VIEW BOTTOM

Preferred placement of Emergency Location Number
X~5.25" min; Y~5.75" min



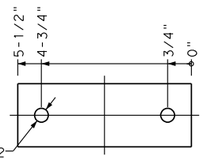
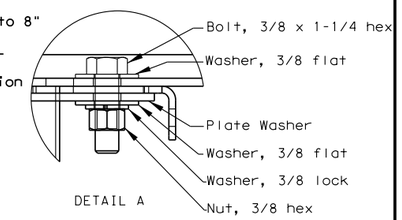
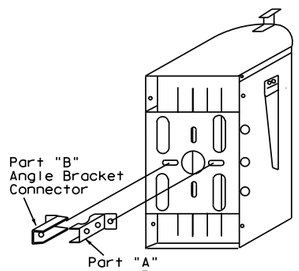
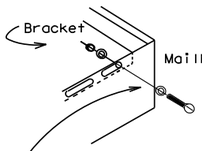


Plate Washer for Architectural Mailbox Plate, 2" x 1/8" ASTM A36 Steel



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS



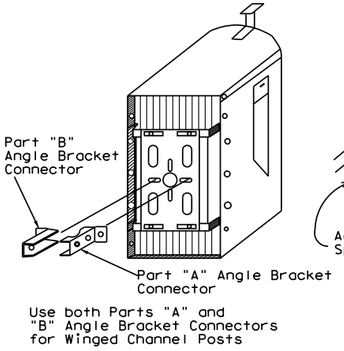


Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/ 2 flat washers and nut per each bolt.

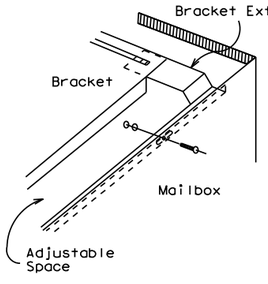
Angle to bracket attachment:
2 - 3/8" Dia. x 3/4" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to
2 - 3/8" Dia. x 2 1/2" bolt with 2 flat washers, lock washer and nut per each bolt.

SMALL MAILBOX



Use both Parts "A" and "B" Angle Bracket Connectors for Winged Channel Posts



Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/2 flat washers and nut per each bolt.

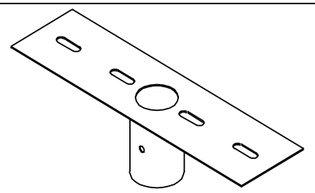
Bracket to bracket extension attachment:
2 - 1/4" Dia. x 3/4" carriage bolt w/ flat washer, lock washer and nut per bolt (4 bolts required if 2 bracket extensions are used).

Angle to bracket attachment:
2 - 3/8" Dia. x 3/4" bolt w/2 flat washers, lock washer and nut per each bolt.

Angle to mailbox support attachment:
2 - 3/8" Dia. x 2 1/2" bolt w/2 flat washers, lock washer, and nut per each bolt.

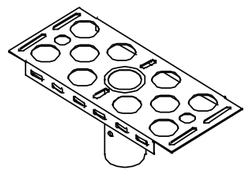
Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES



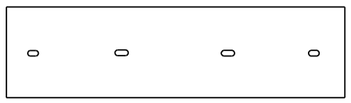
DHT 162323

For use with galvanized thinwall steel posts DHT # 143426 or powder-coated thinwall steel post DHT # 162911.



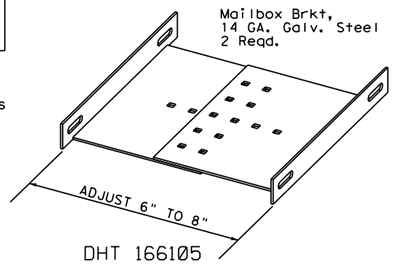
DHT 161443

For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

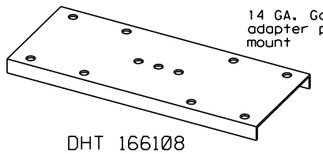


DHT #3789

Used for mounting two Mailboxes on the same post.



DHT 166105

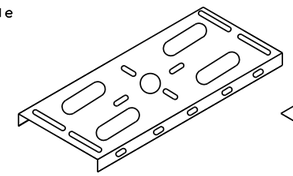


DHT 166108

14 GA. Galv. Steel adapter plate for double mount

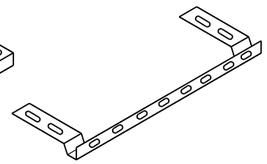
HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.



DHT 148939

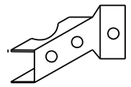
Mailbox Bracket



DHT 148938

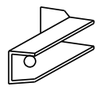
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



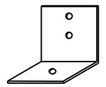
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

GENERAL NOTES

1. Connecting hardware detailed on this sheet is for the hardware that the Department stocks at the Regional Warehouses. This hardware is available to the contractor only when so stated elsewhere in the plans or specification.
2. Hardware for mounting mailboxes to the support/foundation furnished by industry should be used when shown on the Maintenance Divisions "Approved Products List." Only mailbox hardware that have been crash tested in accordance with NCHRP Report 350, will be on the approved list.
3. Hardware furnished by industry shall be erected in accordance with the manufacturer's recommendation.
4. Bracket and bracket extension shall be constructed of 14 gauge galvanized steel sheet metal.
5. The angles, brackets and adapter plates shall be constructed of 12 gauge galvanized steel sheet metal.
6. Items with evidence of damage to the galvanized coating or wet storage stains (white rust) will not be accepted.

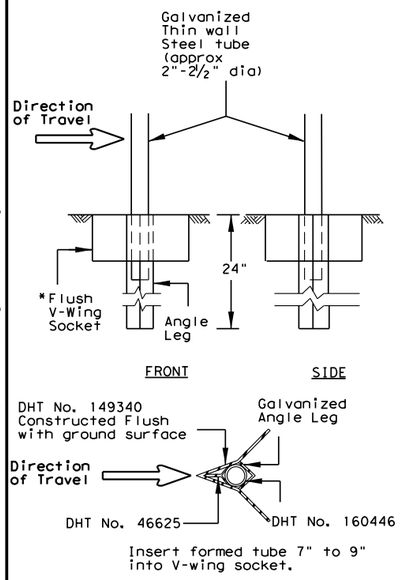
Texas Department of Transportation
Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-14(1)

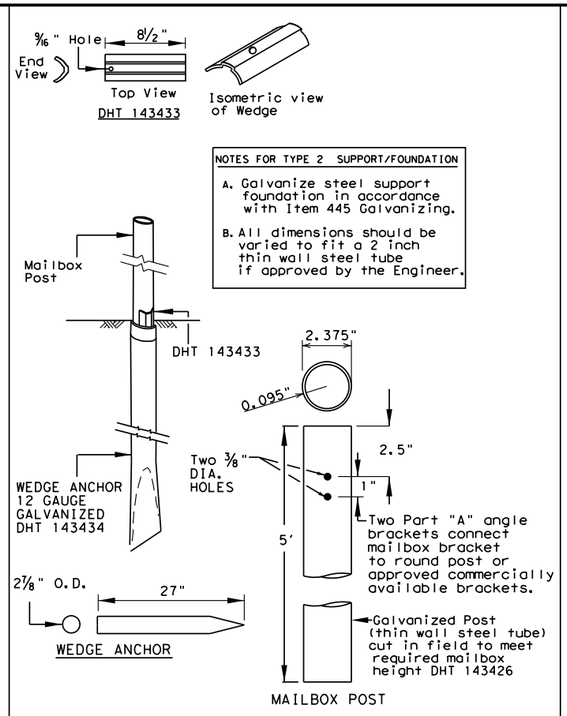
FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED DHT 163730				
	DIST	COUNTY		SHEET NO.
				DT25

DATE:
FILE:



TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



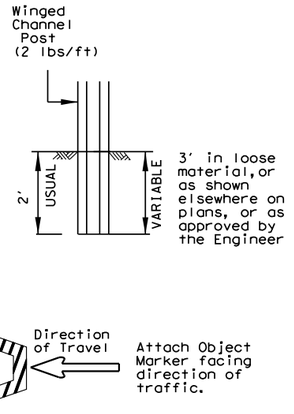
NOTES FOR TYPE 2 SUPPORT/FOUNDATION

A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

B. All dimensions should be varied to fit a 2 inch thin wall steel tube if approved by the Engineer.

TYPE 2 SUPPORT/FOUNDATION

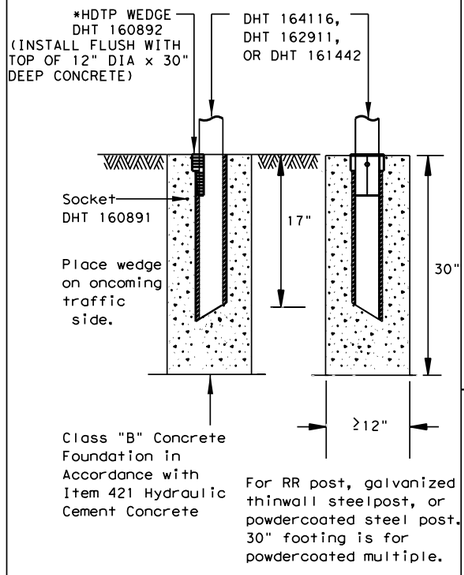
THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



TYPE 3 SUPPORT/FOUNDATION

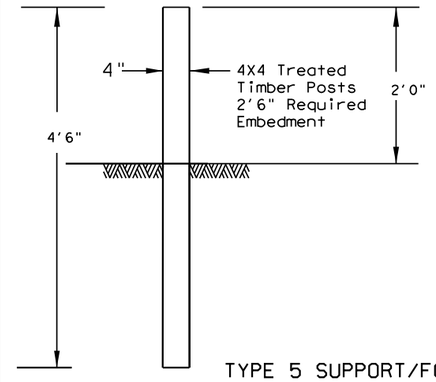
WINGED CHANNEL POST

Note on DHT Number
See Table of Applicable DHT Numbers on this sheet 4 for DHT description.



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

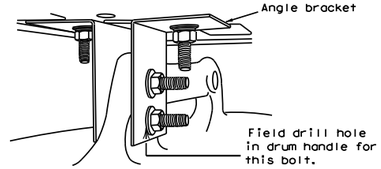


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



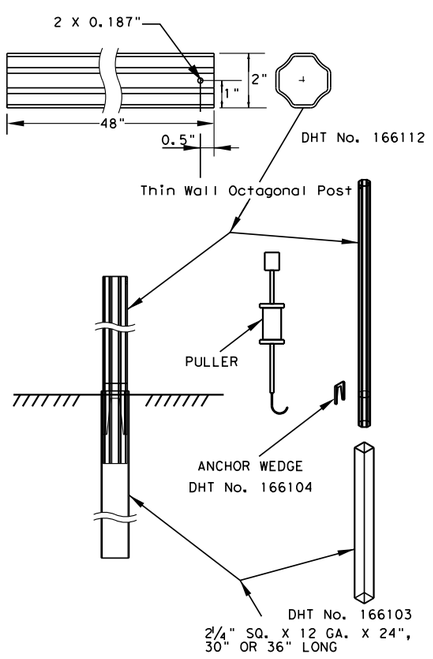
Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL

GENERAL NOTES

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. type 1, 2, 3, 4 or 7 supports or foundation can be used for single or double mailbox installations. The RCR post should be used only for a single installation with a small mailbox. The Type 5 support/foundation is used for the single molded plastic mailbox. The Type 4 support/foundation is used for the 2.375" O.D. RR post, thin wall steel post, and white multiple mailbox post.
4. The Type 1 or type 7 support/foundation can be used for a multiple mailbox mount.
5. The Type 4 support should be used with thin wall steel pipe for the medium, large and double mailbox installations.
6. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition.



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

MB-(X) ASSM TY (XXX) (X) (XX) (OPTIONAL)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- SP = Single Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post
- Ty 7 = Wedge Anchor

Type of Bracket
- AB = Angle Bracket.
- TB = 2.375" Tube Bracket

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-14(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				DT36

LOCKABLE ARCHITECTURAL MAILBOX

SINGLE-MOUNT INSTALLATION PARTS			
#	PART NAME	PART/DHT #	QTY
1	SOCKET, TYPE 4 FOUNDATION	160891	1
2	WEDGE FOR TYPE 4 FOUNDATION	160892	1
3	THIN-WALL WHITE STEEL TUBE 2.375 OD	162911	1
4	BRACKET FOR ATTACHING MAILBOX	161443	1
5	ARCHITECTURAL MAILBOX	SEE NOTE	1
6	NUT, 5/16" HEX	NUT, 5/16" HEX	1
7	BOLT, 5/16 X 3 HEX	GRADE 5	1
8	PLATE WASHER FOR ARCHITECTURAL MAILBOX	SEE SEE SHEET 2	2
9	WASHER, 3/8 FLAT		8
10	WASHER, 3/8 LOCK		4
11	NUT, 3/8 HEX		4
12	BOLT, 3/8 X 1-1/4 HEX	GRADE 5	4
13	CONCRETE, CLASS B (2000 PSI)		1

LOCKABLE ARCHITECTURAL MAILBOX DETAILS

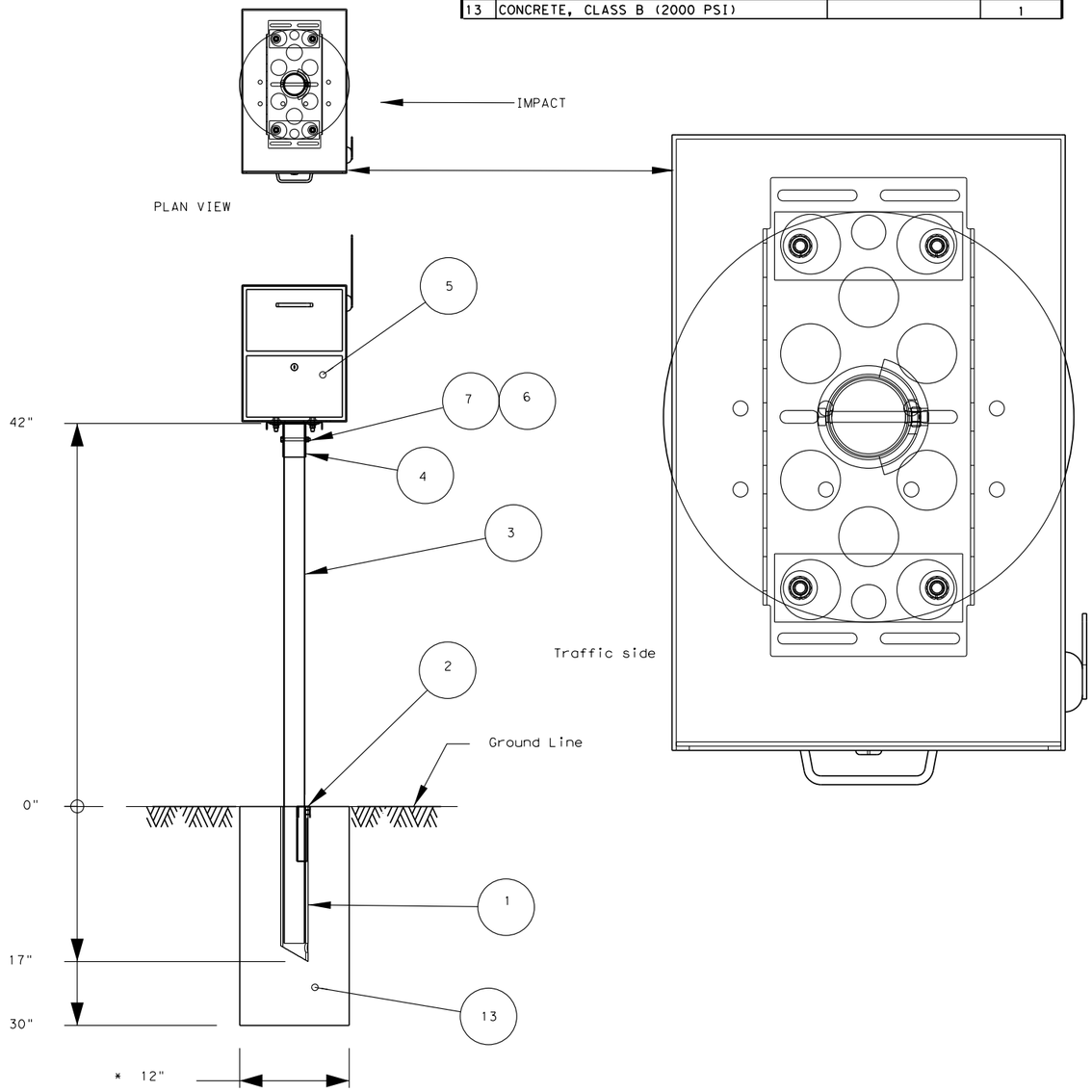


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
160892	WEDGE FOR TYPE 4 FOUNDATION
166104	WEDGE FOR TYPE 7 FOUNDATION
	POSTS
4289	WINGED CHANNEL MAILBOX POST
149339	MULTIPLE MAILBOX POST (GALVANIZED TUBING)
164116	MULTIPLE MAILBOX POST (WHITE COATED)
166114	MULTIPLE MAILBOX POST (WHITE COATED OCTAGONAL)
166153	MULTIPLE MAILBOX POST (GALVANIZED OCTAGONAL)
161442	RECYCLED RUBBER POST. FOR SMALL MAILBOX ONLY
143426	THIN-WALL GALVANIZED STEEL TUBE 2.375" OUTER DIAMETER
162911	THINWALL WHITE STEEL TUBE 2.375" OUTER DIAMETER
166152	SINGLE OR DOUBLE THIN-WALL MAILBOX POST GALVANIZED 2" OCTAGONAL
166112	SINGLE OR DOUBLE THIN-WALL MAILBOX POST WHITECOATED 2" OCTAGONAL
	REFLECTIVE SHEETING
161812	REFLECTIVE SHEETING FOR EMERGENCY LOCATION NUMBER PANEL
	CONNECTING HARDWARE
2917	ANGLE BRACKET USED FOR TEMPORARY MAILBOX SUPPORT
166105	BRACKET FOR SINGLE MOUNTING OF MAILBOXES (MOUNTING KIT)
3789	PLATE FOR DOUBLE MOUNTING OF MAILBOXES
166108	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES (MOUNTING KIT)
166111	BRACKET FOR MULTIPLE MOUNTING OF MAILBOXES (MOUNTING KIT)
148939	BRACKET FOR ATTACHING SMALL OR MEDIUM SIZE MAIL BOX
148938	EXTENDER TO BRACKET FOR ATTACHING LARGE MAILBOX
159489	ANGLE BRACKET PART A
159490	ANGLE BRACKET PART B
162323	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES ON THINWALL STEEL POST, GALVANIZED OR POWDERCOATED.
161443	BRACKET FOR ATTACHING MAILBOX TO RECYCLED RUBBER POST AND TO MULTIPLE WHITE MAILBOX POST
158358	CASTING (NEWSPAPER RECEPTACLE BRACKET)
163731	U-BOLT (NEWSPAPER RECEPTACLE BRACKET)
160698	BOLT;HEX HEAD, GALV;3/8"DIA X 3/4"L HD, W/2-FLAT WASHERS
163750	BOLT;HEX HEAD, GALV;3/8" X 1-1/2, 16 NC, W/WASHERS
160701	BOLT;HEX HEAD, GALV;3/8"DIA X 2-1/2"L, HD, W/2-FLAT WASHERS
163730	BOLT;HEX HEAD, GALV;3/8" X 3-1/2", NC, W/NUT, 2 FLAT WASHERS
160699	BOLT;HEX HEAD, GALV;3/8"DIA X 3-3/4"L HD, W/2-FLAT WASHERS
160700	BOLT;HEX HEAD, GALV;3/8"DIA X 4"L HD, W/2-FLAT WASHERS

