RECORD AS - BUILT DRAWINGS

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

MCIP PROJECT NO. 17701

BROOKHAVEN TRAIL CONNECTION

FROM VALLEY VIEW LANE TO EXISTING VITRUVIAN TRAIL

CITIES OF ADDISON AND FARMERS BRANCH

TEXAS

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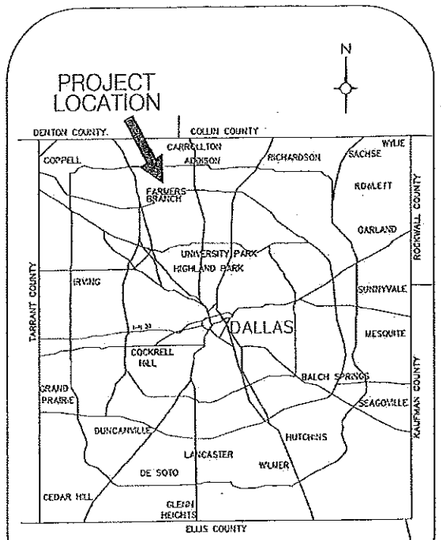
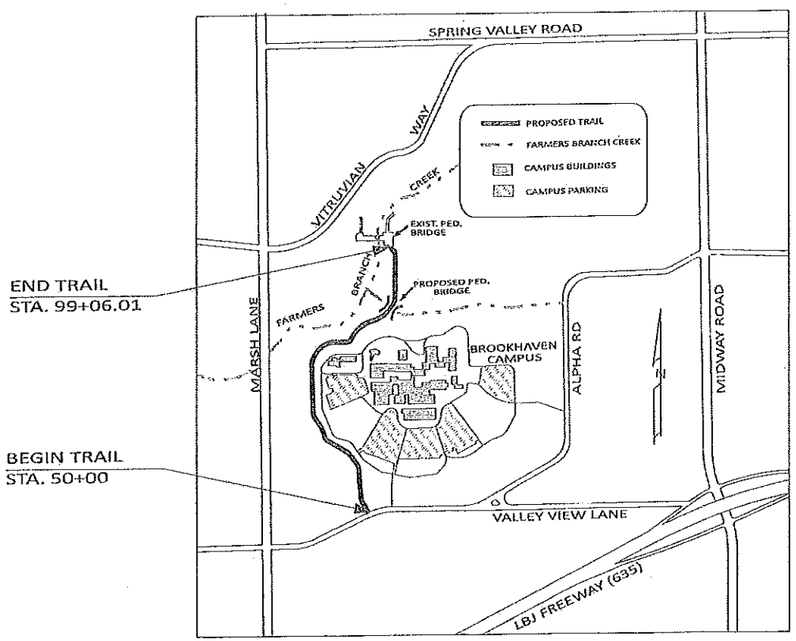


FARMERS BRANCH

Brookhaven College
DALLAS COUNTY COMMUNITY COLLEGE DISTRICT

Addison!



END TRAIL
STA. 99+06.01

BEGIN TRAIL
STA. 50+00

LENGTH OF PROJECT
4906 FT
(0.92 MILE)

CONSTRUCTION TYPE
PAVING, DRAINAGE &
PEDESTRIAN BRIDGE

STATE OF TEXAS
KOMALA D. NARRA
115011
LICENSED
PROFESSIONAL ENGINEER

Komala D Narra
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NASRA, P.E. 115011 on 05.22.2013

COUNTY OFFICIALS

COUNTY JUDGE
CLAY LEWIS JENKINS

COMMISSIONER DISTRICT NO. 1
THERESA M. DANIEL

COMMISSIONER DISTRICT NO. 2
MIKE CANTRELL

COMMISSIONER DISTRICT NO. 3
JOHN WILEY PRICE

COMMISSIONER DISTRICT NO. 4
DR. ELBA GARCIA

APPROVALS

COUNTY OF DALLAS

RECOMMENDED FOR APPROVAL: 22 MAY 20 13
Komala Narra
PROJECT MANAGER

RECOMMENDED FOR APPROVAL: May 29th 20 13
ASSIST. DIRECTOR OF PUBLIC WORKS, TRANS. & PLANNING
ANTOINETTE BACCHUS, P.E.

APPROVED: 5-29 20 13
DIRECTOR OF PUBLIC WORKS
ALBERTA L. BLAIR, P.E.

CITY OF ADDISON

APPROVED: 28 MAY 20 13
DIRECTOR OF PUBLIC WORKS AND TRANSPORTATION

CITY OF FARMERS BRANCH

APPROVED: 22 MAY 20 13
DIRECTOR OF PUBLIC WORKS AND TRANSPORTATION

M:\Brookhaven Trail Connection 17701\Roadway\General\Brookhaven Trail Ext. Cover Sheet.dgn 5/22/2013 3:20:26 PM