DATE:
FILE:

SHEET 4 OF 4

Texas Department of Transportation | Maintenance Division Standard

DHT NUMBERS TABLE

MB-14(1)

FILE:MB14(1).DGN	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
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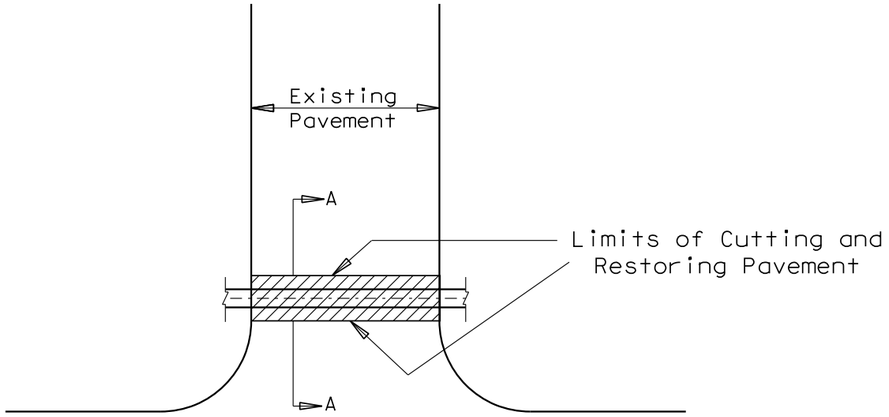
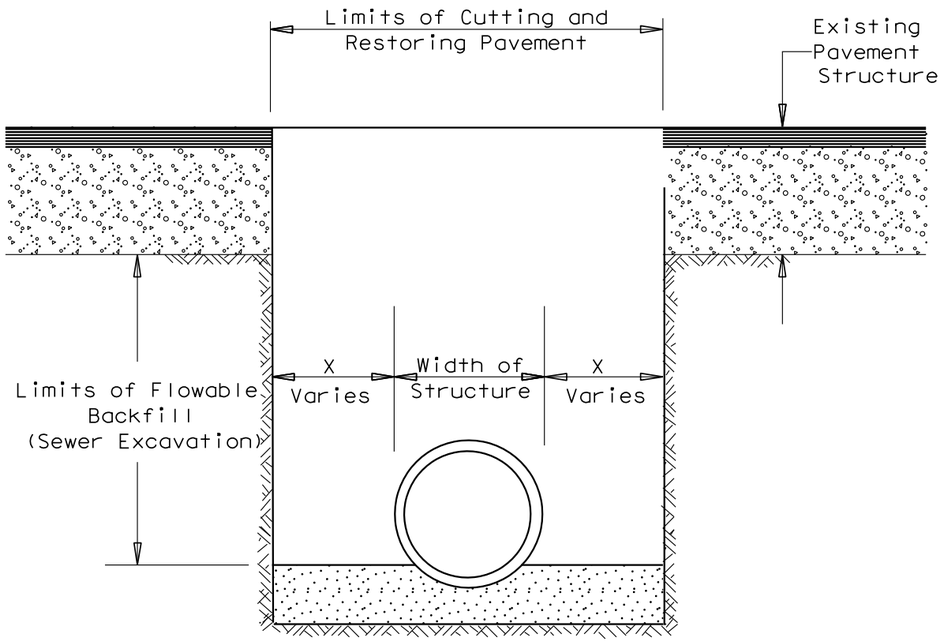
				DT33



PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

TABLE OF STANDARD EXCAVATION WIDTHS FOR RC PIPE			
PIPE		X	WIDTH OF CUTTING AND RESTORING PAVEMENT
ID	OD		
18"	22 ½"	1'	3.88'
24"	29 ½"	1'	4.46'
30"	37"	1'	5.08'
36"	44"	1'	5.67'
42"	51"	1'	6.25'
48"	58"	2'	8.83'
54"	65"	2'	9.42'
60"	72"	2'	10.00'
66"	79"	2'	10.58'
72"	86"	2'	11.17'
78"	93"	2'	11.75'
84"	100"	2'	12.33'
96"	114"	2'	13.50'

Provide width of Cutting and Restoring Pavement for installation of storm drain structures as the overall width of the structure plus:

- 2 feet for structures with an inside dimension of 42" or less, or,
- 4 feet for structures with an inside dimension greater than 42".

GENERAL NOTES:

Consider any work performed to repair damage to the existing pavement outside the limits shown subsidiary to the pertinent Items.

Replacement material will be an Asphalt Stabilized paving material, Flowable Backfill or Class A Concrete as required by existing conditions or an equivalent material as directed. Ensure that the thickness of the replacement material(s) is equivalent to the thickness of the existing pavement structure.

Payment for Cutting and Restoring Pavement as shown shall be made at the unit price bid for "Cutting and Restoring Pavement."

Texas Department of Transportation
Austin District Design

CUTTING AND RESTORING PAVEMENT DETAILS

Austin District Standard

REVISIONS	DIST	FED REG	FEDERAL AID PROJECT •	SHEET
3/03 District Update	AUS	6		DT28
9/04 2004 Update	COUNTY		CONTROL SECT JOB	HIGHWAY
	WILLIAMSON			

FILE: CRPVMT-04.dgn

STORMWATER POLLUTION PREVENTION PLAN

SITE DESCRIPTION

PROJECT NAME: FOREST NORTH PHASE II

LATITUDE/LONGITUDE: 30° 28' 11" N / 97° 46' 39" W

OWNER NAME AND ADDRESS:
WILLIAMSON COUNTY
3151 S.E. INNER LOOP, SUITE B , GEORGETOWN, TEXAS 78626

DESCRIPTION:
THE FOREST NORTH DRAINAGE IMPROVEMENTS PROJECT PERFORMS MAINTAINENCE FOR EXISTING DRAINAGE INFRASTRUCTURE WITHIN THE NEIGHBORHOOD. MAINTAINENCE OPERATIONS WILL INCLUDE REGRADING OF EXISTING CHANNELS, REMOVAL AND REPLACEMENT OF EXISTING CULVERTS, AND INSTALLING SAFETY END TREATMENTS ON EXISTING CULVERTS.

RUNOFF COEFFICIENT:
THE WEIGHTED RUNOFF COEFFICIENT FOR THE SITE WILL BE 0.50.

SITE AREA:
THE TOTAL DISTURBED AREA FOR THE PROJECT WILL BE 1.2 ACRES.

SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES:
INSTALL TEMPORARY EROSION AND SEDIMENTATION CONTROL BEST MANAGEMENT PRACTICES.
LOCATE EXISTING UTILITIES HORIZONTALLY AND VERTICALLY.
SITE DEMOLITION/CLEARING AND GRADING.
CONSTRUCTION OF STORMWATER FACILITIES FROM DOWNSTREAM TO UPSTREAM.
SITE RESTORATION.
ASPHALT REPAIR, SEEDING, REVEGETATION, AND SOIL SURFACE PROTECTION.
REMOVE TEMPORARY EROSION AND SEDIMENTATION CONTROL BEST MANAGEMENT PRACTICES.

EXISTING SOIL AND VEGETATION CONDITIONS
FROM TRAVIS COUNTY SOIL SURVEY:
WEATHERED LIMESTONE, FAT AND LEAN CLAY WITH GRAVEL DEPOSITS

NAME OF RECEIVING WATERS:
LAKE CREEK

EROSION AND SEDIMENT CONTROLS

VEGETATION/STABILIZATION CONTROLS/MEASURES:
_X_ TEMPORARY SEEDING
_X_ PERMANENT SEEDING, SODDING, PLANTING
___ MULCHING
___ FERTILIZER
_X_ TOPSOIL
___ SOIL RETENTION BLANKET, CLASS I, TYPE ___
_X_ SOIL RETENTION BLANKET, CLASS II, TYPE _F_
_X_ IRRIGATION FOR VEGETATION ESTABLISHMENT
___ GRASSED SWALES
_X_ PRESERVATION OF NATURAL RESOURCES: _X_ TREES, ___ BUFFER ZONES
_X_ TREE FENCING: ___ PLASTIC, _X_ CHAIN LINK, _X_ WOOD
___ OTHER:

STRUCTURAL CONTROLS/MEASURES:
TEMPORARY SEDIMENT CONTROLS DURING CONSTRUCTION:
_X_ ROCK BERMS, WIRE WRAPPED: _X_ 18", ___ 36"
_X_ SILT FENCES: _X_ PERIMETER, ___ REINFORCED
___ TRIANGULAR FILTER DIKES
___ SAND BAG BERMS
_X_ ROCK STABILIZED CONSTRUCTION ENTRANCE (IF CONTRACTOR ELECTS TO HAVE STAGING AREA)
___ DIVERSION DIKES/SWALES
___ STORM DRAIN INLET PROTECTION
___ SEDIMENT TRAPS
___ SEDIMENT BASIN
_X_ MAINTENANCE OF SEDIMENT CONTROLS
___ OTHER:

PERMANENT CONTROLS:
___ ROCK BERM/DAM/RETARDS
_X_ STONE RIP-RAP: ___ 3-5", ___ 7-10", _X_ 12"
___ CONCRETE RIP-RAP
___ TREE WELLS, STONE
___ GABIONS: ___ MATTRESSES, ___ BASKETS
___ CURBS AND GUTTERS
___ STORM SEWERS
___ VELOCITY CONTROL DEVICES
___ PONDS: ___ DETENTION, ___ DET/FILTRATION, ___ WET
___ OTHER: (VEGETATIVE FILTER STRIPS)

DRAINAGE/STORMWATER MANAGEMENT:

STORM WATER DRAINAGE IS PROVIDED BY A COMBINATION OF CLOSED STORM DRAIN SYSTEM AND ROADSIDE CHANNELS FOR THE ROAD AND OFFSITE STORM WATER.

TIMING AND CHANGES TO CONTROLS/MEASURES

AS INDICATED IN THE SEQUENCE OF MAJOR ACTIVITIES, THE FIRST PHASE OF TEMPORARY EROSION/SEDIMENT CONTROL - SILT FENCES AND ROCK BERMS - WILL BE INSTALLED BY THE CONTRACTOR IN THE ROADSIDE AREAS AND DRAINAGE CHANNELS PRIOR TO CLEARING AND GRADING ACTIVITIES ON THE SITE. THE SECOND PHASE OF TEMPORARY EROSION/SEDIMENT CONTROL CONSISTING OF SHORT LENGTHS OF REINFORCED SILT FENCES INSTALLED PERIODICALLY ACROSS THE DRAINAGE CHANNELS SHALL BE INSTALLED, MAINTAINED BY THE CONTRACTOR INCLUDING REMOVAL OF ACCUMULATED SEDIMENT AND REINSTALLED AS NECESSARY DURING THE GRADING AND CONSTRUCTION PROCESS TO ENSURE CONTINUOUS SEDIMENT CONTROL PROTECTION FOR THE SITE.

AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR MORE THAN 21 DAYS WILL BE STABILIZED BY THE CONTRACTOR WITH TEMPORARY SEEDING WITHIN 14 DAYS OF THE LAST DISTURBANCE. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN AREA, THAT AREA WILL BE STABILIZED WITH PERMANENT VEGETATION AND SOIL RETENTION BLANKETS.

THE TOTAL LINEAR FOOTAGE, NUMBER AND LOCATION OF SILT FENCES AND ROCK BERMS REFERENCED IN THIS PLAN, THE CONSTRUCTION DRAWINGS AND THE CONTRACT LINE ITEMS ARE ESTIMATED, BASED ON THE PARTICULAR AREA OF THE SITE AND ITS ANTICIPATED STORMWATER FLOW AND SEDIMENT LOAD DURING CONSTRUCTION. ADJUSTMENTS TO THE LOCATIONS, NUMBER, AND LINEAR FOOTAGE OF SEDIMENT CONTROL BERMS ARE TYPICALLY MADE AFTER CONSTRUCTION BEGINS AND STORMWATER EVENTS OCCUR, TO MOST EFFECTIVELY TRAP SEDIMENT IN THE AREAS MORE LIKELY TO DISCHARGE OFF-SITE. THESE CHANGES AND ADJUSTMENTS WILL BE MADE BY THE CONTRACTOR AT THE DIRECTION OF THE CITY. ADJUSTMENTS WHICH DO NOT INCREASE TOTAL LINEAR FOOTAGE OF CONTROLS OR CHANGE THE GENERAL AREAS AND CHANNELS REQUIRING CONTROLS ARE WITHIN THE ORIGINAL SCOPE OF THIS CONTRACT.

MAINTENANCE/INSPECTION PROCEDURES AND REPORTING

THESE ARE THE INSPECTION AND MAINTENANCE PRACTICES THAT WILL BE USED TO MAINTAIN EROSION AND SEDIMENT CONTROLS:

ALL CONTROLS WILL BE INSPECTED AT LEAST ONCE PER WEEK AND FOLLOWING ANY STORM EVENT OF 0.5 INCHES OR GREATER BY THE CONTRACTOR AND CITY INSPECTOR. A RAIN GAUGE SHALL BE KEPT AT THE SITE BY THE CONTRACTOR TO MEASURE RAINFALL EVENTS.

AN INSPECTION AND MAINTENANCE REPORT (SEE COPY OF FORM BELOW) WILL BE MADE AFTER EACH INSPECTION BY THE COUNTY OR DESIGNATED REPRESENTATIVE, WHICH WILL AS A MINIMUM INCLUDE THE INSPECTORS NAME, DATE, DAYS SINCE LAST RAINFALL, AMOUNT OF LAST RAINFALL; MAJOR SITE AREAS, DAYS SINCE LAST ACTIVITY, TEMPORARY/PERMANENT STABILIZATION NEEDED; INSPECTION OF ALL BERMS AND STRUCTURAL CONTROLS AND THEIR CONDITION, SEDIMENT DEPTH, AND ANY REMOVAL OR REPAIRS REQUIRED; ANY CHANGES IN THE POLLUTION PREVENTION PLAN NEEDED AND THE REASONS FOR SUCH; AND BE SIGNED BY THE INSPECTOR.

ALL MEASURES WILL BE MAINTAINED BY THE CONTRACTOR IN GOOD WORKING ORDER; IF REPAIRS ARE NECESSARY, THEY WILL BE INITIATED WITHIN 48 HOURS OF REPORT, OR AS DETAILED IN THE REPORT FORM. ACCUMULATED SEDIMENT WILL BE REMOVED WHEN IT REACHES A DEPTH OF SIX INCHES (SILT FENCE) OR TWELVE INCHES (ROCK BERM) OR ONE THIRD THE HEIGHT OF THE BERM, WHICHEVER IS GREATER. SILT FENCES WILL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, IF FABRIC IS SECURELY ATTACHED TO THE BACKING AND TRENCHED IN THE GROUND AND BACKFILLED TO THE REQUIRED DEPTH, AND IF THE POSTS ARE INSTALLED IN THE GROUND TO THE REQUIRED DEPTH.

TEMPORARY AND PERMANENT SEEDING AND PLANTING WILL BE INSPECTED FOR BARE SPOTS, WASHOUTS, BREACHES IN THE SOIL RETENTION BLANKET, AND HEALTHY GROWTH.

THE CONTRACTOR'S SITE SUPERINTENDENT WILL SELECT, AND TRAIN AS NECESSARY, DESIGNATED PERSONNEL RESPONSIBLE FOR INSPECTION, REPAIR, SEDIMENT REMOVAL AND ANY OTHER MAINTENANCE REQUIRED FOR KEEPING THE EROSION AND SEDIMENT CONTROLS ON-SITE IN GOOD WORKING ORDER.

NON-STORMWATER DISCHARGES:
ANY NON-STORMWATER DISCHARGES FROM THE CONSTRUCTION SITE, SUCH AS DEWATERING FROM EXCAVATIONS, WATER FROM LINE FLUSHING, EQUIPMENT WASH WATER, ETC., WILL BE CONTROLLED AND MANAGED BY THE CONTRACTOR IN COMPLIANCE WITH ALL TCEQ AND LOCAL WATER QUALITY DISCHARGE REQUIREMENTS.

SPOIL/FILL MANAGEMENT

ALL SOIL AND ROCK "SPOIL" MATERIAL SHALL BE MANAGED, TEMPORARILY STORED OR PERMANENTLY DISPOSED OF ON-SITE BY THE CONTRACTOR AS SPECIFIED IN THIS CONTRACT AND CONSTRUCTION PLANS OR APPROVED BY THE CITY. ANY DISPOSAL OF SPOIL MATERIAL OUTSIDE OF THE CITY RIGHT-OF-WAY AND EASEMENTS OF THIS PROJECT SHALL OBTAIN REQUIRED PERMITS. NO CONSTRUCTION SOLID WASTE MATERIALS WILL BE BURIED ONSITE.

DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS AND SHALL NOT BE LOCATED IN ANY WETLAND, FLOODPLAIN, OR STREAMBED. CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE RUNOFF OF POLLUTANTS.

OFF-SITE VEHICLE TRACKING

OFF-SITE TRACKING OF SOIL BY VEHICLES SHALL BE MANAGED AND MINIMIZED TO THE GREATEST EXTENT POSSIBLE BY THE CONTRACTOR AND SHALL BE REMOVED BY CLEANING AND SWEEPING AS NECESSARY.