RECORD AS - BUILT DRAWINGS

1. The Contractor shall notify the Dallas County Department of Public Works, the City of Farmers Branch, Town of addison and franchise utility companies within forty-eight (48) hours prior to beginning any construction.
   a. Dallas County Public Works, Komala Narra, P.E., Project Mgr. 214-653-6164
   b. Dallas County Public Works 214-653-7151
   c. City of Farmers Branch, Street Superintendent, Gary Spoerl - 972-919-2597
   d. Town of Addison, Allison Ream 972-450-2818
   e. Brookhaven College, Tommy Gallegos 972-860-4799
   f. Time Warner 214-869-9038
   g. ATMOS 214-206-2717
   h. ONCOR 214-486-2255
2. In the adoption of the Texas Department of Transportation(TxDOT), Specifications, it is understood that any reference to the Texas Department of Transportation, (TxDOT), shall be interpreted to include the County of Dallas as applicable.
3. Any conflict between the General Provisions of the NCTCOG Specifications, the TxDOT Specifications and/or the County of Dallas Specifications, as contained herein, shall be decided by the Engineer. The general order of precedence shall be as followed:
   a. County of Dallas General Provisions
   b. TxDOT General Provisions and Specifications
   c. City of Farmers Branch Construction Standards.
   d. NCTCOG General Provisions and Specifications.
4. The items under which payment is to be made to the CONTRACTOR are as listed in the bid proposal. Reference to other items in the standard specifications as pay items is hereby deleted. The provisions for construction and material requirements for such items are to be complied with and only the provisions for direct payment are deleted.
5. The Contractor and the County of Dallas will obtain the general permit together for the storm water discharge from construction sites. The Contractor and the County of Dallas will become co-permittees. Costs for administering the Storm Water Pollution Prevention Plan (SWPPP) will not be paid for directly, but will be included in the various other bid items of the Contract.
6. Prior to the start of Work, the Contractor shall develop, in detail, a construction schedule and method that shall cause minimum interference with traffic along, across, or adjacent to the project during construction. If the schedule or method becomes unworkable or unsatisfactory as Work proceeds, adjustments shall be made. If, at any time during construction, the Contractor's proposed Plan of operation results in unsafe traffic movement in the opinion of the Engineer, the Contractor shall immediately correct the unsatisfactory condition. Contractor shall submit a construction schedule with itemized tasks, subtasks, etc., (four copies) for approval ten days prior to the pre-construction meeting. This construction schedule shall be updated weekly.
7. Contractor shall field verify all dimensions and conditions before commencing work. It shall be Contractor's responsibility to report any discrepancies to the Engineer before commencing work.
8. The Contractor shall prepare a detailed traffic control plan for the traffic control signing, barricading and temporary pavement markings for the safe maintenance of traffic during construction within the existing streets and public right of way. The construction sequence and traffic control shown in plans are suggested traffic control only. The Contractor needs to submit signed and sealed traffic control plans a minimum of ten (10) days prior to beginning work for approval. Work shall not begin prior to the approval of the construction traffic control plan.
9. A very important feature of this Contract is providing for the safety and convenience of the traveling public and abutting property owners. The schedule to be provided under Note 6 of these GENERAL NOTES and Article 8.3 of the General Provisions and Regulations shall insure this provision. Where, in the opinion of the Engineer, local traffic and abutting property owners would be unduly inconvenienced for an extended period of time, the Engineer shall limit the length of excavation that the Contractor may open up at one time. For protection of the pavement subgrade and to reduce an unsightly condition, backfill behind curbs will be done in a reasonable time after pavement cures and forms are removed.
10. No storage of materials is allowed on private property without written permission of the property owner. If written permission is obtained the Contractor shall restore the private property to original or better condition; two (2) copies of each written permission shall be delivered to the Dallas County Public Works Project Manager.
11. Contractor shall furnish the Engineer a copy of the signed agreement with any and all property owners for any private property that will be used by the Contractor and/or Subcontractors for storage of equipment, materials and supplies, and/or each disposal site which the Contractor intends to use for "waste" materials. Conditions and restrictions, if any, shall be clearly stated. Compliance is required and a release from the property owner shall be obtained upon completion of the project.
12. Contractor shall not unload or store materials, permit workers to park, nor park equipment within the street right-of-way where street is open to public travel without prior approval of the City.
13. Contractor shall be responsible for and adequately protect existing structures, utilities, trees, shrubs, fences, sprinkler systems, mail boxes and other adjoining facilities. Damages caused by Contractor shall be reported to the appropriate Property Owner and repaired or replaced at the Contractor's expense within twenty-four (24) hours.
14. All adjacent properties damaged by the proposed construction shall be restored to the same or better than condition in which the same was found before such work was undertaken. This shall be considered subsidiary to the various items of the contract and will not be paid for directly.
15. The Contractor shall provide for continuous supervision of construction and a Superintendent shall be on the project site at all times during working hours. The Superintendent shall, at all times, have in his immediate possession a complete set of current Contract Documents including the Plans and Specifications. The Superintendent, or his representative, shall be fully authorized to act on behalf of the Contractor in all matters pertaining to the Work.
16. The Contractor shall coordinate with other contractors of any trade or discipline working adjacent to the project site prior to and during construction.
17. All salvable material encountered on this project shall become the property of Dallas County, including, but not limited to, surplus flexible base and/or flexible pavement, pipe culverts, guard fence, etc., when Dallas County Road and Bridge Districts request the material. The Contractor shall load the material on the Dallas County trucks following removal or shall stockpile the material at an agreed adjacent site to be loaded onto the County trucks by the Contractor at a later date. The Road and Bridge District in which the project is located shall have first choice of the salvable material. If no Road and Bridge District requests the material, it shall become the property of the Contractor to be disposed of by him at his entire expense. The Contractor may remove old flexible base and asphalt for embankment including subgrade material, however, this material may not be used as finished flexible base.
18. If indicated on the drawings, conduit shall be installed to provide continuous service for the street lighting. All underground conduit shall be installed before final compaction of the pavement subgrade.