___ STABILIZED CONSTRUCTION ENTRANCE
___ IRRIGATION FOR DUST CONTROL
___ EXCESS DIRT ON ROAD REMOVED DAILY

WASTE MANAGEMENT

SOLID WASTE:
ALL LITTER, TRASH, AND SANITARY WASTE GENERATED BY THE PROJECT CONSTRUCTION WILL BE COLLECTED AND DISPOSED OF BY THE CONTRACTOR AS REQUIRED IN THIS CONTRACT AND THE STATE OF TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) REGULATIONS 30 T.A.C., CHAPTER 330, MUNICIPAL SOLID WASTE.

HAZARDOUS WASTE:
ALL HAZARDOUS MATERIALS AND HAZARDOUS/SPECIAL WASTE WILL BE HANDLED AND DISPOSED OF BY THE CONTRACTOR AS REQUIRED BY THE TCEQ REGULATIONS 30 T.A.C., CHAPTER 330, MUNICIPAL SOLID WASTE AND CHAPTER 335, INDUSTRIAL AND HAZARDOUS WASTE.

SPILL PREVENTION AND CONTROL

SPILL PREVENTION, CONTROL, CLEANUP, AND REPORTING SHALL COMPLY WITH TCEQ REGULATIONS 30 T.A.C., CHAPTER 327 SPILL PREVENTION AND CONTROL., AND ANY LOCAL REGULATIONS.

MATERIALS INVENTORY:
THE FOLLOWING MATERIALS AND SUBSTANCES MAY BE PRESENT ONSITE AT SOME TIME DURING THE CONSTRUCTION: CONCRETE, FERTILIZER, PAINTS, ASPHALT, FUEL AND PETROLEUM BASED PRODUCTS.

MATERIAL MANAGEMENT PRACTICES:
THE FOLLOWING ARE MANAGEMENT PRACTICES THAT WILL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORMWATER RUNOFF:

AN EFFORT WILL BE MADE TO STORE ONLY ENOUGH PRODUCT REQUIRED TO DO THE JOB.

ALL MATERIALS STORED ONSITE WILL BE STORED IN A SECURED LOCATION, IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS, AND IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE.

PRODUCTS WILL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE ORIGINAL MANUFACTURERS' LABEL.

SUBSTANCES WILL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.

WHENEVER POSSIBLE, ALL OF A PRODUCT WILL BE USED UP BEFORE DISPOSING OF THE CONTAINER.

MANUFACTURER' RECOMMENDATIONS FOR PROPER USE AND DISPOSAL WILL BE FOLLOWED.

THE SITE SUPERINTENDENT WILL INSPECT REGULARLY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS.

HAZARDOUS CHEMICAL PRODUCTS WILL BE KEPT IN THEIR ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.

ORIGINAL LABELS AND MATERIAL SAFETY DATA SHEETS (MSDS) WILL BE RETAINED AND FOLLOWED.

IF SURPLUS PRODUCT MUST BE DISPOSED OF, MANUFACTURERS' OR STATE REQUIRED METHODS FOR PROPER DISPOSAL SHALL BE FOLLOWED.

PRODUCT SPECIFIC PRACTICES:
PETROLEUM PRODUCTS:
ALL FUEL STORAGE SHALL BE IN COMPLIANCE WITH TCEQ REGULATIONS 30 T.A.C., CHAPTER 334, UNDERGROUND AND ABOVEGROUND STORAGE TANKS.

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

FERTILIZERS:
FERTILIZERS USED WILL BE APPLIED ONLY IN THE MINIMUM AMOUNTS SPECIFIED IN THIS CONTRACT AND RECOMMENDED BY THE MANUFACTURER. STORAGE WILL BE COVERED FROM STORMWATER. THE CONTENTS OF PARTIALLY USED BAGS WILL BE TRANSFERRED TO OTHER WATER TIGHT STORAGE AS NECESSARY.

PAINTS:
ALL PAINT CONTAINERS WILL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE. EXCESS PAINT OR PAINT WASH WATER WILL NOT BE DISCHARGED ON OR OFF THE SITE BUT WILL BE PROPERLY DISPOSED OF ACCORDING TO MANUFACTURERS INSTRUCTION AND TCEQ AND LOCAL REGULATIONS.

CONCRETE TRUCKS:
CONCRETE TRUCKS WILL NOT BE ALLOWED TO WASH OUT OR DISCHARGE SURPLUS CONCRETE OR DRUM WASH WATER ON THE SITE.

SPILL CONTROL PRACTICES:
SPILL CLEANUP PROCEDURES, INCLUDING PERSONAL SAFETY GUIDELINES WILL BE CLEARLY POSTED OR AVAILABLE FOR PERSONNEL AT THE SITE IN THE EVENT OF A SPILL.

MATERIALS AND EQUIPMENT FOR SPILL CLEANUP, SUCH AS ABSORBENT, RAGS, SAND, SAWDUST, CONTAINERS, ETC., WILL BE KEPT AVAILABLE IN VEHICLES OR AT THE MATERIALS STORAGE AREA ONSITE.

ALL SPILLS WILL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY.

REPORTABLE QUANTITIES OF SPILLS OF HAZARDOUS MATERIALS WILL BE REPORTED TO THE TRAVIS COUNTY INSPECTOR, PROJECT MANAGER, APPROPRIATE TCEQ AND/OR LOCAL OFFICIALS AS REQUIRED BY LAW.

THE SPILL PREVENTION PLAN WILL BE ADJUSTED AS NECESSARY TO INCLUDE MEASURES TO PREVENT PARTICULAR TYPES OF SPILLS FROM REOCCURRING.

THE CONTRACTORS' SITE SUPERINTENDENT RESPONSIBLE FOR DAY-TO-DAY OPERATIONS WILL BE RESPONSIBLE FOR COORDINATING, DESIGNATING, AND TRAINING ONSITE PERSONNEL IN SPILL PREVENTION CONTROL AND CLEAN UP.

SAMPLE INSPECTION AND MAINTENANCE REPORT FORM

Project Name: _____

Inspector: _____

Stormwater Construction Pollution Prevention Plan
Inspection and Maintenance Report

Contractor: _____ Date/Amount of Last Rainfall: _____

Location	Approximate Stations Left or Right of Centerline		Date of Last Soil Disturbance	Date of Next Soil Disturbance	Control Measure(s)	Condition	Explanation/Notes	Corrective Action Schedule
	From	To						

CONTROL MEASURE CODES:		
1.- Silt Fence - Perimeter	8. - Triangular Filter Dike	15.- Temporary Seeding
2.- Silt Fence - Reinforced	9. - Stabilized Construction Entrance	16.- Permanent Seeding / Sodding
3.- Rock Berm 18"	10.- Stone Rip-Rap	17.- Soil Retention Blanket, Class I
4.- Rock Berm 36"	11.- Concrete Rip-Rap	18.- Soil Retention Blanket, Class II
5.- Diversion Dike/Swale	12.- Storm Drain Inlet Protection	19.- Mulch
6.- Sediment Trap	13.- Dust Control Irrigation	20.- Irrigation For Seeding
7.- Sediment Basin	14.- Spoil/Fill Removal	21.- Tree Fencing

CONDITIONS CODES:
S - Secure
1 - Remove Sediment
2 - Repair
3 - Replace
4 - Add Controls
5 - Other

CORRECTIVE ACTION SCHEDULE CODES:
D1 - 24 Hours
D2 - 48 Hours
D3 - By Next Inspection / 7 Days
D4 - Other

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

Signature: _____ Date of Inspection: _____ Date Given to Contractor: _____

POLLUTION PREVENTION PLAN CERTIFICATION

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNATED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

_____

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

THIS STORMWATER POLLUTION PREVENTION PLAN MEETS ALL THE REQUIREMENTS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) FOR CONSTRUCTION ACTIVITIES. THIS PLAN IS IN COMPLIANCE WITH ALL STATE OF TEXAS REQUIREMENTS AND IS IN COMPLIANCE WITH THE FOLLOWING LOCAL STORMWATER POLLUTION CONTROL TECHNICAL STANDARD(S): CITY OFAUSTIN ENVIRONMENTAL CRITERIA MANUAL.

CONTRACTOR CERTIFICATION

THE CONTRACTOR AWARDED THIS CONTRACT AND PERFORMING THIS WORK SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION OF THIS PLAN. FOR CONTRACTOR'S CERTIFICATION STATEMENT, PLEASE REFER TO CONTRACT DOCUMENT.

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER
9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS
STORM WATER POLLUTION PREVENTION PLAN

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P - 512.338.1704 F - 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015

SHEET NO.
DT29 OF DT34

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. WILLIAMSON COUNTY

2. CITY OF AUSTIN

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☒ Erosion Control Compost	☒ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Charlotte A. Gilpin
STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED
PROFESSIONAL ENGINEER
9/14/2015

Texas Department of Transportation

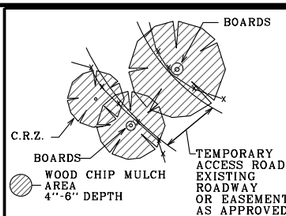
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

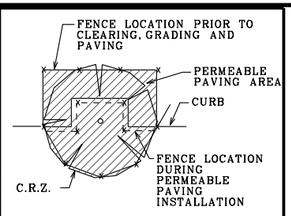
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
12-12-2011 (DS)					
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				DT 30	

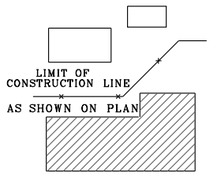
DATE: 12/17/2015 9:00 AM
FILE:



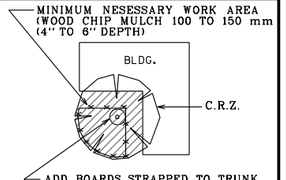
LINEAR CONSTRUCTION THROUGH TREES



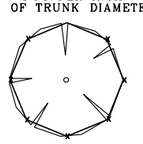
TREES IN PAVING AREA



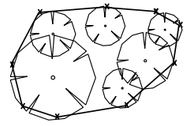
NATURAL AREAS



TREES NEAR CONSTRUCTION ACTIVITY

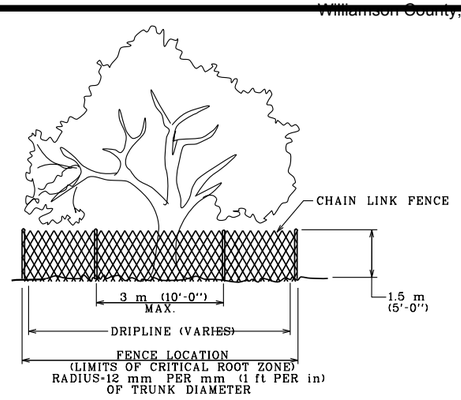


INDIVIDUAL TREE

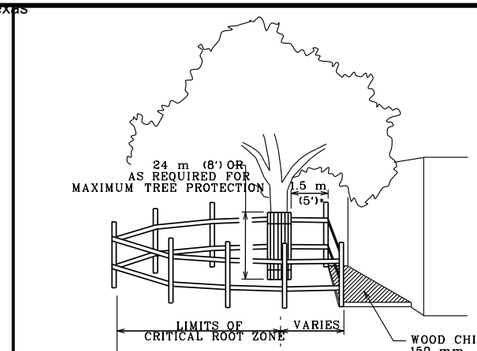


GROUP OF TREES

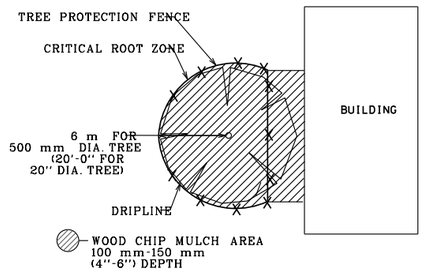
CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TREE PROTECTION FENCE LOCATIONS
RECORD COPY SIGNED BY J. PATRICK MURPHY	11/15/99 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 610S-1



CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TREE PROPTECTION FENCE TYPE A - CHAIN LINK
RECORD COPY SIGNED BY J. PATRICK MURPHY	11/15/99 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 610S-2



*AS NEEDED TO PROVIDE MINIMUM NECESSARY WORK SPACE. IF LESS THAN 1.5 m (5'), THEN ADD BOARDS STRAPPED TO TRUNK.



CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT		TREE PROTECTION FENCE MODIFIED TYPE B - WOOD
RECORD COPY SIGNED BY J. PATRICK MURPHY	11/15/99 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 610S-5

REV. NO.	BY	DATE	REVISION DESCRIPTION

Charlotte A. Gilpin

STATE OF TEXAS
CHARLOTTE A. GILPIN
99532
LICENSED PROFESSIONAL ENGINEER

9/14/2015

K FRIESE & ASSOCIATES, INC.
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WILLIAMSON COUNTY
FOREST NORTH DRAINAGE IMPROVEMENTS

MISCELLENOUS EROSION CONTROL DETAILS

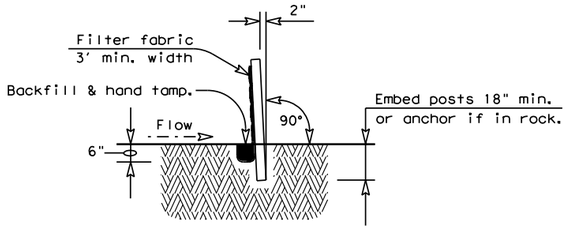
K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
1120 S. Capital of Texas Highway
CityView 2, Suite 100
Austin, Texas 78746
P – 512.338.1704 F – 512.338.1784
TBPE Firm #6535
www.kfriese.com

WILLIAMSON COUNTY
1848

SCALE	
DATE	9/14/2015

SHEET NO.
DT31 OF DT34

DATE:
FILE:



SECTION A-A

GENERAL NOTES

1. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

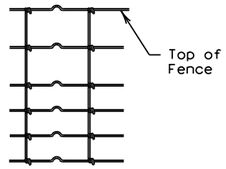
PLAN SHEET LEGEND

Sediment Control Fence —— SCF ——

SEDIMENT CONTROL FENCE USAGE GUIDELINES

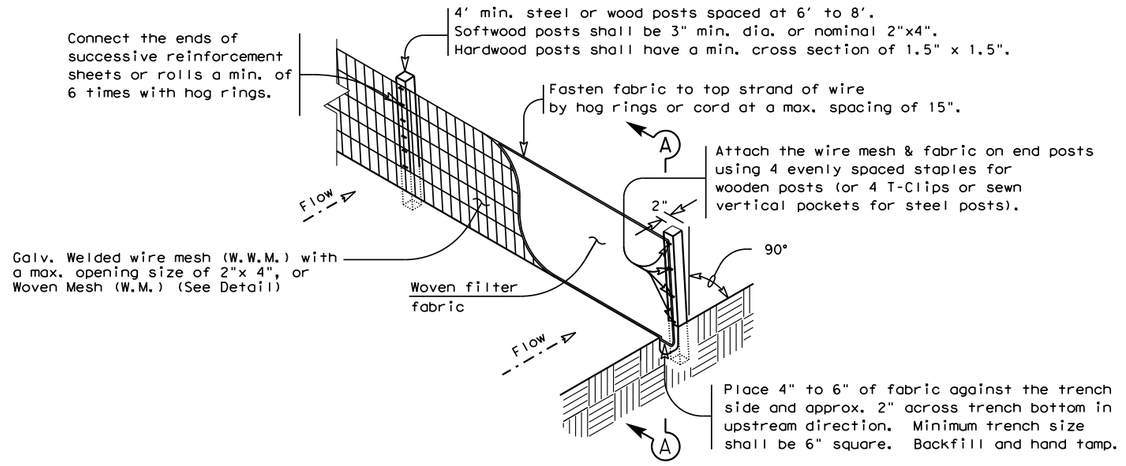
A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.



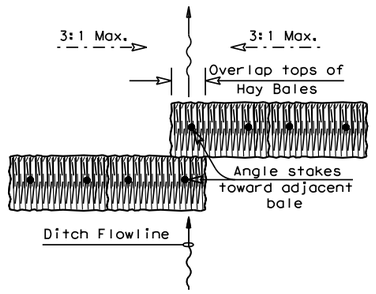
Galv. Hinge joint knot woven mesh (12.5 Ga. Min.) requires a minimum of five horizontal wires spaced at a max. 12 inches apart and all vertical wires spaced at a max. 12 inches apart.

Hinge Joint Knot Woven Mesh (Option)

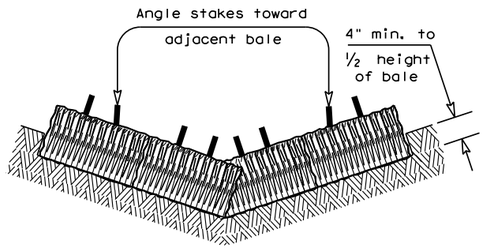


TEMPORARY SEDIMENT CONTROL FENCE

SCF



PLAN VIEW



PROFILE VIEW

PLANS SHEET LEGEND

Baled Hay —— BH ——

BALED HAY USAGE GUIDELINES

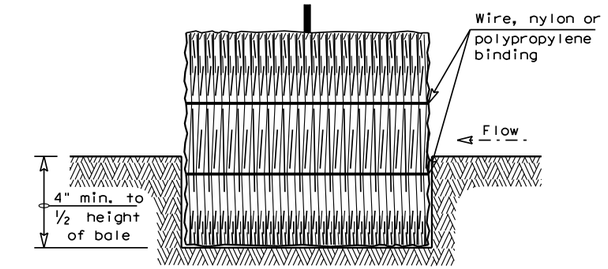
A Baled Hay installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A two year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT^2 of cross sectional area. Baled hay may be used at the following locations:

1. Where the runoff approaching the baled hay flows over disturbed soil for less than 100'. If the slope of the disturbed soil exceeds 10%, the length of slope upstream the baled hay should be less than 50'.
2. Where the installation will be required for less than 3 months.
3. Where the contributing drainage area is less than ½ acre.

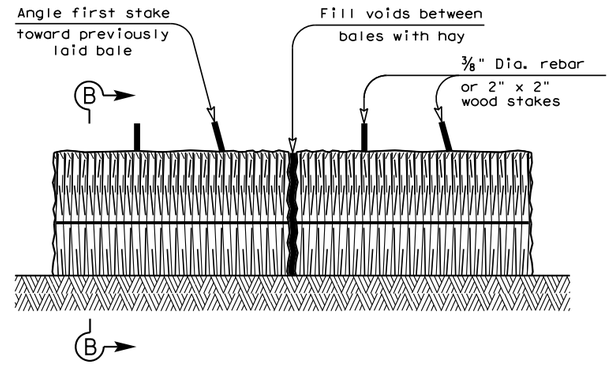
For Baled Hay installations in small ditches, the additional following considerations apply:

1. The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
2. The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the baled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.



SECTION B-B



BALED HAY FOR EROSION CONTROL

BH

GENERAL NOTES

1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
2. Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetative matter.
3. Hay bales shall be embedded in the soil a minimum of 4" and where possible ½ the height of the bale.
4. Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
5. Hay bales shall be securely anchored in place with ⅜" Dia. rebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

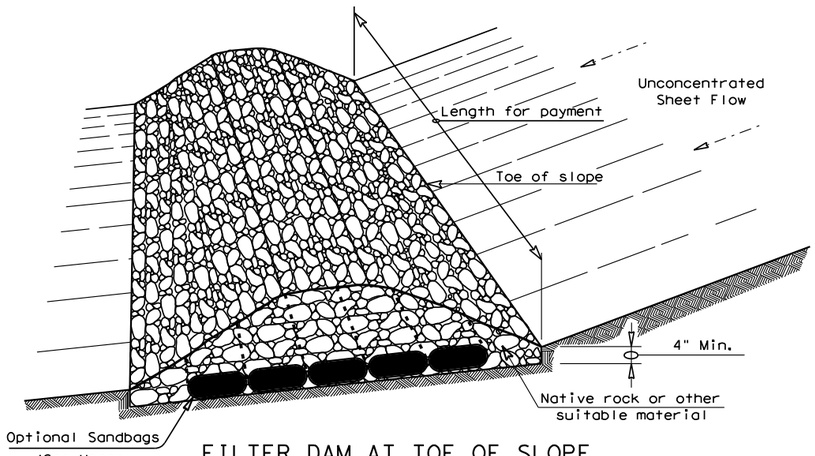
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & BALED HAY

EC(1)-09

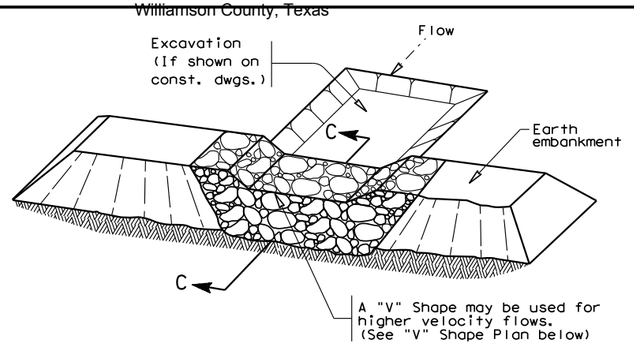
FILE: ec109.dgn	DN: TxDOT	CK: AM	DW: TV	CK: BD
©TxDOT June 1993	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				DT32



FILTER DAM AT TOE OF SLOPE

RFD1

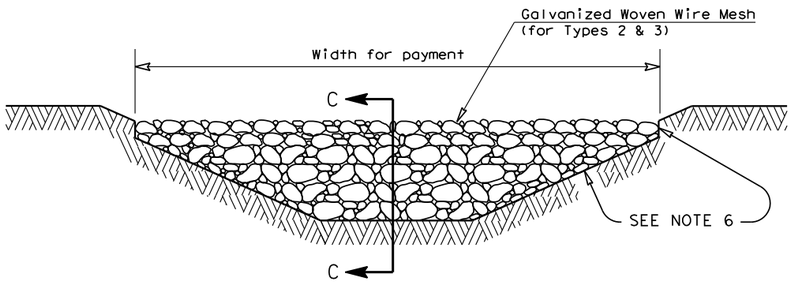
TYPE 1



FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2

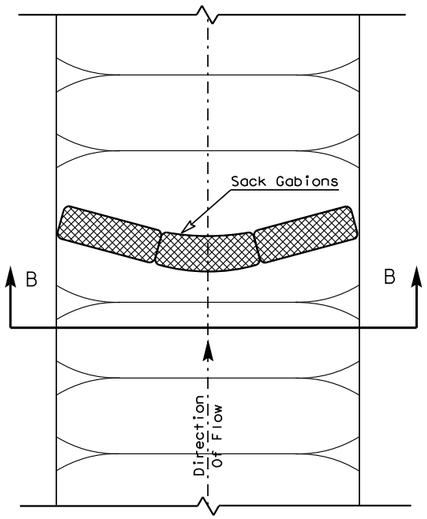
TYPE 1 OR TYPE 2



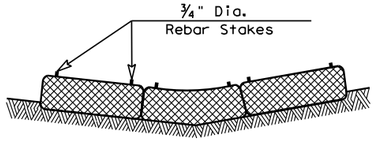
FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

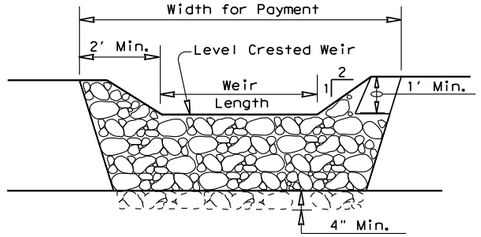
TYPE 1 OR TYPE 2



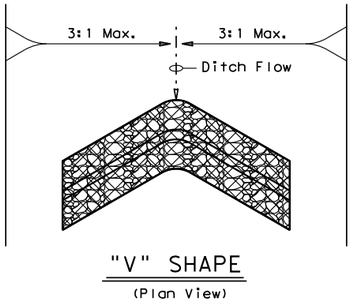
PLAN VIEW



SECTION B-B

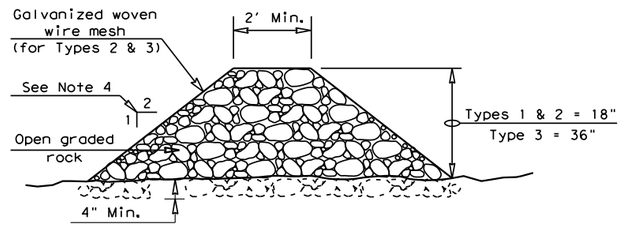


PROFILE



"V" SHAPE

(Plan View)



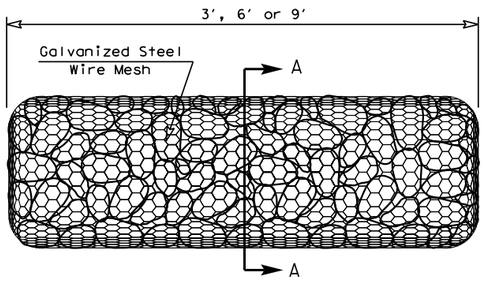
SECTION C-C

PLANS SHEET LEGEND

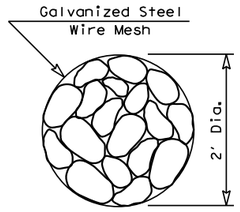
Type 1 Rock Filter Dam — RFD1

Type 2 Rock Filter Dam — RFD2

Type 3 Rock Filter Dam — RFD3



TYPE 4 (SACK GABIONS)



SECTION A-A

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approx. 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. In stream use the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes.
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-93

FILE: ec293.dgn	DN: TxDOT	CK: HEJ	DW: BD	CK:
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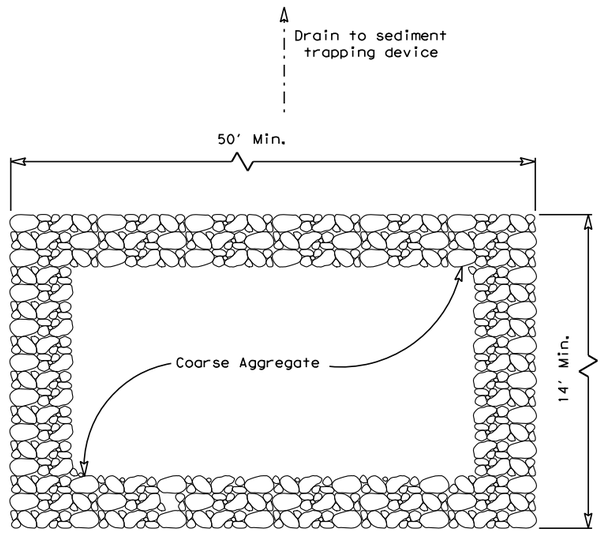
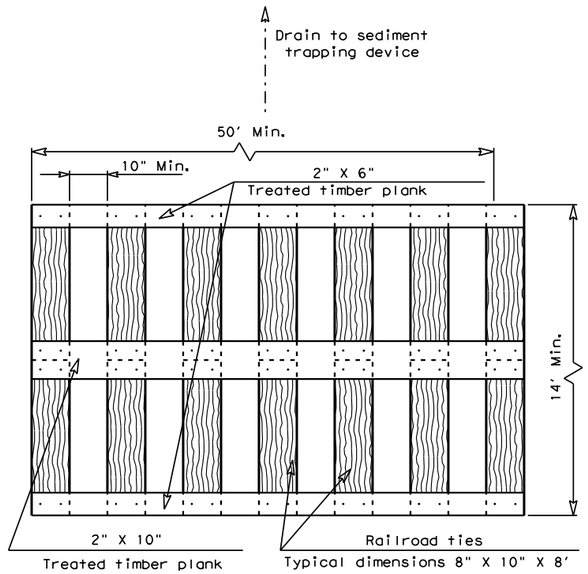


PLAN



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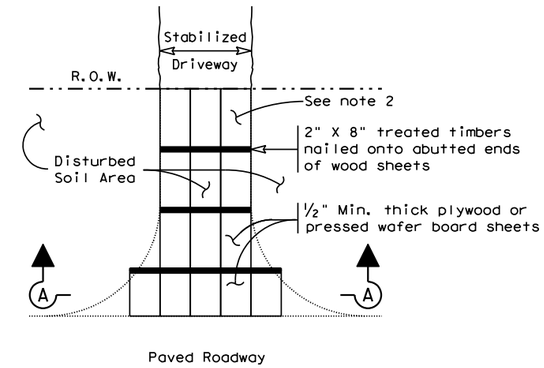
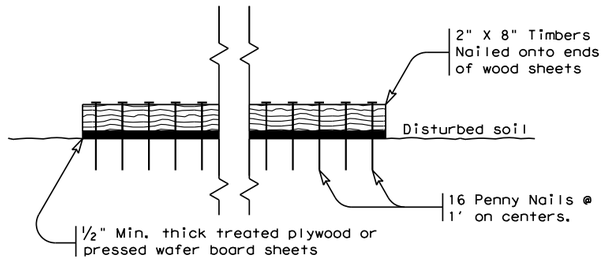
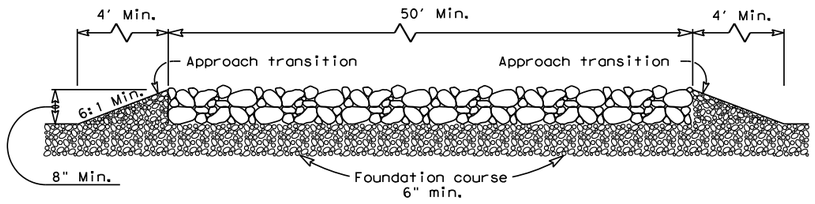


PLAN



SECTION A-A

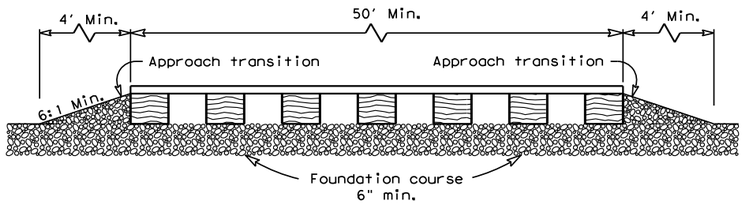


PROFILE

CONSTRUCTION EXIT (TYPE 1)

GENERAL NOTES

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



PROFILE

CONSTRUCTION EXIT (TYPE 2)

GENERAL NOTES

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

CONSTRUCTION EXIT (TYPE 3)

GENERAL NOTES

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-93

FILE: ec393.dgn	DN: TxDOT	CK: HEJ	DW: BD	CK:
©TxDOT June 1993	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				DT34

Bidder References

List the **last (3) companies or governmental agencies,** where the same or similar goods and/or services as contained in this IFB package, were recently provided by Bidder.

Reference 1

Client Name: Location:
City or County

Contact Name: Title:

Phone: Email: Contract Dates:
Contract Value: $

Scope of Work:

Reference 2

Client Name: Location:
City or County

Contact Name: Title:

Phone: Email: Contract Dates:
Contract Value: $

Scope of Work:

Reference 3

Client Name: Location:
City or County

Contact Name: Title:

Phone: Email: Contract Dates:
Contract Value: $

Scope of Work:

For Bidder or other person doing business with local government entity

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006 Local Government Code.

A person commits an offense if the person violates Section 176.0006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

1. Name of person doing business with local governmental entity.

2. Check this box is you are filing an update to a previously filed questionnaire.

☐

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3. Describe each affiliation or business relationship with an employee or contractor of the local government entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.

4. Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.

CONFLICT OF INTEREST QUESTIONNAIRE **FORM CIQ**

For Bidder or other person doing business with local government entity

5. Name of local government officer with whom filer has affiliation or business relationship. (Complete this section only if the answer to A, B, or C is YES.)

   This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or business relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

B. Is the filer of the questionnaire receive or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local government entity?

C. Is the filer of the questionnaire affiliated with a Corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

D. Describe each affiliation or business relationship:

6. Describe any other affiliation or business relationship that might cause a conflict of interest.

Cooperative Purchasing Program

Check one of the following options below. A non-affirmative Bid will in no way have a negative impact on the evaluation of the Bid.

☐ I will offer the quoted prices to all authorized entities during the term of the contract.

☐ I will not offer the quoted prices to all authorized entities.

BID FORMAT AND SUBMISSION

1.1 Organization of Bid Contents for Submittal

Each Bid should be organized and items submitted in the order described in of this IFB.

1.2 Conflict of Interest

No public official shall have interest in a contract, in accordance with Vernon's Texas Codes Annotated, Local Government Code Title 5, Subtitle C, Chapter 171, as amended.

As of January 1, 2006, Bidders are responsible for complying with Local Government Code Title 5, Subtitle C, Chapter 176. Additional information may be obtained from the Williamson County website at the following link: http://www.wilco.org/CountyDepartments/Purchasing/ConflictofInterestDisclosure/taBid/689/langu age/en-US/Default.aspx

Each Bidder must disclose any existing or potential conflict of interest relative to the performance of the requirements of this IFB. **Examples of potential conflicts may include an existing business or personal relationship between the Bidder, its principal, or any affiliate or subcontractor, with Williamson County or any other entity or person involved in any way in the project that is the subject of this IFB.** Similarly, any personal or business relationship between the Bidder, the principals, or any affiliate or subcontractor, with any employee or official of Williamson County or its suppliers must be disclosed. Any such relationship that might be perceived or represented as a conflict must be disclosed. Failure to disclose any such relationship or reveal personal relationships with Williamson County employees or officials may be cause for termination. Williamson County will decide if an actual or perceived conflict should result in Bid disqualification.

By submitting a Bid in response to this IFB, all Bidders affirm that they have not given, nor intend to give, at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a Williamson County public servant or any employee, official or representative of same, in connection with this procurement.

Each Bidder must provide a Conflict of Interest Statement in accordance with this IFB.

1.3 Ethics

The Bidder shall not accept or offer gifts or anything of value nor enter into any business arrangement with any employee, official or agent of Williamson County.

1.4 Bid Submittal Deadline

The Bid is due no later than the submittal date and time set forth in the 'Public Announcement and General Information' listed above for this IFB. Contents of each Bid shall be submitted in accordance with this IFB.

1.5 Delivery of Bids

Williamson County uses BidSync to distribute and receive bids and proposals Bids can be submitted electronically through BidSync or by hard copy. Refer to www.bidsync.com for further information.

If mailed or delivered in person, Bids and Bid addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the 'Public Announcement and General Information' listed above for this IFB, to:

Williamson County Purchasing Department
Attn: **BID NAME AND NUMBER**
901 South Austin Avenue Georgetown, Texas 78626

Williamson County will not accept any Bids received after the submittal deadline, and shall return such Bids unopened to the Bidder.
Williamson County will not accept any responsibility for Bids being delivered by third party carriers. Bidder should submit one (1) original, and one (1) copy of their Bid on CD (or other portable storage device). Bids will be opened publicly and read aloud. In the case of an RFP (Request for Proposal) submissions may be recognized in a manner to avoid public disclosure of contents; however, names of Bidders will then be read aloud.

Bidders should list the Bid Number, Bid Name, Name and Address of Bidder, and the Date of the Bid opening on the outside of the box or envelope and note "Sealed Bid Enclosed."

2.0 INSTRUCTIONS AND GENERAL REQUIREMENTS RELATED TO THIS BID

Read this document carefully. Follow all instructions and requirements. You are responsible for fulfilling all requirements and specifications. Be sure you have a clear understanding of this IFB.

General requirements apply to all advertised IFBs; however, these may be superseded, in whole or in part, by the **Bid Specifications, Addenda issued as a part of this IFB and Modifications issued as a part of this IFB.** Be sure your Bid package is complete.

2.1 Ambiguity, Conflict, or other Errors in the IFB

If Bidder discovers any ambiguity, conflict, discrepancy, omission or other error in this IFB, Bidder shall immediately notify Williamson County Purchasing Department of such error in writing and request modification or clarification of the document. Modifications will be made by issuing Addenda. If the Bidder fails to notify Williamson County prior to the date and time fixed for submission of Bids of an error or ambiguity in the IFB known to Bidder, or an error or ambiguity that reasonably should have been known to Bidder, then Bidder shall be deemed to have waived the error or ambiguity or its later resolution.

Williamson County may also modify the IFB, no later than 48 hours prior to the date and time fixed for submission of Bids, by issuance of an Addendum. All addenda will be numbered consecutively, beginning with 1.

2.2 Notification of Most Current Address

Bidders in receipt of this IFB shall notify the Williamson County Purchasing Department of any address changes, contact person changes, and/or telephone number changes no later than 48 hours prior to the date and time fixed for submission of Bids.