19. Contractor shall be responsible for providing required security to protect his own property, equipment, and work in progress.
20. Working hours are Monday through Friday from 7 a.m. to 5 p.m.. Work is not allowed on Saturdays or Sundays without written permission from the Dallas County Public Works Project Manager and from City of Farmers Branch Project Manager.
21. Contractor shall notify in writing all property owners 24-hrs. in advance of any construction near their property.
22. Contractor shall comply with OSHA Regulations and State of Texas Laws concerning excavation, trenching and shoring.
23. Contact the Traffic Engineer Division in the City of Farmers Branch at 972-919-2597, at least 48 hours prior to work requiring removal or relocation of traffic signs, traffic control equipment or other traffic control appurtenances.
24. When working in street rights-of-way within 300-feet of a traffic signal, contact the Traffic Engineering Division in the City of Farmers Branch at 972-919-2597, at least 48 hours prior to the work for locations of underground traffic signal equipment.
25. Two-way traffic shall be maintained at all times (at least one lane in each direction), unless otherwise authorized by the Engineer in writing. At least one lane of traffic will be maintained at all driveways and entrances at all times.
26. All existing street and traffic signs shall be maintained as needed throughout construction. Existing signs and posts to be relocated shall be maintained in good condition. Any signs damaged prior to installation in final position shall be replaced at no cost to the Owner. Payment for this work shall be subsidiary to other items of the Contract.
27. Any references to steel drums as traffic control devices is deleted. Drums (as required) shall be polyethylene plastic.
28. Access to all abutting property by automotive and pedestrian traffic shall be provided by the Contractor at all times by the use of grading, drainage, stabilization or other materials. The cost of materials, labor, equipment and related costs for providing such access will not be paid for directly but will be subsidiary to the other bid items of the Contract.
29. All traffic control devices shall conform to the requirements of the Texas Department of Transportation Manual on Uniform Traffic Control Devices, current edition. All work required to maintain traffic control devices shall be included in the unit price established under Item 502, "Barricades, Signs, and Traffic Handling."
30. No "Stop" or "Yield" sign is to be relocated or moved without prior approval by the City.
31. Item 502 - "Temporary Pavement Markings" to delineate traffic lanes during construction shall conform to Item 662 Work Zone Pavement Markings. All temporary markings shall be removable and conform with a Construction Traffic Control Plan submitted by the Contractor a minimum of ten (10) days prior to beginning work for approval. Work shall not begin prior to approval of the Construction Traffic Control Plan. This work shall not be paid for directly, but shall be considered subsidiary to Item 502.
32. No work shall commence within existing street right-of-way without an approved traffic control plan. Contractor shall notify the City at least two (2) normal business days prior to beginning work within the right-of-way, or before performing any work which will obstruct or impede the normal flow of traffic.
33. Three (3) project identification signs shall be furnished and installed by the Contractor, one on each end of the project at locations designated by the Engineer. The sign shall be constructed as shown in the Contract Documents booklet. The signs shall be considered subsidiary to the pay items and will not be paid for directly.
34. The location of existing utilities indicated on the Plans have been determined from field surveys and available public records. Exact location and elevation of all utilities are not guaranteed and shall be determined in the field by the Contractor prior to construction. It shall be the duty of the Contractor to ascertain whether any additional utilities other than those shown on the Plans may exist and to locate the same in the field prior to construction. The Contractor shall also become familiar with any proposed adjustments to be made by the Utility Owners and extend full cooperation. Any cost resulting from the Contractor damages to utilities shall be the sole responsibility of the Contractor. The Contractor is required to maintain existing utilities in a safe and serviceable condition. No extra compensation will be allowed for additional work or materials to maintain service.
35. Water supply for use during construction shall be approved by the Engineer and secured by the Contractor and has to be authorized by the city.
36. All gas, telephone, cable and power lines to be adjusted shall be done by others.
37. Prior to any excavation or drilling in close proximity to existing utilities or sewers, the Contractor shall be required to probe or expose these facilities to determine their exact location. All costs involved will be subsidiary to the related bid items.
38. Contractor has to confirm the locations of all existing water and sanitary sewer lines before excavating. Contractor has to inform City of Farmers Branch personnel before commencing work in any easements.
39. Dewatering system or systems installed during construction shall be approved by the Engineer and are subsidiary to various other items of the contract. Trench and pit bottoms and excavations shall be maintained in dry stable condition until work is complete.
40. The Contractor shall haul away all waste material such as rubbish, pavement, concrete pipe, unacceptable soil, etc., to an approved offsite landfill. This shall be subsidiary to the various pay items of the contract.
41. The Contractor shall not be permitted to have open trenches at the end of each working day unless used for boring and receiving pits and /or approved by the engineer.
42. Surplus excavation and other materials must not be deposited in areas designated as Flood Plain or along natural drainage ways. Material so deposited will be required to be removed at the Contractor's expense and the area restored to its natural condition.
43. The specified density for the Embankment, Excavation, Treated Subgrade, and Flexible Base shall be obtained with the moisture content at the optimum or above.
44. All subgrade shall be brought to within 0.05 foot (+/-) of plan profile at a density in accordance with specifications.
45. All structural excavation, backfilling and bedding material shall not be paid for directly, but shall be considered subsidiary to the various bid items of the Contract.
46. The Contractor shall strip and stockpile the existing topsoil from Unclassified Trail Excavation for use in final dressing of the median and parkway areas. If sufficient topsoil is not available from Unclassified Trail Excavation, the Contractor shall furnish suitable, friable material at his own expense to properly dress the median and parkway areas.
47. All existing slope, drainage, easements and areas not limited to shown in the plans will be included in "Item 100, Preparing Right of Way", as measured along the centerline of the project.
48. Item 100, Preparing Right of Way shall be full compensation for removing and disposing of all obstructions, existing timber bollards, trees not included in tree remediation schedule, debris within the Right of Way and within all easements shown on the plans. This item shall also be full compensation for restoring areas to original condition, if possible, and for all labor, equipment, tools, and incidentals necessary to complete the work.