2.3 Bid Preparation Cost

Cost of developing Bids is entirely the responsibility of Bidders and shall not be charged to Williamson County.

2.4 Signature of Bidder

If the Bidder is a Corporation or Limited Liability Company, the legal name of the Corporation or Limited Liability Company shall be provided together with the signature of the officer or officers authorized to sign on behalf of such entity.

If the Bidder is a General Partnership, the true name of the firm shall be provided with the signature of each partner authorized to sign.

If the Bidder is a Limited Partnership, the name of the Limited Partner's General Partner shall be provided with the signature of the officer authorized to sign on behalf of the General Partner.

If the Bidder is a Sole Proprietor(s) (individual), each Sole Proprietor(s) shall sign.

If signature is by an agent, other than the Sole Proprietor(s) or an officer of a Corporation, Limited Liability

Company, General Partner or a member of a General Partnership, a power of attorney or equivalent document must be submitted to the Williamson County Purchasing Department.

2.5 Assumed Business Name

If the Bidder operates business under an Assumed Business Name, the Bidder must have on file with the Williamson County Clerk a current Assumed Name Certificate and provide a file marked copy of same.

2.6 Bid Obligation

The contents of the IFB, Bid, and any clarification thereof submitted by the Successful Bidder shall become part of the contractual obligation and incorporated by reference into the Contract and any ensuing Agreement.

2.7 Compliance with IFB Specifications

It is intended that this IFB describe the requirements and the Bid format in sufficient detail to secure comparable Bids. Failure to comply with all provisions of the IFB may, at the sole discretion of Williamson County, result in disqualification.

2.8 Withdrawal of Bid

The Bidder may withdraw its Bid by submitting a written request over the signature of an authorized individual, as described herein above, to the Williamson County Purchasing Department any time prior to the submission deadline. The Bidder may thereafter submit a new Bid prior to the deadline. Modification of the Bid in any manner will not be considered if submitted after the deadline. Withdrawal of a Bid after the deadline will be subject to written approval of the Williamson County Purchasing Agent.

2.9 Evaluation/Award

Williamson County reserves the right to use all pertinent information (also learned from sources other than disclosed in the BID process) that might affect Williamson County's judgment as to the appropriateness of an award to the lowest and best evaluated Bid. This information may be appended to the Bid evaluation process results. Information on a Bidder from reliable sources, and not within the Bidder's Bid, may also be noted and made part of the evaluation file. Williamson County shall have sole discretion for determining the reliability of the source.

To ensure the proper and fair evaluation of a solicitation, Williamson County prohibits unsolicited communication initiated by the Bidder to the County Official or Employee evaluating or considering the Bids prior to the time an award has been made. Unsolicited communication may be ground for disqualifying the offending Bidder from consideration or award of the solicitation then in evaluation, or any future solicitation.

Communication between Bidder and the County will be initiated by the appropriate County Official or Employee in order to obtain information or clarification needed to develop a proper and accurate evaluation of the solicitation.

To award the lowest responsible bidder in accordance with Texas Government Code and Local Government Code, the County may consider, to the extent allowed by law, the following:

- Price
- Bidder's experience and reputation
- Quality of the Bidder's goods and/or services
- Bidder's safety record
- Bidder's proposed personnel
- Bidder's financial capabilities
- Any other relevant factors specifically listed in the IFB

Consideration of Location of Principal Office

Pursuant to Texas Local Government Code Section 271.905, in purchasing under this title any real property or personal property that is not affixed to real property, if Williamson County receives one or more Bids from a Bidder whose principal place of business is in Williamson County and whose Bid is within three percent (3%) of the lowest bid price received by Williamson County from a Bidder who is not a resident of Williamson County, Williamson County may enter into a contract with:
(1) the lowest Bidder; or
(2) the Bidder whose principal place of business is in Williamson County if the Williamson County Commissioners Court determines, in writing, that the local Bidder offers Williamson County the best combination of contract price and additional economic development opportunities for Williamson County created by the contract award, including the employment of residents of Williamson County and increased tax revenues to Williamson County.

This consideration does not prohibit Williamson County from rejecting all BidsIt is understood that the Commissioners Court of Williamson County, Texas, reserves the right to accept or reject any and/or all Bids for any or all goods and/or services covered in this IFB, and to waive informalities or defects in the Bid or to accept such Bid it shall deem to be in the best interest of Williamson County.

Awards should be made approximately sixty (60) business days after the Bid opening date Results may be obtained by viewing the Williamson County vendor portal at the following link:
http://wilco-online.org/eBids/Bids.aspx

2.10 Responsibility

It is expected that a prospective Bidder will be able to affirmatively demonstrate Bidder's responsibility. A prospective Bidder should be able to meet the following requirements:

a) have adequate financial resources, or the ability to obtain such resources as required;
b) be able to comply with the required or proposed delivery schedule;
c) have a satisfactory record of performance that can be determined thru references provided
d) have a satisfactory record of performance with Williamson County; and e) be otherwise qualified and eligible to receive an award.

Williamson County may request representation and other information sufficient to determine Bidder's ability to meet these minimum standards listed above.

2.11 Firm Pricing

For unit price items, all of the items listed are to be on a "per unit" basis, stating a firm price per unit or unit quantity of each item. Bidder must submit a firm price that must be good from the date of Bid opening for the fixed period of time set out in this IFB. Unless the IFB expressly states otherwise, this period shall be until the end of the Initial Contract Period. Bids which do not state a fixed price, or which are subject to change without notice, will not be considered. The Court may award a contract for the period implied or expressly stated in the lowest and best Bid.

2.12 Purchase Orders

If required by the Williamson County Purchasing Department, a purchase order(s) may be generated to the Successful Bidder for goods and/or services. If a purchase order is issued, the purchase order number must appear on all itemized invoices and/or requests for payment.

2.13 Silence of Specifications

The apparent silence of these specifications as to any detail or to the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best

practices are to prevail. All interpretations of these specifications shall be made on the basis of this statement.

2.14 References

Williamson County may require Bidder to supply a list of at least three (3) references where like services and/or goods have been supplied by their firm within the past five (5) years. References should be provided in accordance with this IFB.

3.0 DEFINITIONS, TERMS AND CONDITIONS

3.1 Definitions

a. "Addenda" – Means any written or graphic instruments issued by Williamson County prior to the consideration of Bids which modify or interpret the Bid Documents by additions, deletions, clarifications, or corrections.
b. "Agreement" – The Successful Bidder may be required by Williamson County to sign an additional Agreement containing terms necessary to ensure compliance with the IFB and Bidder's Bid. Such ensuing Agreement(s) shall contain the Bid Specifications, Terms and Conditions that are derived from the IFB.
c. "Contract" – This IFB and the Bid of the Successful Bidder shall become a contract between the Successful Bidder and Williamson County once the Successful Bidder's Bid is properly accepted by the Williamson County Commissioners Court.
d. "Bid Documents" – The Legal Notice, IFB including attachments, and any Addenda issued by Williamson County prior to the consideration of any Bids.
e. "Bid" – The completed and signed bid form referred to as the Price Sheet and ALL required forms and documentation listed in the bid package which have been submitted in accordance with the terms and conditions described in the IFB package. A Bid submitted in accordance with this IFB is irrevocable during the specified period for evaluation and acceptance of Bids unless a waiver is obtained from the Williamson County Purchasing Agent.
f. "Bidder" – A person or entity who submits a Bid in response to this IFB.
g. "IFB" – Refers to this document, together with the attachments thereto and any future addenda issued by Williamson County.
h. "Successful Bidder"– The liable Bidder to whom Williamson County intends to award the Contract.

3.2 Terms and Conditions

3.2.1 Venue and Governing Law

Bidder hereby agrees and acknowledges that venue and jurisdiction of any suit, right, or cause of action arising out of or in connection with this IFB, the Contract and any ensuing Agreement shall lie exclusively in either Williamson County, Texas or in the Austin Division of the Western Federal District of Texas, and the parties hereto expressly consent and submit to such jurisdiction. Furthermore, except to the extent that this IFB, the Contract and any ensuing Agreement is governed by the laws of the United States, this IFB, the Contract and any ensuing Agreement shall be governed by and construed in accordance with the laws of the State of Texas, excluding, however, its choice of law rules.

3.2.2 Incorporation by Reference and Precedence

The Contract shall be derived from (1) the IFB and its Schedules; and (2) the Bidder's Bid. In the event of a dispute under the Contract, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence: (1) the IFB and its Schedules; and (2) the Bidder's Bid.

In the event Williamson County requires that an ensuing Agreement be executed following award and a dispute arises between (1) terms and conditions of the ensuing Agreement, (2) the IFB, and its Schedules; and (3) the Bidder's Bid, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence: (1) terms and conditions of the ensuing Agreement, (2) the IFB; and (3) the Bidder's Bid.

3.2.3 Ownership of Bid

Each Bid shall become the property of Williamson County upon submittal and will not be returned to Bidders unless received after the submittal deadline.

3.2.4 Disqualification of Bidder

Upon signing and submittal of the Bid, a Bidder offering to sell supplies, materials, services, or equipment to Williamson County certifies that the Bidder has not violated the antitrust laws of this state codified in Section 15.01, et seq, Business & Commerce Code, or the Federal Antitrust Laws, and has not communicated directly or indirectly the offer made to any competitor or any other person engaged in such line of business. Any or all Bids may be rejected if Williamson County believes that collusion exists among the Bidders.

3.2.5 Funding

Williamson County intends to budget and make sufficient funds available and authorize funds for expenditure to finance the costs of the Contract. Bidders understand and agree that the County's payment of amounts under the Contract shall be contingent on Williamson County receiving appropriations or other expenditure authority sufficient to allow the County, in the exercise of reasonable administrative discretion, to make payments under this Contract.

3.2.6 Assignment, Successors and Assigns

The Successful Bidder may not assign, sell, or otherwise transfer the Contract or any other rights or interests obtained under the Contract without written permission of the Williamson County Commissioners Court. The Contract and any ensuing Agreement shall be binding upon and inure to the benefit of the contracting parties hereto and their respective successors and permitted assigns.

3.2.7 Implied Requirements

Products or services not specifically described or required in the IFB, but are necessary to provide the functional capabilities described by the Bidder, shall be implied and deemed to be included in the Bid.

3.2.8 Termination

a. **Termination for Cause**: Williamson County reserves the right to terminate the Contract and/or any ensuing Agreement for default if the Successful Bidder breaches any of the IFB Specifications, Terms and Conditions, including warranties of Bidder, if any, or if the Successful Bidder becomes insolvent or commits acts of bankruptcy. Such right of termination is in addition to and not in lieu of any other remedies Williamson County may have at law or in equity or as may otherwise be provided hereunder. Default may be construed as, but not limited to, failure to deliver the proper goods and/or services within the proper amount of time, and/or to properly perform any and all other requirements to Williamson County's satisfaction, and/or to meet all other obligations and requirements.

b. **Termination for Convenience:** Williamson County may terminate the Contract and/or any ensuing Agreement for convenience and without cause or further liability, upon no less than thirty (30) calendar days written notice to Successful Bidder. Williamson County reserves the right to extend this period if it is in the best interest of the County. In the event Williamson County exercises its right to terminate without cause, it is understood and agreed that only the amounts due to the Successful Bidder for goods, commodities and/or services provided and expenses incurred to and including the date of termination, will be due and payable. No penalty will be assessed for Williamson County's termination for convenience.

3.2.9 Non-Performance

It is the objective of Williamson County to obtain complete and satisfactory performance of the requirements set forth herein. In addition to any other remedies available at law, in equity or that may be set out herein, failure to perform may result in a deduction of payment equal to the amount of the goods and/or services that were not provided and/or performed to Williamson County's satisfaction. In the event of such non-performance, Williamson County shall have the right, but shall not be obligated, to complete the services itself or by others and/or purchase the goods from other sources. If Williamson County elects to acquire the goods or perform the services itself or by others, pursuant to the foregoing, the Successful Bidder shall reimburse Williamson County, within ten (10) calendar days of demand, for all costs incurred by Williamson County (including, without limitation, applicable, general, and administrative expenses, and field overhead, and the cost of

necessary equipment, materials, and field labor) in correcting the nonperformance which the Successful Bidder fails to meet pursuant to the requirements set out herein. In the event the Successful Bidder refuses to reimburse Williamson County as set out in this provision, Williamson County shall have the right to deduct such reimbursement amounts from any amounts that may be then owing or that may become owing in the future to the Successful Bidder.

3.2.10 Proprietary Information and Texas Public Information Act

All material submitted to Williamson County shall become public property and subject to the Texas Public Information Act upon receipt. If a Bidder does not desire proprietary information in the Bid to be disclosed, each page must be clearly identified and marked proprietary at time of submittal or, more preferably, all proprietary information may be placed in a folder or appendix and be clearly identified and marked as being proprietary. Williamson County will, to the extent allowed by law, endeavor to protect from public disclosure the information that has been identified and marked as proprietary. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General. Failure to clearly identify and mark information as being proprietary as set forth under this provision will result in all unmarked information being deemed non-proprietary and available to the public. For all information that has not been clearly identified and marked as proprietary by the Bidder, Williamson County may choose to place such information on the County's website and/or a similar public database without obtaining any type of prior consent from the Bidder.

To the extent, if any, that any provision in this IFB or in the Bidder's Bid is in conflict with Tex. Gov't Code 552.001 et seq., as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood and agreed that Williamson County, its officers and employees may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any items or data furnished to Williamson County as to whether or not the same are available to the public. It is further understood that Williamson County's officers and employees shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that Williamson County, its officers and employees shall have no liability or obligation to any party hereto for the disclosure to the public, or to any person or persons, of any items or data furnished to Williamson County by a party hereto, in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

3.2.11 Right to Audit

Successful Bidder agrees that Williamson County or its duly authorized representatives shall, until the expiration of three (3) years after termination or expiration of the services to be performed, have access to and the right to examine and photocopy any and all books, documents, papers and records of Successful Bidder, which are directly pertinent to the services to be performed or goods to be delivered for the purposes of making audits, examinations, excerpts and transcriptions. Successful Bidder agrees that Williamson County shall have access during normal working hours to all necessary facilities and shall be provided adequate and appropriate work space in order to conduct audits in compliance with the provisions of this section. Williamson County shall give Successful Bidder reasonable advance notice of intended audits.

3.2.12 Testing and Inspections

Williamson County reserves the right to inspect and test equipment, supplies, materials and goods for quality and compliance with this IFB, and ability to meet the needs of the user. Demonstration units must be available for review. Should the goods or services fail to meet requirements and/or be unavailable for evaluation, Williamson County can deem the Bidder to be in breach and terminate the Contract and/or any ensuing Agreement(s).

3.2.13 Bid Preparation Cost

Cost of developing Bids is the sole responsibility of Bidders and shall not be charged to Williamson County. There is no expressed or implied obligation for Williamson County to reimburse Bidders for any expense incurred in preparing a Bid in response to this IFB and Williamson County will not reimburse Bidders for such expenses.

3.2.14 INDEMNIFICATION

SUCCESSFUL BIDDER SHALL INDEMNIFY, DEFEND AND SAVE HARMLESS WILLIAMSON COUNTY, ITS OFFICIALS, EMPLOYEES, AGENTS AND AGENTS' EMPLOYEES FROM AND AGAINST ALL CLAIMS, LIABILITY, AND EXPENSES, INCLUDING REASONABLE ATTORNEYS' FEES, ARISING FROM ACTIVITIES OF BIDDER, ITS AGENTS, SERVANTS OR

EMPLOYEES, PERFORMED HEREUNDER THAT RESULT FROM THE NEGLIGENT ACT, ERROR, OR OMISSION OF BIDDER OR ANY OF BIDDER'S AGENTS, SERVANTS OR EMPLOYEES, AS WELL AS ALL CLAIMS OF LOSS OR DAMAGE TO THE BIDDER'S AND WILLIAMSON COUNTY'S PROPERTY, EQUIPMENT, AND/OR SUPPLIES.

FURTHERMORE, WILLIAMSON COUNTY, ITS OFFICIALS, EMPLOYEES, AGENTS AND AGENTS' EMPLOYEES SHALL NOT BE LIABLE FOR DAMAGES TO THE SUCCESSFUL BIDDER ARISING FROM ANY ACT OF ANY THIRD PARTY, INCLUDING, BUT NOT BEING LIMITED TO THEFT. SUCCESSFUL BIDDER FURTHER AGREES TO **INDEMNIFY, DEFEND AND SAVE HARMLESS** WILLIAMSON COUNTY FROM, ITS OFFICIALS, EMPLOYEES, AGENTS AND AGENTS' EMPLOYEES AGAINST ALL CLAIMS OF WHATEVER NATURE ARISING FROM ANY ACCIDENT, INJURY, OR DAMAGE WHATSOEVER CAUSED TO ANY PERSON OR TO THE PROPERTY OF ANY PERSON OCCURRING IN RELATION TO SUCCESSFUL BIDDER'S PERFORMANCE OF ANY SERVICES REQUESTED HEREUNDER DURING THE TERM OF THE CONTRACT AND/OR ANY ENSUING AGREEMENT(S).

SUCCESSFUL BIDDER SHALL TIMELY REPORT ALL CLAIMS, DEMANDS, SUITS, ACTIONS, PROCEEDINGS, LIENS OR JUDGMENTS TO WILLIAMSON COUNTY AND SHALL, UPON THE RECEIPT OF ANY CLAIM, DEMAND, SUIT, ACTION, PROCEEDING, LIEN OR JUDGMENT, NOT LATER THAN THE FIFTEENTH (15TH) DAY OF EACH MONTH; PROVIDE WILLIAMSON COUNTY WITH A WRITTEN REPORT ON EACH SUCH MATTER, SETTING FORTH THE STATUS OF EACH MATTER, THE SCHEDULE OR PLANNED PROCEEDINGS WITH RESPECT TO EACH MATTER AND THE COOPERATION OR ASSISTANCE, IF ANY, OF WILLIAMSON COUNTY REQUIRED BY SUCCESSFUL BIDDER IN THE DEFENSE OF EACH MATTER. SUCCESSFUL BIDDER'S DUTY TO DEFEND, INDEMNIFY AND HOLD WILLIAMSON COUNTY HARMLESS SHALL BE ABSOLUTE. IT SHALL NOT ABATE OR END BY REASON OF THE EXPIRATION OR TERMINATION OF THE CONTRACT AND/OR ANY ENSUING AGREEMENT(S) UNLESS OTHERWISE AGREED BY WILLIAMSON COUNTY IN WRITING. THE PROVISIONS OF THIS SECTION SHALL SURVIVE THE TERMINATION OF THE CONTRACT AND SHALL REMAIN IN FULL FORCE AND EFFECT WITH RESPECT TO ALL SUCH MATTERS NO MATTER WHEN THEY ARISE.