49. All trenches which cause the removal of pavement shall be backfilled in accordance with TxDOT Standard Specification Item 400 and covered with a minimum of 8" of Flexible Base and 4" of hot mix asphaltic concrete pavement, Type "D", until such time as the permanent pavement is placed. Payment for this work will not be made directly but will be considered subsidiary to the various bid items of the Contract.
50. Trench excavation for trenches five (5) feet or more in depth shall be in accordance with all provisions of Part 1926, Subpart P - Excavations, Trenching and Shoring of the Occupational Safety and Health's Standards and Interpretations. It shall be the responsibility of the Contractor to conform to the above provisions.
51. Unpaved areas disturbed by construction, are to be seeded and watered.
52. Sprinkling, as ordered by the Engineer to control dust on this project, shall be considered subsidiary to the various bid items.
53. Contractor shall maintain flows in ditch outfalls, storm sewer pipes, inlets, and other drainage systems during construction and restore damaged of same during construction to original condition or better. This work shall not be paid for directly.
54. Existing sprinkler systems in the Right-of-Way will be plugged at the Right-of-Way line and the sprinkler heads will be delivered to the abutting property owner. This will not be paid for directly, but will be subsidiary to the other items of the contract.
55. Vegetative Watering shall be hauled to each site by truck. The cost of materials, labor, equipment and related costs for providing vegetative watering will not be paid for directly but will be subsidiary to item 192.
56. Fertilizer used will have an analysis of 12-12-12 and will be applied at 350 pounds per acre and will not be paid for directly but will be considered subsidiary to the various bid items of the Contract.
57. Removal or relocation of existing trees not specifically indicated on approved construction drawings will be permitted only with prior written approval from the Engineer and under the guidance of the City.
58. Contractor to follow City of Farmers Branch Standards for purchasing trees.
59. The Contractor shall consult with Engineer prior to any tree removal.
60. Contractor to follow TXDOT Item 192 for planting trees and observe and at the same time make sure that contractor fulfills City of Farmers Branch Planting specs. (see contract book)
61. Where applicable, the Contractor shall place rubber mats on the pavement to protect it from track marks and/or cracking during construction. If there is a damamge to new pavement it needs to be replaced instead of reparing.
62. All cut and fill slopes shall be between the range of 6 horizontal to 1 vertical slope and 4 Horizontal and 1 Vertical Slope (6:1 - 4:1). Cut slopes may be steepened to protect existing trees and fences only with prior approval of the Engineer. Property adjacent to the proposed construction shall be graded as directed by the Engineer which shall be considered subsidiary to the various pay items of the contract.
63. The end of the trail and driveways shall match the existing pavement elevations, unless otherwise directed by the Engineer. Payment for asphalt tie-ins shall be subsidiary to other items of work.
64. No dirt, mud, or any other material shall be allowed to fall or be tracked onto the existing or finished roadway. It shall be the responsibility of the Contractor to maintain the existing travelled way in a clean condition at all times. Contractor is responsible for keeping streets and sidewalks adjacent to the project free of mud and debris from the construction.
65. Prior to opening any new concrete pavement to traffic, all joints must be sealed and all edges shall be backfilled.Heavy construction equipment, Watering trucks are not permitted to drive on top of new trail pavement.
66. The use of rubber-tired equipment will be required for moving soil or other materials along or across paved surfaces.
67. The use of wood forms for pavement construction will be permitted where necessary for intersections, drives, pavement transition and transverse construction joints, as directed by the Engineer.
68. Existing concrete pavement, existing jogging trail or sidewalk, or asphalt pavement or curb to be removed, whether in streets or driveways, shall be sawed along neat lines where portions are to be left in place. All sawing is subsidiary.
69. Bar chairs to support reinforcing steel and dowels in pavement will be required and are subsidiary to various pay items.
70. When concrete pavement is not formed, a trimmer will be required for grade control as specified. When concrete pavement is to be formed, a planer will be required for grade control as specified.
71. The contractor shall protect all storm sewer inlets receiving storm water runoff from the construction site.
72. The Contractor shall protect any existing and/or proposed storm sewer structure which is in the proposed subgrade during the subgrade stabilization process.
73. The Contractor shall be responsible for the integrity of existing structures in the vicinity of the proposed construction. (No separate pay)
74. Contractor shall not open, turn off, interfere with, attach any pipe or hose or connect anything with any fire hydrant, stop valve or stop cock, or tap any water main belonging to the City or to Brookhaven College, unless duly authorized to do so by the City or by Brookhaven College. Contractor shall contact City forty-eight (48) hours prior to taking any waterlines out of service.
75. Street intersections, as required by the Engineer, will be kept open to traffic by paving one half widths at a time. Pavement for a leave-out will be provided in such case as directed by the Engineer.
76. Barrier-free ramps will be built with this project. Pay items will be those shown on the plan. Location may be adjusted as directed by the Engineer to clear obstructions.
77. Sidewalks, barrier-free ramps, and driveways shall be constructed to comply with current ADA standards. Maximum driveway slopes outside of the sidewalk area shall conform to City of Farmers Branch Standards.
78. Reinforced concrete pipe storm sewer shall conform to ASTM C-76, Class III, and be installed, bedded, and backfilled in accordance with the technical specifications.
79. Aggregate for cement stabilized backfill shall be pit run gravel or crushed stone free from lumps of clay or organic matter and a plasticity index (PI) not to exceed 3.
80. All sewer construction shall conform to the minimum requirements of the Texas Commission on Environmental Quality and regulations for public water and sewer systems.
81. The Contractor shall notify the City of Farmers Branch Water Utilities Distribution Division at 214-919-2597 and the Wastewater Collection Division at 214-919-2597, at least 48 hours (two working days) prior to construction that might affect their facilities. At no time shall the Contractor operate any existing water valves. Only City of Farmers Branch personnel will operate existing valves.
82. The Contractor shall give the City, residents and businesses affected by any water or sewer line shut downs at least twenty-four (24) hours prior notice.
83. The Contractor is responsible for protecting all water and sewer laterals crossing the project. The Contractor shall repair all damaged laterals immediately (non-pay item).