IN THE EVENT OF ANY DISPUTE BETWEEN THE PARTIES AS TO WHETHER A CLAIM, DEMAND, SUIT, ACTION, PROCEEDING, LIEN OR JUDGMENT APPEARS TO HAVE BEEN CAUSED BY OR APPEARS TO HAVE ARISEN OUT OF OR IN CONNECTION WITH ACTS OR OMISSIONS OF WILLIAMSON COUNTY, BIDDER SHALL NEVER-THE- LESS FULLY DEFEND SUCH CLAIM, DEMAND, SUIT, ACTION, PROCEEDING, LIEN OR JUDGMENT UNTIL AND
UNLESS THERE IS A DETERMINATION BY A COURT OF COMPETENT JURISDICTION THAT THE ACTS AND OMISSIONS OF BIDDER ARE NOT AT ISSUE IN THE MATTER.

SUCCESSFUL BIDDER'S INDEMNIFICATION SHALL COVER, AND SUCCESSFUL BIDDER AGREES TO INDEMNIFY WILLIAMSON COUNTY, IN THE EVENT WILLIAMSON COUNTY IS FOUND TO HAVE BEEN NEGLIGENT FOR HAVING SELECTED SUCCESSFUL BIDDER TO PER THE WORK DESCRIBED IN THIS REQUEST. THE PROVISION BY SUCCESSFUL BIDDER OF INSURANCE SHALL NOT LIMIT THE LIABILITY OF SUCCESSFUL BIDDER UNDER THE CONTRACT AND/OR ANY ENSUING AGREEMENT.

3.2.15 Waiver of Subrogation

Successful Bidder and Successful Bidder's insurance carrier waive any and all rights whatsoever with regard to subrogation against Williamson County as an indirect party to any suit arising out of personal or property damages resulting from the Bidder's performance under this Contract and any ensuing Agreement.

3.2.16 Relationship of the Parties

The Successful Bidder shall be an independent contractor and shall assume all of the rights, obligations, liabilities, applicable to it as such independent contractor hereunder and any provisions herein which may appear to give Williamson County the right to direct the Successful Bidder as to details of doing work herein covered or to exercise a measure of control over the work shall be deemed to mean that the Successful Bidder shall follow the desires of Williamson County in the results of the work only. Williamson County shall not retain or have the right to control the Successful Bidder's means, methods or details pertaining to the Successful Bidder's performance of the work. Williamson County and the Successful Bidder hereby agree and declare that the Successful Bidder is an independent contractor and as such meets the qualifications of an "Independent Contractor" under Texas Workers Compensation Act, Texas Labor Code, Section 406.141, that the Successful Bidder is not an employee of Williamson County, and that the Successful Bidder and its employees, agents and sub-contractors shall not be entitled to workers compensation coverage or any other type of insurance coverage held by Williamson County.

3.2.17 Sole Provider

The Successful Bidder agrees and acknowledges that it shall not be considered a sole provider of the goods and/or services described herein and that Williamson County may contract with other providers of such goods and/or services if Williamson County deems, at its sole discretion, that multiple providers of the same goods and/or services will serve the best interest of Williamson County.

3.2.18 Force Majeure

If the party obligated to perform is prevented from performance by an act of war, order of legal authority, act of God, or other unavoidable cause not attributable to the fault or negligence of said party, the other party shall grant such party relief from the performance. The burden of proof for the need of such relief shall rest upon the party obligated to perform. To obtain release based on force majeure, the party obligated to perform shall file a written request with the other party.

3.2.19 Severability

If any provision of this IFB, the Contract or any ensuing Agreement shall be held invalid or unenforceable by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision thereof, but rather the entire IFB, Contract or any ensuing Agreement will be construed as if not containing the particular invalid or unenforceable provision or provisions, and the rights and obligation of the parties shall be construed and enforced in accordance therewith. The parties acknowledge that if any provision of this IFB, the Contract or any ensuing Agreement is determined to be invalid or unenforceable, it is the desire and intention of each that such provision be reformed and construed in such a manner that it will, to the maximum extent practicable, give effect to the intent of this IFB, the Contract or any ensuing Agreement and be deemed to be validated and enforceable.

3.2.20 Equal Opportunity

Neither party shall discriminate against any employee or applicant for employment because of race, color, sex, religion or national origin.

3.2.21 Notice

Any notice to be given shall be in writing and may be affected by personal delivery, or by registered or certified mail, return receipt requested, addressed to the proper party, at the following address:

Williamson County Purchasing Department
Purchasing Agent
901 South Austin Avenue
Georgetown, Texas 78626

Bidder: Address set out in IFB referred to as the Bid Affidavit.

Notices given in accordance with this provision shall be effective upon (i) receipt by the party to which notice is given, or (ii) on the third (3rd) calendar day following mailing, whichever occurs first.

3.2.22 Sales and Use Tax Exemption

Williamson County is a body corporate and politic under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code Ann. § 151.309, as amended, and the services and/or goods subject hereof are being secured for use by Williamson County.

3.2.23 Compliance with Laws

Williamson County and Successful Bidder shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of the Contract and any ensuing Agreement, including, without limitation, Workers' Compensation laws, salary and wage statutes and regulations, licensing laws and regulations. When required, the Successful Bidder shall furnish Williamson County with certification of compliance with said laws, statues, ordinances, rules, regulations, orders, and decrees above specified.

3.2.24 Incorporation of Schedules, Exhibits, Appendices & Attachments

All of the Schedules, Exhibits, Appendices and Attachments referred to herein are incorporated by reference as if set forth verbatim herein. All of the Schedules, Exhibits, Appendices and Attachments referred to herein are incorporated by reference as if set forth verbatim herein. Any conflicting terms in the contract documents will be resolved at the sole discretion of the Williamson County Commissioners Court.

3.2.25 No Waiver of Immunities

Nothing herein shall be deemed to waive, modify or amend any legal defense available at law or in equity to Williamson County, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. Williamson County does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

3.2.26 No Waiver

The failure or delay of any party to enforce at any time or any period of time any of the provisions of this IFB, the Contract or any ensuing Agreement shall not constitute a present or future waiver of such provisions nor the right of either party to enforce each and every provision. Furthermore, no term or provision hereof shall be deemed waived and no breach excused unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether expressed or implied, shall not constitute a consent to, waiver of or excuse for any other, different or subsequent breach.

3.2.27 Current Revenues

The obligations of the parties under the Contract and any ensuing Agreement do not constitute a general obligation or indebtedness of Williamson County for which Williamson County is obligated to levy, pledge, or collect any of taxation. It is understood and agreed that Williamson County shall have the right to terminate the Contract and any ensuing Agreement at the end of any Williamson County fiscal year if the governing body of Williamson County does not appropriate sufficient funds as determined by Williamson County's budget for the fiscal year in question. Williamson County may effect such termination by giving written notice of termination to the Successful Bidder at the end of its then-current fiscal year.

3.2.28 FOB – Destination

To the extent applicable to this IFB, all of the items listed are to be Free On Board to final destination (FOB Destination) with all transportation charges if applicable to be included in the Bid, unless otherwise specified in the Invitation for Bids. The title and risk of loss of the goods shall not pass to Williamson County until receipt and acceptance takes place at the FOB Destination point.

3.2.29 Binding Effect

This Contract and any ensuing Agreement shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

3.2.30 Assignment

The Successful Bidder's interest and duties hereunder may not be assigned or delegated to a third party without the express written consent of Williamson County.

3.2.31 Safety

Successful Bidder is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with any services to be provided hereunder. The safety program shall comply with all applicable requirements of the current federal Occupational Safety and Health Act and all other applicable federal, state and local laws and regulations.

3.2.32 General Obligations and Reliance

Successful Bidder shall perform all services and/or provide all goods, as well as those reasonably inferable and necessary for completion and provision of services and/or goods required hereunder. The Successful Bidder shall keep Williamson County informed of the progress and quality of the services. Successful Bidder agrees and acknowledges that Williamson County is relying on Successful Bidder's represented expertise and ability to provide the goods and/or services described herein. Successful Bidder agrees to use its best efforts, skill, judgment, and abilities to perform its obligations in accordance with the highest standards used in the profession and to further the interests of Williamson County in accordance with Williamson County's requirements and procedures. Successful Bidder's duties as set forth herein shall at no time be in any way diminished by reason of any approval by the Williamson County nor shall the Successful Bidder be released from any liability by reason of such approval by Williamson County, it being understood that Williamson County at all times is ultimately relying upon the Successful Bidder's skill and knowledge in performing the services and providing any goods required hereunder.

3.2.33 Estimated Quantities

To the extent applicable to this IFB, the estimated quantity of each item listed in this IFB is only an estimate -- the actual quantity to be purchased may be more or less. Williamson County is not obligated to purchase any minimum amount, and Williamson County may purchase any reasonable amount greater than the estimate for the same unit price. Any limit on quantities available must be stated expressly in the Bid.

3.2.34 Contractual Development

The contents of the IFB and the selected Bid will become an integral part of the Contract, but may be modified, at Williamson County's sole discretion, by provisions of an ensuing Agreement. Therefore, the Bidder must agree to inclusion in an ensuing Agreement of the Bid Specifications, Terms and Conditions of this IFB. If an ensuing Agreement is required under this IFB, information relative to the Agreement will be located in the Special Provisions Section of this IFB.

3.2.35 Survivability

All applicable agreements that were entered into between Successful Bidder and Williamson County under the terms and conditions of the Contract and/or any ensuing Agreement shall survive the expiration or termination thereof for ninety (90) days unless a new contract has been awarded.

3.2.36 Air Quality

In determining the overall best Bid, Williamson County may, to the extent applicable, exercise the following option granted to local governments under the Texas Local Government Code.

Option – TLGC § 271.907. This option allows Williamson County to evaluate Bids and give preference to goods and/or services of a Bidder that demonstrates that the Bidder meets or exceeds any and all state or federal environmental standards, including voluntary standards, relating to air quality. If the Bid being submitted will have an effect on air quality for Williamson County (as it relates to any state, federal, or voluntary air quality standard), then the Bidder is encouraged to provide information in narrative indicating the anticipated air quality impact. Bidders are expected to meet all mandated state and federal air quality standards.

3.2.37 Entire Agreement

The Contract and any ensuing Agreement shall supersede all prior Agreements, written or oral between the Successful Bidder and Williamson County and shall constitute the entire Agreement and understanding between the parties with respect to the services and/or goods to be provided. Each of the provisions herein shall be binding upon the parties and may not be waived, modified amended or altered except by writing signed by the Successful Bidder and Williamson County.

3.2.38 Payment

Williamson County's payment for goods and services shall be governed by Chapter 2251 of the Texas Government Code. An invoice shall be deemed overdue the 31st day after the later of (1) the date Williamson County receives the goods under the Contract; (2) the date the performance of the service under the Contract is completed; or (3) the date the Williamson County Auditor receives an invoice for the goods or services. Interest charges for any overdue payments shall be paid by Williamson County in accordance with Texas Government

Code Section 2251.025. More specifically, the rate of interest that shall accrue on a late payment is the rate in effect on September 1 of Williamson County's fiscal year in which the payment becomes due. The said rate in effect on September 1 shall be equal to the sum of one percent (1%); and (2) the prime rate published in the Wall Street Journal on the first day of July of the preceding fiscal year that does not fall on a Saturday or Sunday.

In the event that an error appears in an invoice submitted by Successful Bidder, Williamson County shall notify Successful Bidder of the error not later than the twenty first (21st) day after the date Williamson County receives the invoice. If the error is resolved in favor of Successful Bidder, Successful Bidder shall be entitled to receive interest on the unpaid balance of the invoice submitted by Successful Bidder beginning on the date that the payment for the invoice became overdue. If the error is resolved in favor of Williamson County, Successful Bidder shall submit a corrected invoice that must be paid in accordance within the time set forth above. The unpaid balance accrues interest as provided by Chapter 2251 of the Texas Government Code if the corrected invoice is not paid by the appropriate date.

As a minimum, invoices shall include:

(1) Name, address, and telephone number of Successful Bidder and similar information in the event the payment is to be made to a different address
(2) Williamson County contract, Purchase Order, and/or delivery order number
(3) Identification of items or service as outlined in the Contract
(4) Quantity or quantities, applicable unit prices, total prices, and total amount
(5) Any additional payment information which may be called for by the Contract

Payment inquiries should be directed to the Williamson County Auditor's Office, Accounts Payable Department: accountspayable@wilco.org, 512-943-1500.

3.2.39 Contractual Formation and Ensuing Agreement

The IFB and the Bidder's Bid, when properly accepted by the Williamson County Commissioners Court, shall constitute a contract equally binding between the Successful Bidder and Williamson County.

If an ensuing Agreement is required by this IFB, that information will be provided in Special Provisions section of this IFB. The Successful Bidder shall be required to execute the Agreement at the Williamson County Purchasing Department approximately ten (10) calendar days after the Successful Bidder is notified of award. The ensuing Agreement shall be in the same form as the Agreement which is attached to the end of this IFB. The only anticipated changes in the ensuing Agreement will be to include additional exhibits, to fill in blanks to identify the Successful Bidder, and terms relating to the compensation, or to revise the Agreement to accommodate corrections, changes in the scope of services, or changes pursuant to Addenda issued. **Bidders should raise any questions regarding the terms of the Agreement in the of written questions or submittals as described in the Public Announcement and General Information portion of this IFB.** Because the signed ensuing Agreement will be substantively and substantially derived from the attached Agreement, each Bidder is urged to seek independent legal counsel as to any questions about the terms, conditions or provisions contained in the Agreement ***before*** submitting a Bid. Again, the attached Agreement contains important legal provisions and is considered part and parcel of this IFB. Failure or refusal to sign aforesaid Agreement shall be grounds for Williamson County to revoke any award which has been issued, forfeit Bid security, if applicable, and select another Bidder.

3.2.40 Cooperative Purchasing Program

During the term of the Contract resulting from this IFB, Williamson County would like to afford the same prices, terms and conditions to other political subdivisions or public entities. Another entity's participation in the Contract resulting from this Invitation to Bid is subject to a properly authorized Purchasing Cooperative Interlocal Agreement with Williamson County. Any liability created by Purchase Orders issued against the Contract shall be the sole responsibility of the governmental agency placing the order.

3.2.41 Insurance Requirements

To the extent applicable Insurance information will appear in the Special Provisions section of this IFB.

3.2.42 Bidders Bond, Warranty Bond, Performance and Payment Bonds

To the extent applicable Bond information will appear in the Special Provisions section of this IFB.

3.2.43 Legal Liability Information

The Successful Bidder shall disclose all legal liability information by listing any pending litigation or anticipated litigation that your firm is involved in, including but not limited to, potential or actual legal matters with private parties and any local, State, Federal or international governmental entities. Williamson County reserves the

right to consider legal liability information in the recommendation of any proposed contract to the Williamson County Commissioners Court.

3.2.44 Inclement Weather

In case of inclement weather or any other unforeseen event causing the County to close for business on the date a bid/proposal submission deadline, the bid closing will automatically be postponed until the next business day the County is open. If inclement weather conditions or any other unforeseen event causes delays in carrier service operations, the County may issue an addendum to all known vendors interested in the project to extend the deadline. It will be the responsibility of the vendor to notify the County of their interest in the project if these conditions are impacting their ability to turn in a submission within the stated deadline. The County reserves the right to make the final judgment call to extend any deadline.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity **Form CIQ**

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of person doing business with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Describe each affiliation or business relationship with an employee or contractor of the local governmental entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.**

4 **Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.**

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor or other person doing business with local governmental entity

Form CIQ
Page 2

5

Name of local government officer with whom filer has affiliation or business relationship.
(Complete this section only if the answer to A, B, or C is YES.)

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or other relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity?

☐ Yes ☐ No

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐ Yes ☐ No

D. Describe each affiliation or business relationship.

6. Describe any other affiliation or business relationship that might cause conflict of interest:

7

Signature of person doing business with the governmental entity

Date

Signature not required if completing in BIDSYNC electronically.

BID References for

Bidders Name

List at least **(3) companies or governmental agencies,** where the same or similar goods and/or services as contained in this BID package, were recently provided by Respondent in the last 4 years – OR attach list of references with the following details.

Reference 1

Client Name: Location:

Contact Name: Title

Phone: Email:

Contract Dates: Contract Value:

Scope of Work:

Reference 2

Client Name: Location:

Contact Name: Title:

Phone: Email:

Contract Dates: Contract Value:

Scope of Work:

Reference 3

Client Name: Location:

Contact Name: Title:

Phone: Email:

Contract Dates: Contract Value:

Scope of Work:

BID FORM
FOREST NORTH DRAINAGE IMPROVEMENTS
BAYSWATER ZONE

TxDOT Bid Item	Description	Unit	Estimated Quantity	Computed Unit Price	Total Price
0400 6006	CUT & RESTORING PAV	SY	31		
0420 6074	CL C CONC (MISC)	CY	6		
0432 6002	RIPRAP (CONC)(5 IN)	CY	9		
0462 6003	CONC BOX CULV (4 FT X 2 FT)	LF	47		
0464 6003	RC PIPE (CL III)(18 IN)	LF	68		
0464 6005	RC PIPE (CL III)(24 IN)	LF	38		
0466 6178	WINGWALL (PW - 1) (HW=3 FT)	EA	1		
0467 6140	SET (TY I)(S= 4 FT)(HW= 3 FT)(4:1) (P)	EA	3		
0467 6359	SET (TY II) (18 IN) (RCP) (4: 1) (P)	EA	8		
0467 6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	2		
0496 6016	REMOV STR (PIPE)	EA	1		
0500 6001	MOBILIZATION	LS	1		
0502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.5		
0530 6004	DRIVEWAYS (CONC)	SY	93		
0531 6002	CONC SIDEWALKS (5")	SY	9		
0560 6001	MAILBOX INSTALL-S (TWG-POST) TY 1	EA	1		
0644 6075	RELOCATE SM RD SN SUP&AM(SIGN ONLY)	EA	1		
0752 6007	TREE REMOVAL (18" - 24" DIA)	EA	1		
1004 6002	TREE PROTECTION	AC	0.1		
COA 701S	FENCING (WOOD)	LF	195		
				Project Total	

BID AFFIDAVIT

This form must be completed, signed, notarized and returned with Bid package

The undersigned certifies that the IFB and the Bidder's Bid have been carefully reviewed and are submitted as correct and final. Bidder further certifies and agrees to furnish any and/or all goods and/or services upon which prices are extended at the price Bid, and upon the conditions contained in the IFB.