STATE OF TEXAS
KOMALA D. NARRA
119601
LICENSED PROFESSIONAL ENGINEER

Komala Narra

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NARRA P.E. 119601 ON 05.29.2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
GENERAL NOTES
BROOKHAVEN TRAIL CONNECTION
FROM TO VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JR	DATE: 05	FILE: GNDSY
APPROVED - TS	CHECKED - KN	SCALE:	SHEET: 2A

RECORD AS - BUILT DRAWINGS

84. The Contractor shall relocate and adjust all water valves, meters, or fire hydrants and sewer manholes that are in direct conflict with the proposed improvements. Said relocations shall be subsidiary to the contract unless otherwise specifically called out for in the bid proposal. All materials necessary to complete the adjustments or relocations that are not called out in the plans shall be subsidiary.

85. The Contractor shall backfill under the sidewalks, driveways and pavement repair as outlined in the specifications as indicated on the standard drawings for trench backfill details.

86. Any water meters that fall within the proposed Trail and sidewalk shall be adjusted. Any adjustment shall be subsidiary and no separate pay allowed.

87. Fire hydrants shall not be located on proposed trail or sidewalks. In general, hydrants shall be placed between sidewalk and back of curb. If sidewalk is placed at back of curb, the hydrant will be located between the public right-of-way line and the sidewalk.

88. The Contractor shall carefully review the soil bore logs provided in the contract drawings. No additional payment will be made for rock excavation necessary to construct any items of work identified in the contract drawings.

89. The Contractor shall notify the Engineer no later than noon on the Thursday preceding any Saturday he chooses to work.

90. References to half-size plan sheets are intended to indicate 11"x17" sheets. References to full-size plan sheets are intended to indicate 22"x34" sheets.

91. Any testing that fails to meet Dallas County requirements shall be re-tested at the Contractor's expense.

92. The Contractor shall be responsible for mowing and litter removal in the public right of way and designated easements within the construction limits as often as necessary and as directed by the Engineer. At no time shall weeds within the project limits reach a height greater than Six (6) inches. No additional payment will be made for mowing and litter removal and any associated costs will be considered incidental to the job.

93. A master set of record drawing mark-ups will be kept in the field office with all permanent construction completed and changes/additions to plans clearly identified to the extent necessary by the Engineer and County inspector in conjunction with the Contractor. No payment for any applicable items shall be made until they are marked as constructed on the record drawing mark-ups. This work shall not be paid for directly, but shall be considered subsidiary to project pay items.

94. The Contractor shall locate all existing storm drainage pipe at all proposed tie in points to verify the horizontal alignment and elevation. The Contractor shall notify the Engineer of the locations and elevations prior to excavation for installation of the proposed storm sewer pipe. This shall be considered subsidiary to storm sewer construction and no separate pay item is provided.

95. The cost for pavement removal, disposal and repair associated with installing drainage items within existing pavement that is proposed to remain either permanently or temporarily is subsidiary to the various drainage items. No additional payment will be made.

96. All Contractors' on site employees and sub-contractors' employees shall wear visible identification which will include their name(s) and direct employer. In addition, all persons working on site should wear necessary protective gear (helmets, gloves, safety vests and boots) or any other equipment to protect their safety and well-being at the construction site.

97. It is the Contractor's responsibility to keep all drainage facilities operating at all times (ditches, inlets, etc.).

98. All construction staging areas are to be restored to their original condition after construction completion.

99. Contractor must be familiar with and abide by the Farmers Branch Noise Ordinance during construction.

100. Detectable warning ramp as shown in the plans shall be considered subsidiary to curb ramp bid item. All color pavers and red color pavers per ADA section 4.29.2 shall be considered subsidiary to Curb Ramp bid item.

101. The sawcuts and removal of curb for laying of Curb ramp will be subsidiary to each curb ram item (item 531).

102. The sawcuts and removal and replacing of existing 8"concrete near barrier free ramp will be subsidiary to Barrier free ramp item 531

103. Other than designated College contact, Contractor, during construction of the trail, must avoid contact with College staff and/or students while on Brookhaven College Campus.

BID ITEM NOTES

ITEM 100 - PREPARING RIGHT OF WAY

1. Shall be full compensation for removing and disposing of all obstructions and debris within the public right-of-way and within all easements shown on the plans to be removed or that is in conflict with the proposed improvements, unless specifically paid for in Item 104 series (Removing Concrete), Item 105 series (Removing Base and Asphalt Pavement) or Item 496 (Remove Structure). This item shall also be full compensation for all labor, equipment, tools and incidentals necessary to complete the work.