STATE OF _____ COUNTY OF _____

BEFORE ME, the undersigned authority, a Notary Public in and for the State of _____, on this

day personally appeared _____ (*Name of Signer*), who after being by me duly sworn, did depose and say:

"I, _____ (*Name of Signer*) am a duly authorized officer of/agent for

_____ (*Name of Respondent*) and have been duly authorized

to execute the foregoing on behalf of the said _____

(Name of Respondent).

I hereby certify that the foregoing Bid has not been prepared in collusion with any other Bidder or other person or persons engaged in the same line of business prior to the official opening of this Bid. Further, I certify that the Bidder is not now, nor has been for the past six (6) months, directly or indirectly concerned in any pool or agreement or combination, to control the price of services/commodities Bid on, or to influence any person or persons to submit a Bid or not to submit a Bid thereon."

Name and Address of Respondent:

_____

Fax: _____ Telephone #: _____

By: _____ Printed Name: _____

Title:

_____

SUBSCRIBED AND SWORN to before me by the above-named _____

_____ on this the _____ day of _____, 20_____

_____

Notary Public in and for

The State of _____

Agreement for Construction Services

This Agreement ("Agreement") between Williamson County, Texas, a political subdivision of the State of Texas ("Owner") and _____ ("Contractor") is entered into in accordance with the following terms and conditions:

ARTICLE 1 SCOPE OF WORK: The Owner desires to retain Contractor to provide the construction services described herein. The Contractor shall have the overall responsibility for and shall provide complete construction services and furnish all materials, equipment, tools and labor as necessary or reasonably inferable to complete the following described construction services, or any phase of such services, in accordance with the Owner's requirements and the terms of this Agreement (hereinafter collectively referred to as the "Work"):

As described in the Invitation for Bid Solicitation, Forest North Drainage Improvements #1512-037, including the specifications set forth therein, which is incorporated herein as if copied in full.

ARTICLE 2 CONTRACT PRICE: Owner agrees to pay to the Contractor, for the satisfactory performance of the Work, the not-to-exceed amount of _____ ($_____) in accordance with the terms and conditions of this Agreement.

ARTICLE 3 PLANS AND SPECIFICATIONS: The Work shall be performed pursuant to and in accordance with the following described plans and specifications, as well as any revisions made thereto:

As described in the Invitation for Bid Solicitation #1512-037, including the specifications set forth therein, which is incorporated herein as if copied in full.

Additional Work: Should Owner choose to add additional work, such additional work shall be described in a separate written amendment to this Agreement wherein the additional work shall be described and the parties shall set forth the amount of compensation to be paid by Owner for the additional work. Contractor shall not begin any additional work and Owner shall not be obligated to pay for any additional work unless a written amendment to this Agreement has been signed by both parties.

ARTICLE 4 SUBSTANTIAL AND FINAL COMPLETION:

4.1 Commencement of Work. Contractor shall commence the Work upon instruction to do so from the Owner and Construction shall be deemed to have commenced on the date of such instruction.

4.2 Substantial Completion. "Substantial Completion" means the stage in the progress of the Work when the Work, or designated portions thereof, may still require minor modifications or adjustments but, in the Owner's opinion, the Work has progressed to the point such that all parts of the Work under consideration are fully operational and usable for intended purposes, as evidenced by a Certificate of Substantial Completion approved by the Owner. If a Certificate of Occupancy is required by public authorities having jurisdiction over the Work, said certificate shall be issued before the Work or any

portion thereof is considered substantially complete. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify Owner's Designated Representative (sometimes referred to as the "ODR") and request a determination as to whether the Work or designated portion thereof is substantially complete. If the ODR does not consider the Work substantially complete, the ODR will notify the Contractor giving reasons therefore. Failure on the Owner's part to list a reason does not alter the responsibility of the Contractor to complete all Work in accordance with the terms of this Agreement. After satisfactorily completing items identified by Owner's Designated Representative, the Contractor shall then submit another request for the ODR to determine Substantial Completion. If The ODR considers the Work substantially complete, The ODR will prepare and deliver a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall include a punch list of items to be completed or corrected before final completion and final payment, shall establish the time within which the Contractor shall finish the punch list, and shall establish responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, warranty and insurance. Failure to include an item on the punch list does not alter the responsibility of the Contractor to complete all Work in accordance with the terms and conditions of this Agreement. The certificate of Substantial Completion shall be signed by the Owner and the Contractor to evidence acceptance of the responsibilities assigned to them in such certificate.

Substantial Completion (as defined in this agreement) for all stages of the Work shall be achieved on or before the following Substantial Completion date:

DATE FOR SUBSTANTIAL COMPLETION: TBD

Under no circumstances will the time for Substantial Completion exceed this date without a written amendment to this Agreement. **THE TIMES SET FORTH IN THE CONSTRUCTION DOCUMENTS ARE AN ESSENTIAL ELEMENT OF THE AGREEMENT. TIME LIMITS STATED IN THE CONTRACT DOCUMENTS ARE OF THE ESSENCE OF THIS AGREEMENT.**

4.3 Final Completion. The Work shall be fully and finally completed **on or before TBD**; provided, however, Owner may extend said time period in the event bad weather affects the progress of the Work. Owner shall, at its sole discretion, determine when the Work has been fully and finally completed to its satisfaction.

4.4 Liquidated Damages. For each consecutive calendar day after the date of Substantial Completion that the Work is not Substantially Complete, the Owner may deduct the amount of **Two Hundred Dollars per day ($200/day)** from any money due or that becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of contract execution of the damages that the Owner will sustain for late completion. The parties stipulate and agree that calculating Owner's actual damages for late completion of the Work would be impractical, unduly burdensome, and cause unnecessary delay and that the amount of daily liquidated damages set forth is reasonable.

ARTICLE 5 PAYMENT:

Contractor shall have a duty to submit to the ODR by the end of each month a statement showing the total value of the Work performed during such month. The statement shall also include the value of all sound materials delivered on the Work site and to be included in the Work and all partially completed Work, whether bid as a lump sum or a unit item, which in the opinion of the ODR is acceptable. The ODR shall examine and approve or modify and approve such statement. The Owner shall then pay the Contractor pursuant to Chapter 2251 of the Texas Government

Code ("Texas Prompt Payment Act"), as set forth in Article 11.1 of this Agreement, the total amount of the approved statement less all previous payments and all further sums that may by retained by the Owner under the terms of this Agreement or under the law. **Statements are not considered "received" until reviewed by the ODR and an approved statement is submitted to the Williamson County Auditor's Office; therefore, Contractor must ensure timely delivery of statements for review and processing.**

At any time following the completion of all Work, including all punch list items, cleanup, and the delivery of record documents, the Contractor shall submit a certified application for final payment, including all sums held as retainage if any, to the ODR for its review and approval. Contractor shall submit, prior to or with the application for final payment, final copies of all close out documents, including maintenance and operating instructions, guarantees and warranties, certificates, and all other items required by this Agreement. Contractor shall also submit consent of surety to final payment, an affidavit that all payrolls, bills for materials and equipment, subcontracted work and other indebtedness connected with the Work, except as specifically noted, have been paid or will be paid or otherwise satisfied within the period of time required by Chapter 2251, Texas Government Code. Contractor shall furnish documentation establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of claims arising out of the Agreement. Owner is entitled to rely upon this affidavit and the Contractor may not submit a claim on behalf of a subcontractor or vendor if that claim has not been noted as an exception in the affidavit.

Owner may deduct from the final payment all sums due from Contractor for any reason, Liquidated Damages and all other deductions authorized by this Agreement.

Final payment shall constitute a waiver of all claims by the Contractor except those specifically identified in writing and submitted to the ODR prior to the application for final payment. Provided, however, that the Work shall not be deemed fully performed by the Contractor and closed until the expiration of all warranty periods.

ARTICLE 6 CONTRACTOR'S GENERAL RESPONSIBILITIES AND COVENANTS:

6.1 Contractor shall perform all services specifically allocated to it hereunder, as well as those services reasonably inferable and necessary for completion of the Work. The Contractor shall keep the Owner informed of the progress and quality of the Work. Contractor agrees and acknowledges that Owner is entering into this Agreement in reliance on Contractor's represented expertise and ability to provide the Work described in this Agreement. Contractor agrees to use its best efforts, skill, judgment, and abilities to perform its obligations in accordance with the highest standards used in the profession and to further the interests of Owner in accordance with Owner's requirements and procedures. Contractor's duties as set forth herein shall at no time be in any way diminished by reason of any approval by the Owner nor shall the Contractor be released from any liability by reason of such approval by the Owner, it being understood that the Owner at all times is ultimately relying upon the Contractor's skill and knowledge in performing the services required hereunder.

6.2 Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. The safety program shall comply with all applicable requirements of the current federal Occupational Safety and Health Act and all other applicable federal, state and local laws and regulations.

6.3 Contractor shall be an independent contractor under this Agreement and shall assume all of the rights, obligations, liabilities, applicable to it as such independent contractor hereunder and any provisions in this agreement which may appear to give Owner the right to direct Contractor as to details of doing the Work herein covered or to exercise a measure of control over the Work shall be deemed to mean that Contractor shall follow the desires of Owner in the results of the Work only. Owner shall not retain or have the right to control the Contractor's means, methods or details pertaining to the Contractor's performance of the Work described herein, nor shall Owner have the power to direct the order in which Contractor's Work is performed under this agreement. Owner and Contractor hereby agree and declare that Contractor is an Independent Contractor and as such meets the qualifications of an Independent Contractor under Texas Worker's Compensation Act, Texas Labor Code, Section 406.141, that the Contractor is not an employee of Owner for purposes of this Agreement, and that the Contractor and its employees, agents and sub-subcontractors shall not be entitled to worker's compensation coverage or any other type of insurance coverage held by Owner.

6.4 As part of Contractor obligation to coordinate the Work, Contract shall:

a. cooperate with the ODR and endeavor to further the interests of the Owner and the Work;
b. provide an on-site, full-time superintendent for the duration of the Work;
c. visit the Work site and inspect the existing facilities, systems and conditions to insure an accurate understanding of the existing conditions as required;
d. at Owner's request, attend public meetings and hearings concerning the development of the Work;
e. review all drawings, specifications, and other plans as they are developed by the Owner and/or its architect and advise Owner of any error, inconsistency or omission discovered in the drawings, specifications, and other plans;
f. review the drawings, specifications, and other plans for compliance with all applicable laws and code requirements;
g. advise Owner of any tests that should be performed;
h. organize and maintain a competent, full-time staff at the Work site with clearly defined lines of authority and communication as necessary to coordinate construction activities, monitor and direct progress of the Work;
i. attend Owner's regularly scheduled Work progress meetings and fully advise the ODR of the Work status including schedule, costs, quality and changes;
j. assist Owner in obtaining building permits and obtain special permits for permanent improvements as required by law; and
k. shall coordinate, monitor and inspect the Work of subcontractors to ensure conformance with the drawings, specifications, other plans and with the terms of this Agreement.

6.5 Contractor shall identify every subcontractor it intends to use for the Work to the Owner in writing at least ten (10) days before entering into any subcontract. Contractor shall not use any subcontractor to which Owner has a reasonable objection. If Owner does not object to a particular subcontractor with said ten (10) days, such subcontract may be considered acceptable to Owner. Following Owner's acceptance of a subcontractor, that subcontractor shall not be changed without Owner's written consent, which shall not be unreasonably withheld.

6.6 Contractor's designated representative, which is set forth below Contractor's signature herein below, shall be responsible for the day-to-day management of the Work on behalf of Contractor. The designated representative shall be the Owner's primary contact during the Work and shall be available as required for the benefit of the Work and the Owner. The contractor's designated representative shall be authorized to act on behalf of and bind the Contractor in all matters related to the Work including, but not limited to, execution of Change Orders.

6.7 NO ALTERATIONS OR CHANGES SHALL BE MADE, HOWEVER, EXCEPT UPON THE WRITTEN ORDER OF THE OWNER, OR THE ODR.

6.8 Contractor shall promptly correct any defective Work at Contractor's sole expense, unless the Owner specifically agrees, in writing, to accept the Work.

6.9 Contractor shall maintain and deliver the close out documents that describe changes or deviations from the original drawings, specifications and plans that occurred during construction and that reflect the actual "As Built" conditions of the completed Work.

COMMISSIONING AND WARRANTY RESPONSIBILITIES

6.10 Contractor shall provide commissioning, starting and check-out services for the systems installed as a part of the Work prior to completion and acceptance. Operation manuals and instructions will be provided to the Owner, the systems will be demonstrated and training provided to Williamson County's operators upon completion and prior to acceptance.

6.11 Contractor hereby warrants that the materials and equipment provided for the Work will be of good quality and new unless otherwise required or permitted by the Owner; that the construction will be free from faults and defects; and that the construction will conform with the requirements of the plans, specifications, drawings and the terms of this Agreement.

6.12 Contractor shall provide warranty services for the Work for a full **18 months** (30 months for Work involving mechanical services, if any) following Final Completion and final payment. Just before the warranty period expires, Contractor shall attend an on-site meeting with the Owner to ensure that all warranty issues have been identified and properly remedied.

ARTICLE 7 OWNER'S RESPONSIBILITIES

7.1 The Owner shall:

a. provide the general schedule for the Work provided Owner is of the opinion such schedule is necessary. The general schedule will set forth the Owner's plan for milestone dates and completion of the Work;
b. identify a person as its ODR who is authorized to act in the Owner's behalf with respect to the Work. The ODR shall examine the documents submitted by the Contractor and shall render decisions on behalf of the Owner to the extent allowed by Texas law;
c. at Owner's cost, will secure the services of surveyors, soils engineers, existing facility surveys, testing and balancing, environmental surveys or other special consultants to develop such additional information as may be necessary for the design or construction of the Work;
d. furnish required information and services and shall render approvals and decisions as expeditiously as is consistent with reasonable skill and care and the orderly progress of the Contractor's services and of the Work;
e. shall have the right to reject any defective Work. Should Contractor refuse or neglect to correct any such Work within a reasonable time after notice, Owner may have the Work corrected and recover all expenses incurred from Contractor on demand; and
f. Owner shall furnish to the Contractor a sufficient number of plans, drawings and specifications sets.

ARTICLE 8 INSURANCE AND INDEMNITY

8.1 Insurance. The Contractor shall carry insurance in the types and amounts indicated below for the duration of the Agreement, which shall include items owned by Owner in the care, custody and control of Contractor prior to and during construction. Contractor must also complete and file the declaration pages from the insurance policies with Owner whenever a previously identified policy period expires during the term of the Agreement, as proof of continuing coverage. Contractor shall update all expired policies prior to submission of any payment requests hereunder. Failure to update policies shall be reason for payment to be withheld until evidence for renewal is provided to the Owner.

8.1.1 The Contractor shall provide and maintain, until the Work covered in this Agreement is completed and accepted by the Owner, the minimum insurance coverage in the minimum amounts as described below. Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A- or better by A.M. Best Company or otherwise acceptable to Owner.

Type of Coverage	Limits of Liability
a. Worker's Compensation	Statutory
b. Employer's Liability	
Bodily Injury by Accident	$500,000 Ea. Accident
Bodily Injury by Disease	$500,000 Ea. Employee
Bodily Injury by Disease	$500,000 Policy Limit

c. Comprehensive general liability including completed operations and contractual liability insurance for bodily injury, death, or property damages in the following amounts:

COVERAGE	PER PERSON	PER OCCURRENCE
Comprehensive General Liability (*including premises, completed operations and contractual*)	$1,000,000	$1,000,000
Aggregate policy limits:		$1,000,000

d. Comprehensive automobile and auto liability insurance (covering owned, hired, leased and non-owned vehicles):

COVERAGE	PER PERSON	PER OCCURRENCE
Bodily injury (including death)	$1,000,000	$1,000,000
Property damage	$1,000,000	$1,000,000
Aggregate policy limits	No aggregate limit	

e. Builder’s Risk Insurance

(*all risks*)

An all risks policy shall be in the amount equal at all times to 100% of the Contract Sum. The policy shall include coverage for loss or damage caused by certified acts of terrorism as defined in the Terrorism Risk Insurance Act. The policy shall be issued in the name of the Contractor and shall name his Subcontractors as additional insureds. The Owner shall be named as a loss payee on the policy. The builders risk policy shall have endorsements as follow:

1. This insurance shall be specific as to coverage and not considered as contributing insurance with any permanent insurance maintained on the present premises. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

2. For renovation projects and or portions of work contained within an existing structure, the Owner waives subrogation for damage by fire to existing building structure(s), if the Builder's Risk Policy has been endorsed to include coverage for existing building structure(s) in the amount described in the Special Conditions. However, Contractor shall not be required to obtain such an endorsement unless specifically required by the Special Conditions., in this Agreement. The aforementioned waiver of subrogation shall not be effective unless such endorsement is obtained.

f. Umbrella coverage in the amount of not less than $1,000,000.

8.1.2 The above insurance requirements are not intended to be compounded with the Contractor's standing insurance policies. If the Contractor already has in force insurance policies which provide the required coverage, there is no need to purchase duplicate coverage for this Work.

8.1.3 Policies must include the following clauses, as applicable.

a. "This insurance shall not be canceled, limited in scope or coverage, or non-renewed until after thirty (30) days prior written notice, or ten (10) days for non-payment of premium, has been given to Williamson County."
b. "It is agreed that the Contractor's insurance shall be deemed primary with respect to any insurance or self insurance carried by Williamson County for liability arising out of operations under the Agreement with Williamson County."
c. "Williamson County, it officials, directors, employees, representatives, and volunteers are added as additional insured as respects operations and activities of, or on behalf of the named insured performed under Agreement with the Owner." This is not applicable to the workers' compensation policy.
d. "The workers' compensation and employers' liability policy will provide a waiver of subrogation in favor of Williamson County."

8.1.4 Workers' Compensation Insurance Coverage:

In the event that Contractor employs any individual to perform any portion of the Work, Contractor shall comply with Texas Labor Code, §406.096, which requires workers' compensation insurance coverage for all employees providing services on a building or construction project for a governmental entity.

a. Definitions:

(1) Certificate of Coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Texas Workers' Compensation Commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the Duration of the Work.

(2) Duration of the Work - includes the time from the beginning of the Work until the Work has been completed and accepted by the Owner.

(3) Coverage – Workers' compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).

(4) Persons providing services relating to the Work ("subcontractor") - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform the Work, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services in relation to the Work. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Work, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

b. The Contractor shall provide Coverage, based on proper reporting of classification codes and payroll amounts and filing of any Coverage agreements, which meets the statutory requirements of Texas labor Code, §401.011(44) for all employees of the Contractor providing services in relation to the Work, for the Duration of the Work.

c. The Contractor must provide a Certificate of Coverage to the Owner prior to or contemporaneously with the execution of this Agreement.

d. If the Coverage period shown on the Contractor's current Certificate of Coverage ends during the Duration of the Work, the Contractor must, prior to the end of the Coverage period, file a new Certificate of Coverage with the Owner showing that Coverage has been extended.

e. The Contractor shall obtain from each person providing services in relation to the Work, and provide to the Owner:

(1) a Certificate of Coverage, prior to that person beginning any of the Work, so the Owner will have on file Certificates of Coverage showing Coverage for all persons providing services in relation to the Work; and

(2) no later than seven days after receipt by the Contractor, a new Certificate of Coverage showing extension of Coverage, if the Coverage period shown on the current Certificate of Coverage ends during the Duration of the Work.

f. The Contractor shall retain all required Certificates of Coverage for the Duration of the Work and for one year thereafter.

g. The Contractor shall notify the Owner in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of Coverage of any person providing services in relation to the Work.

h. The Contractor shall post on the Work site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services in relation to the Work that they are required to be covered, and stating how a person may verify

Coverage and report lack of Coverage.

i. By signing this Agreement or providing or causing to be provided a Certificate of Coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services in relation to the Work and all persons providing services in relation to the Work will be covered by workers' compensation coverage for the Duration of the Work, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self- insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

j. The Contractor's failure to comply with any of these provisions is a breach of Agreement by the Contractor which entitles the Owner to declare the Agreement void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

8.1.5 The furnishing of the above listed insurance coverage must be tendered prior to execution of the Agreement, and in no event later than ten (10) calendar days from Notice of Award. Failure to provide the insurance in a timely fashion may result in loss of Contractor's bid bond.

8.1.6 The Contractor shall not cause or allow any of its required insurance to be canceled, nor permit any insurance to lapse during the term of the Agreement or as required in the Agreement. If the Contractor fails to obtain, maintain or renew any insurance required by this Agreement, the Owner may, among other remedies available hereunder or at law, obtain insurance coverage directly and recover the cost of that insurance from the Contractor or declare this Agreement void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

8.1.7 The Owner reserves the right to review the insurance requirements set forth in this Article during the effective period of the Agreement and to make reasonable adjustments to the insurance coverage and their limits when deemed necessary and prudent by the Owner based upon changes in statutory law, court decisions, or the claims history of the industry as well as the Contractor.

8.1.8 The Owner shall be entitled, upon request, and without expense, to receive complete copies of the policies with all endorsements and may make any reasonable requests for deletion, or revision or modification of particular policy terms, conditions, limitations, or exclusions, except where policy provisions are established by law or regulation binding upon the Parties or the underwriter of any of such polices. Damages caused by the Contractor and not covered by insurance shall be paid by the Contractor.

8.1.9 Contractor shall be responsible for payment of premiums for all of the insurance coverages required under this Agreement. Contractor further agrees that for each claim, suit or action made against insurance provided hereunder, with respect to all matters for which the Contractor is responsible hereunder, Contractor shall be solely responsible for all deductibles and self-insured retentions. **Any deductibles or self-insured retentions over $50,000 in the Contractor's insurance must be declared and approved in writing by Owner in advance.**

8.1.10 The Contractor shall contractually require each person or entity with whom it contracts to provide services in relation to the Work, to comply with each and every insurance

requirement that Contractor must comply with hereunder. More specifically, each person or entity with whom Contractor contracts to provide services on the in relation to the Work must comply with each insurance requirement under this Article 8 just as if such person or entity was the Contractor. Thus, every reference to Contractor under each insurance requirement of this Article 8 shall mean and include each person or entity with whom Contractor contracts to provide services in relation to the Work. If any such person or entity with whom Contractor contracts to provide services in relation to the Work fails to obtain, maintain or renew any insurance required by this Agreement, the Owner may, among other remedies available hereunder or at law, obtain insurance coverage directly and recover the cost of that insurance from the Contractor or declare this Agreement void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

8.2 INDEMNITY.

8.2.1 INDEMNIFICATION - EMPLOYEE PERSONAL INJURY CLAIMS. TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL INDEMNIFY, DEFEND (WITH COUNSEL OF OWNER'S CHOOSING), AND HOLD HARMLESS OWNER, AND OWNER'S EMPLOYEES, AGENTS, REPRESENTATIVES, PARTNERS, OFFICERS, AND DIRECTORS (COLLECTIVELY, THE "INDEMNITEES") AND SHALL ASSUME ENTIRE RESPONSIBILITY AND LIABILITY (OTHER THAN AS A RESULT OF INDEMNITEES' GROSS NEGLIGENCE) FOR ANY CLAIM OR ACTION BASED ON OR ARISING OUT OF THE PERSONAL INJURY, OR DEATH, OF ANY EMPLOYEE OF THE CONTRACTOR, OR OF ANY SUBCONTRACTOR, OR OF ANY OTHER ENTITY FOR WHOSE ACTS THEY MAY BE LIABLE, WHICH OCCURRED OR WAS ALLEGED TO HAVE OCCURRED ON THE WORK SITE OR IN CONNECTION WITH THE PERFORMANCE OF THE WORK. CONTRACTOR HEREBY INDEMNIFIES THE INDEMNITEES EVEN TO THE EXTENT THAT SUCH PERSONAL INJURY WAS CAUSED OR ALLEGED TO HAVE BEEN CAUSED BY THE SOLE, COMPARATIVE OR CONCURRENT NEGLIGENCE OF THE STRICT LIABILITY OF ANY INDEMNIFIED PARTY. THIS INDEMNIFICATION SHALL NOT BE LIMITED TO DAMAGES, COMPENSATION, OR BENEFITS PAYABLE UNDER INSURANCE POLICIES, WORKERS COMPENSATION ACTS, DISABILITY BENEFITS ACTS, OR OTHER EMPLOYEES BENEFIT ACTS.

8.2.2 INDEMNIFICATION - OTHER THAN EMPLOYEE PERSONAL INJURY CLAIMS. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND (WITH COUNSEL OF OWNER'S CHOOSING), AND HOLD HARMLESS OWNER, AND OWNER'S EMPLOYEES, AGENTS, REPRESENTATIVES, PARTNERS, OFFICERS, AND DIRECTORS (COLLECTIVELY, THE "INDEMNITEES") FROM AND AGAINST CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, ARISING OUT OF OR ALLEGED TO BE RESULTING FROM THE PERFORMANCE OF THIS AGREEMENT OR THE WORK DESCRIBED HEREIN, TO THE EXTENT CAUSED BY THE NEGLIGENCE, ACTS, ERRORS, OR OMISSIONS OF CONTRACTOR OR ITS SUBCONTRACTORS, ANYONE EMPLOYED BY THEM OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE, REGARDLESS OF WHETHER OR NOT SUCH CLAIM, DAMAGE, LOSS OR EXPENSE IS CAUSED IN WHOLE OR IN PART BY A PARTY INDEMNIFIED HEREUNDER.

8.3 Except for the obligation of Owner to pay Contractor the Contract Price pursuant to the terms of this Agreement, and to perform certain other obligations pursuant to the terms and conditions explicitly set forth herein, Owner shall have no liability to Contractor or to anyone claiming through or under Contractor by reason of the execution or performance of this Agreement. Notwithstanding any obligation or liability of Owner to Contractor, no present or future partner or affiliate of Owner or any agent, officer, director, or employee of Owner, Williamson County, or of the various departments comprising

Williamson County, or anyone claiming under Owner has or shall have any personal liability to Contractor or to anyone claming through or under Contractor by reason of the execution or performance of this Agreement.

ARTICLE 9 BONDS

9.1 Performance Bond. Upon execution of this Agreement, Contractor shall provide a Performance Bond in the amount of 100% of the Contract Price. The surety for a Performance Bond shall meet the requirements of Texas law.

9.2 Payment Bond. Upon execution of this Agreement, Contractor shall provide a Payment Bond in the amount of 100% of the Contract Price, as security for the true and faithful payment in full of all subcontractors and persons performing labor, services, materials, machinery, and fixtures in connection with the Work. The surety for a Payment Bond shall meet the requirements of Texas law.

9.3 Warranty Bond. Upon execution of this Agreement, Contractor shall provide a Warranty Bond in the amount of 20% of the Contract Price, as security for the true and faithful performance of all warranties set forth in Bid Documents and this Agreement.

ARTICLE 10 TERMINATION

10.1 Termination for Cause. If either party commits an Event of Breach (a breach of any of the covenants, terms and/or conditions of this Agreement), the non-breaching party shall deliver written notice of such Event of Breach to the breaching party. Such notice must specify the nature of the Event of Breach and inform the breaching party that unless the Event of Breach is cured within three (3) business days of receipt of the notice, additional steps may be taken to terminate this Agreement. If the breaching party begins a good faith attempt to cure the Event of Breach within three (3) business days, then and in that instance, the three (3) business day period may be extended by the non-breaching party, so long as the breaching party continues to prosecute a cure diligently to completion and continues to make a good faith attempt to cure the Event of Breach. If, in the opinion of the non-breaching party, the breaching party does not cure the breach within three (3) business days or otherwise fails to make any diligent attempt to correct the Event of Breach, the breaching party shall be deemed to be in breach and the non-breaching party may, in addition to seeking the remedies available hereunder and under the law, terminate this Agreement.

10.2 Termination for Convenience. The Owner may terminate this Agreement for convenience and without cause or further liability upon thirty (30) days written notice to Contractor. In the event of such termination, it is understood and agreed that only the amounts due to Contractor for goods, commodities and/or services provided and expenses incurred to and including the date of termination, will be due and payable. No penalty will be assessed for Owner's termination of this Agreement for convenience.

ARTICLE 11 MISCELLANEOUS PROVISIONS

11.1 Interest and Late Payments. Except as otherwise specifically set forth herein, Owner's payment for goods and services shall be governed by Chapter 2251 of the Texas Government Code. Interest charges for any overdue payments shall be paid by Owner in accordance with Texas Government Code Section 2251.025. More specifically, the rate of interest that shall accrue on a late payment is the rate in effect on September 1 of Owner's fiscal year in which the payment becomes due. The said rate in effect on September 1 shall be equal to the sum of one percent (1%); and (2) the prime rate published in the Wall Street Journal on the first day of July of the preceding fiscal year that does not fall on a Saturday or Sunday.

In the event that an error appears in an invoice/application for payment submitted by Contractor, Owner shall notify Contractor of the error not later than the twenty first (21st) day after the date Owner receives the invoice/application for payment. If the error is resolved in favor of Contractor, Contractor shall be entitled to receive interest on the unpaid balance of the invoice/application for payment submitted by Contractor beginning on the date that the payment for the invoice/application for payment became overdue. If the error is resolved in favor of the Owner, Contractor shall submit a corrected invoice/application for payment that must be paid in accordance within the time set forth above. The unpaid balance accrues interest as provided by Chapter 2251 of the Texas Government Code if the corrected invoice/application for payment is not paid by the appropriate date.

11.2 Assignment; Successors and Assigns. This Agreement is a personal service contract for the services of Contractor, and Contractor's interest in this Agreement, duties hereunder and/or fees due hereunder may not be assigned or delegated to a third party. This Agreement shall be binding upon and inure to the benefit of parties hereto and their respective successors and assigns.

11.3 Captions. The captions of paragraphs in this Agreement are for convenience only and shall not be considered or referred to in resolving questions of interpretation or construction.

11.4 Governing Law and Venue. This Agreement and all of the rights and obligations of the parties and all of the terms and conditions shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas without reference to its conflicts of law provisions. Williamson County where the Work site is located shall be the sole place of venue for any legal action arising from or related to this Agreement or the project in which the Owner is a party.

11.5 Waivers. No delay or omission by either party in exercising any right or power arising from non-compliance or failure of performance by the other party with any of the provisions of this Agreement shall impair or constitute a waiver of any such right or power. A waiver by either party of any covenant or condition of this Agreement shall not be construed as a waiver of any subsequent breach of that or of any other covenant or condition of the Agreement.

11.6 Interpretation. In the event of any dispute over the meaning or application of any provision of the Contract Documents, the Contract Documents shall be interpreted fairly and reasonably, and neither more strongly for or against any party, regardless of the actual drafter of the Contract Documents.

11.7 Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

11.8 Appointment. Owner hereby expressly reserves the right from time to time to designate by notice to Contractor a representative(s) to act partially or wholly for Owner in connection with the performance of Owner's obligations. Contractor shall act only upon instructions from the designated representative(s) unless otherwise specifically notified to the contrary.

11.9 Audits. Contractor agrees that Owner or its duly authorized representatives shall, until the expiration of three (3) years after final payment under this Agreement, have access to and the right to examine and photocopy any and all books, documents, papers and records of Contractor which are directly pertinent to the services to be performed under this Agreement for the purposes of making audits, examinations, excerpts, and transcriptions. Contractor agrees that Owner shall have access during normal working hours to all necessary Contractor facilities and shall be provided adequate and appropriate work space in order to conduct audits in compliance with the provisions of this section. Owner shall give Contractor reasonable advance notice of intended audits.

11.10 Severability. Should any term or provision of this Agreement be held invalid or unenforceable in any respect, the remaining terms and provisions shall not be affected and this Agreement shall be construed as if the invalid or unenforceable term or provision had never been included.

11.11 No Waiver of Immunities. Nothing in this Agreement shall be deemed to waive, modify or amend any legal defense available at law or in equity to Owner, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. Owner does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

11.12 Current Revenues. Under Texas law, a contract with a governmental entity that contains a claim against future revenues is void; therefore, each party paying for the performance of governmental functions or services must make those payments from current revenues available to the paying party.

11.13 Compliance with Laws. Contractor shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of this Agreement, including, without limitation, Worker's Compensation laws, minimum and maximum salary and wage statutes and regulations, licensing laws and regulations. When required, Contractor shall furnish the County with certification of compliance with said laws, statutes, ordinances, rules, regulations, orders, and decrees above specified.

11.14 Sales and Use Tax Exemption. Owner is a body corporate and politic under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code Ann. § 151.309, as amended.

11.15 Texas Public Information Act. To the extent, if any, that any provision in this Agreement is in conflict with Tex. Gov't Code 552.001 *et seq.*, as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood and agreed that Owner, its officers and employees may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any information or data furnished to Owner whether or not the same are available to the public. It is further understood that Owner, its officers and employees shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that Owner, its officers and employees shall have no liability or obligation to Contractor for the disclosure to the public, or to any person or persons, of any software or a part thereof, or other items or data furnished to Owner by Contractor in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

11.16 Force Majeure. If the party obligated to perform is prevented from performance by an act of war, order of legal authority, act of God, or other unavoidable cause not attributable to the fault or negligence of said party, the other party shall grant such party relief from the performance of this Agreement. The burden of proof for the need of such relief shall rest upon the party obligated to perform. To obtain release based on force majeure, the party obligated to perform shall file a written request with the other party.

11.17 Equal Opportunity in Employment. The parties to this Agreement agree that during the performance of the services under this Agreement they will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The parties to this Agreement will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer;

termination; rates of pay or other forms of compensation, and selection for training, including apprenticeship.

11.18 Reports of Accidents. Within 24 hours after Contractor becomes aware of the occurrence of any accident or other event which results in, or might result in, injury to the person or property of any third person (other than an employee of the Contractor), whether or not it results from or involves any action or failure to act by the Contractor or any employee or agent of the Contractor and which arises in any manner from the performance of this Agreement, the Contractor shall send a written report of such accident or other event to the County, setting forth a full and concise statement of the facts pertaining thereto. The Contractor shall also immediately send the County a copy of any summons, subpoena, notice, or other documents served upon the Contractor, its agents, employees, or representatives, or received by it or them, in connection with any matter before any court arising in any manner from the Contractor's performance of work under this Agreement.

11.19 Relationship of the Parties. Each party to this Agreement, in the performance of this Agreement, shall act in an individual capacity and not as agents, employees, partners, joint ventures or associates of one another. The employees or agents of one party shall not be deemed or construed to be the employees or agents of the other party for any purposes whatsoever.

11.20 Appropriation of Funds by Owner. Owner believes it has sufficient funds currently available and authorized for expenditure to finance the costs of this Agreement. Contractor understands and agrees that the Owner's payment of amounts under this Agreement is contingent on the Owner receiving appropriations or other expenditure authority sufficient to allow the Owner, in the exercise of reasonable administrative discretion, to continue to make payments under this Agreement.

11.21 Execution in Counterparts. This Agreement may be executed in counterparts, each of which, when executed and delivered, shall be deemed to be an original and all of which together shall constitute one and the same document.

11.22 Entire Agreement. This Agreement represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either oral or written. This Agreement may be amended only by written instrument signed by each party to this Agreement. NO OFFICIAL, EMPLOYEE, AGENT, OR REPRESENTATIVE OF THE OWNER HAS ANY AUTHORITY, EITHER EXPRESS OR IMPLIED, TO AMEND THIS AGREEMENT, EXCEPT PURSUANT TO SUCH EXPRESS AUTHORITY AS MAY BE GRANTED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT.

BY SIGNING BELOW, the Parties have executed and bound themselves to this Agreement to be effective as of the date of the last party's execution hereof (Effective Date).

OWNER:	**CONTRACTOR:**
WILLIAMSON COUNTY, TEXAS, a political subdivision of the state of Texas	
By: _____	By: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____

Date: _____

Date: _____

Party Representatives

Owner's Designated Representative ("ODR"):

_____
_____
_____
_____
Phone _____
Fax _____

Contractor's Designated Representative:

_____
_____
_____
_____
Phone _____
Fax _____

Question and Answers for Bid #1512-037 - Forest North Drainage Improvements - Bayswater Zone

Overall Bid Questions
There are no questions associated with this bid.