2. Shall include all existing slope, drainage, and temporary easement areas shown in the plans.

3. Any abandoned utilities encountered by the Contractor in the execution of the work shall be removed and disposed. The cost to remove and dispose of any such utilities shall be considered subsidiary to this item.

ITEM 104 - REMOVING CONCRETE

1. Existing concrete pavement, concrete curb, or curb and gutter to be removed, whether in the streets or drives, shall be sawed to the full depth along neat lines where portions are to be left in place. The cost for sawing is subsidiary to the relevant contract bid items. No additional payment will be made for sawcutting.

ITEM 110, 132 & 160 - EXCAVATION, EMBANKMENT & TOPSOIL

1. Prior to beginning excavation and embankment operations: grass, topsoil, and other organic materials shall be windrowed adjacent to the right-of-way. Upon completion of grading, the slopes and ditches shall be scarified longitudinally to a depth of approximately (4) four inches. The windrowed material shall then be returned to the slopes and the ditches prior to placement of the topsoil.

2. If rock is encountered during roadway excavation, the rock shall be removed.

ITEM 132 - EMBANKMENT

1. Samples of any earth borrow material to be delivered to the site and used as embankment, must be provided to the soils lab. The material must be tested and approved as specified prior to using the material for making the proposed embankments.

2. Prior to placement of any embankment on an existing slope steeper than a 6:1 slope, the slope shall be benched to prevent the formation of a potential sliding plane in the embankment. The vertical wall of each bench shall be a minimum of one (1) foot in height. This work shall not be paid for directly, but shall be considered subsidiary to this item.

ITEM 464 - REINFORCED CONCRETE PIPE

1. The cost of all pipe-to-pipe and pipe-to-structure connections both existing and proposed shall be included in this item; no other payment will be made.

2. The cost of pipe plugs shall be included in this item. No other payment will be made.

3. The joints shall be constructed and jointed together in a manner that eliminates seepage of backfill. Approved joint materials for RCP are concrete collars, rubber gaskets, and Omni-Flex gasket, (ASTM D1056 type tc-1) or Engineer approved equal.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

1. All traffic control devices shall conform to the requirements of the Texas Department of Transportation Manual on Uniform Traffic Control Devices, Current Edition. All work required to meet the requirements for sequencing of construction shall be included in the unit price established under Item 502 - Barricades, Signs and Traffic Handling.

2. Any "temporary pavement markings" shall conform to Item 662 Work Zone Pavement Markings. All temporary markings shall be removable and conform to a construction traffic control plan submitted by the Contractor a minimum of ten (10) days, prior to beginning work, for approval. Work shall not begin prior to approval of the construction traffic control plan. This work shall not be paid for directly, but shall be considered subsidiary to Item 502.

3. Access to abutting property during the construction of this project must be maintained for emergency and local traffic (to be paid under Item 502).

4. The Contractor will be required to provide two (2) portable changeable message signs for the project at various times throughout the project. The signs will primarily serve to communicate important construction-related messages to the motoring public over the course of construction. Additional usage of changeable message signs may be required as directed by the Engineer. The cost for changeable message signs is subsidiary to bid item 502.

5. The cost to relocate existing "STOP" signs on intersecting side streets in association with the sequence of construction shall be subsidiary to Item 502. Existing sign posts may be used for sign relocations where, in the opinion of the Engineer, the posts are deemed to be in good condition. No additional payment will be made for relocating "STOP" signs to their final positions.

6. The construction, maintenance, and removal after project completion of the Project Information sign will not be paid for directly but shall be subsidiary to this bid item.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

1. The quantities of erosion control measures as shown on the storm water pollution prevention plans may increase and their locations may be changed to conform to prevailing field conditions encountered during construction.

2. Install one construction exit at the designated staging area. The remaining construction exits shall be installed at locations directed or approved by the Engineer or County inspector.

3. The General Contractor will obtain the general permit for the storm water discharge for construction sites. The General Contractor and the County of Dallas will become co-permittees.

ITEM 528 - CONC PAV (STAMPED)

1. The pattern to be applied to textured concrete areas identified in the plans shall be "Running Bond". Apply "Brick Red" integral color to textured concrete areas.

ITEM 531- CONCRETE SIDEWALK

1. Construct a 2-inch sand cushion at all proposed trail sidewalk locations. Acceptable materials for the sand cushion are crusher screenings, gravel, crushed rock, or flex base. Material shall be spread, wetted thoroughly, tamped, and leveled. The cushion shall be moist at the time concrete is placed. No additional payment will be made for the sand cushion.

2. Any water meters that fall within the proposed trail shall be relocated. The cost for such water meter relocations shall be subsidiary to Item 531.

3. Sidewalk lugs shall be included in accordance with the City of Farmers Branch Construction Details. The cost for this work is subsidiary to Item 531.

4. Sawcuts and joint sealant shown on the plans shall be considered subsidiary and the joint sealant materials to be used shall conform to the requirements of Class 3, Hot Poured Rubber, Joint sealant, as described in Item DMS-6310 (Joint Sealants and Fillers). All reinforcing steel called for on the plans will not be paid for directly, but shall be considered subsidiary to the applicable bid items. Concrete for all items will be Class C (Item 421) unless otherwise specified. The Rumble Warning Striping will be subsidiary to sidewalk item

City of Farmers Branch General Notes

1. **THE CONTRACTOR** shall provide "As Built" plans to **THE ENGINEER** so that the reproducible sheets of the engineering plans may be corrected to reflect "As Built" conditions. **THE ENGINEER** shall furnish one set of mylar reproducible plans, reflecting the "As Built" conditions, to the City prior to final acceptance of the work.

2. **THE CONTRACTOR** shall not stockpile material contiguous to any creek without the written permission of **THE ENGINEER**.

3. **THE CONTRACTOR** shall not allow soils and debris to enter existing inlets. All inlets shall be protected during construction.

4. **THE CONTRACTOR** shall limit his work to the R.O.W. or Easements shown on the drawings. All disturbed/damaged areas outside the construction limits shall be repaired and or replaced at contractor's expense.

5. **THE CONTRACTOR** shall maintain adequate drainage at all times and provide and maintain erosion protection in and adjacent to construction site.

6. All groundwater, seepage, storm water, or water from any source that may occur or accumulate in excavations during the progress of the work shall be removed. All excavations shall be kept entirely free of standing water at all times during the construction work or until otherwise directed by the City. All expense necessary to comply with this requirement shall be borne by the contractor.

7. Areas which have been backfilled to comply with the requirements of paragraph #7, above, but have not been properly compacted, shall be promptly removed at the start of the next working day and compacted in accordance with sections of the specifications.

8. **THE CONTRACTOR** shall not dispose wastes or any other materials into streams or waterways. Excess material shall be hauled away each day and not be allowed to accumulate.

9. **THE CONTRACTOR** shall not burn or bury rubbish and waste materials on project site.

10. **THE CONTRACTOR** shall wet down dry materials to allay dust and prevent blowing dust.

11. All dimensions shown on the plans are to back of curb and/or to the centerline of pipe, unless noted otherwise.

12. **THE CONTRACTOR** will be responsible for notifying **THE ENGINEER**, the Traffic Engineer, the Police and Fire Departments at least 24 hours in advance when any roadway will be closed or reopened.

14. The locations of existing utilities shown on these plans are approximate. It is the responsibility of **THE CONTRACTOR** to locate and verify in the field any utilities that may conflict with his construction. At least 24 hours prior to beginning construction in the vicinity of existing underground utilities, **THE CONTRACTOR** shall notify the following, as applicable:

City of Farmers Branch	972-247-3131
Public Works Department	972-919-2597
Utilities Department	972-919-2597
Oncor Electric Delivery	
Line Location Service (Digtess)	1-800-344-8377
Emergencies	1-888-313-4747
Atmos Energy	
Line Location Service (Digtess)	1-800-344-8377
Emergencies	1-800-817-8090
Time Warner Cable	
Line Location Service (Digtess)	1-800-344-8377
A.T. & T.	1-800-245-4545
Line Location Service (Digtess)	1-800-344-8377
Emergencies	214-458-8879

The Public Works Department, Utility Division (972.919-2597), shall to be contacted to locate City-owned water lines and sanitary sewer lines. The Parks and Recreation Department (972.919-2620) shall be contacted to locate City-owned irrigation lines and electric (lighting) lines. The Public Works Department, Traffic Division (972.919-2588) shall to be contacted to locate City-owned fiber optic lines and traffic signal lines.

When the City-owned lines are located by any City department, the locates shall be considered valid up to two weeks, after which new locates shall be required. Unless the lines are physically uncovered, surface locates of City-owned lines shall be considered to be approximate. For any facilities the are to be constructed within 3 feet of the surface locates, additional subsurface investigation should be considered to ensure that the City-owned lines are appropriately located.

15. Contractor must have a set of plans "Authorized" by the Engineering Department on this project at all times.

16. Should any part of a concrete pavement panel be removed for utility line installation, the entire panel shall be replaced except otherwise directed by **THE ENGINEER.**

17. Existing regulatory signs and street designation signs within the construction limits shall be relocated by the Contractor as directed by the Engineer. Cost of relocation shall be subsidiary to other items of the project.

18. Adequate access into and out of the subdivision and to and from each residence shall be maintained during construction.

PAVING

1. Contractor shall texture finish all placed concrete as approved by **The Engineer** unless noted otherwise. All concrete shall be class 'C' 3600 PSI, unless noted otherwise.

2. Contractor shall match all proposed pavement, curb, sidewalk and driveways with existing unless noted otherwise.

3. The cost of elevation adjustment of manholes, valves, cleanouts, irrigation heads, pullboxes and water meters shall be subsidiary to the other items of the project. All meters, valves and manholes requiring adjustment shall be cross-referenced by the Contractor so that they may be easily relocated after paving. All elevation adjustments shall be completed prior to placing the pavement.

4. All dimensions and station locations shown on the plans are to back of curb unless noted otherwise.

5. Preparation of R.O.W. includes but is not limited to removal of existing curb and gutter, driveways, pavements, trees, inlets, manholes, pipes and necessary excavation to proposed grade shown on the plans unless otherwise provided for in a separate bid item.

6. Unclassified excavation includes all excavation, removal and disposal within the limits of R.O.W. and areas adjacent thereto as shown on the plans.

TRENCH

1. The maximum length of open excavation for trenches shall be limited to 100 linear feet regardless of depth. All trenches shall be backfilled at the end of the day and a drivable surface provided. A drivable surface shall be as determined by **THE ENGINEER.**

IRRIGATION & LANDSCAPE

1. All existing irrigation shall be considered to remain unless noted otherwise. Damage to existing irrigation shall be repaired/replaced at the contractors expense. Damage to existing irrigation systems shall be repaired within 24 hours.

2. Existing irrigation heads to be relocated are to be set 4" from edge of pavement or back of curb. Set heads flush with finished grade.

3. All landscaping in rights_of_way or easements shall be approved by **THE ENGINEER** prior to construction.

4. Damage to existing landscape to remain shall be replaced with like kind and size at the contractor's expense.

TREES

1. **THE CONTRACTOR** is to exercise extreme caution during all phases of the project to protect existing trees and shrubs.

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NARRA, P.E. 111601 ON 05.29.2013

NO	REVISION	BY	DATE

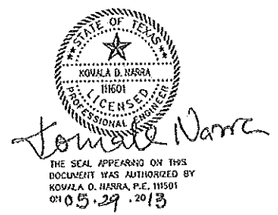
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
GENERAL NOTES
BROOKHAVEN TRAIL CONNECTION
FROM TO VALLEY VIEW ROAD /to VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - KN	DATE: 05/29/13	FILE: GNSH
APPROVED - TS	CHECKED - KN	SCALE:	SHEET: 13

ESTIMATED QUANTITIES

FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL

ITEM No.	DESCRIPTION OF ITEM	UNIT	QUANTITIES																			
			P/P																			
			SHT 24	SHT 25	SHT 26	SHT 27	SHT 28	SHT 29	SHT 30	SHT 31	SHT 32	SHT 33	SHT 34	SHT 35	SHT 36	SHT40	SHT41	SHT42	SHT 43	SHT 44	Bridge	Electrical	TOTAL
100	Preparation of ROW	STA	5	5	5	5	5	5	5	5	5	4										49
104	Removing Concrete	SY	152			77									187							416
105	Removing Stabilised Base and Asphalit Pavement	SY													74							74
110	Excavation (un classified)	CY	62	109	132	163	224	162	89	60	147	155										1,303
132	Embankment	CY	127	165	134	16	50	9	203	517	44	317										1,581
162	Block Sodding	SY	253	253	253	253	253	253	253	253	253	253	163	221	163						223	3,300
360	Concrete Pavement (Cl. P)(8" THK)	SY	10					15														25
416	Drilled Shaft (24")	LF																			160	160
420	Concrete Class C (Abutment)	CY																			10	10
420	Reinforced Concree Landing Slab W/ Thickened Slab Edge	CY																			32	32
423	Concrete Retaining Wall (Cast-In- Place)	SY	25							426												451
432	RIPRAP (Common Stone)(18")(Grout)	CY	12	12																		24
442	Metal for Structures	LB																			378	378
450	Railing (42" HT)	LF	30							230												260
462	Box Culvert (6' X 3')	LF	30																			30
464	Reinforced Concrete Pipe (24" pipe)	LF		68																		68
464	Reinforced Concrete Pipe (12"pipe)	LF																				50
466	HeadWall (CH-PW-S) (For Pipe)	EA	2																			2
466	Headwall (PW)(For Box Culvert)	EA	2																			2
479	Manhole Adjustments	EA										2										2
500	Mobilization	LS																				1
502	Barricades ,Signs and Traffic Handling	MO																				10
504	Field Office	MO																				12
506	Rock Filter Dam(Install)(TY 3)	LF	47	39		17			54													157
506	Rock Filter Dam (Remove) (TY 3)	LF	47	39		17			54													157
506	Construction Exits (Install) (TY 1)	SY	44	45	45				45		38											217
506	Construction Exits (Remove) (TY 1)	SY	44	45	45				45		38											217
506	Temporary Sediment Control Fence(Install)	LF	600	600	600	600	600	600	600	600	600	600										6,000
506	Temporary Sediment Control Fence(Remove)	LF	600	600	600	600	600	600	600	600	600	600										6,000
506	Inlet Protection (Install)	EA	1				1															2
506	Inlet Protection (Remove)	EA	1				1															2
506	Biodegradable Log	EA	1																			1
506	Permanent Erosion Control Mat (Curlex)	SF	100	100																		200
528	Brick Pavers	SY	52			52	85		52		52											292
529	Concrete Curb (6")	LF	20				25															45
529	Concrete Curb (9")	LF								36												36
531	Concrete Sidewalk (Class C)(6")(10'-12' WIDE)	SY	667	667	667	667	667	667	667	600	667	667										6,600
531	Sidewalks (5'-8' wide)(4")(Class C)	SY											285	150	340							775
531	Curb Ramps	EA	1																			1
540	Metal Beam Guard Fence(MBGF)(TIM POST)	LF	88	62																		150
540	Terminal End Section (Short) EE	EA	4	4																		4
644	Small Road Side Sign Supports and assemblies	EA														16	10	15	23	5		69



NO	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
ESTIMATED QUANTITIES
BROOKHAVEN TRAIL CONNECTION
MCIP PROJECT 17701

DESIGNED KR	DRAWN KR	DATE: MAY 2013	ESTIMATED QUANTITIES
APPROVED	CHECKED KR	SCALE: N/A	SHEET: 3A

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ESTIMATED QUANTITIES

FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL

658	Object Marker (OM-3)	EA								2													2
666	Ref Pav Marking TY I (Y)(4")(BROKEN)	LF	500	500	500	500	500	500	500	500	500	500											5,000
678	Pavement Surface Preparation for Marking TYI (Y)(4")(Broken)	LF	500	500	500	500	500	500	500	500	500	500											5,000
740	Anti-Grafiti Coating (For exposed wall of retalningwall and Abutment	SF								690											200		890
752	Tree Removal (> 8" caliper)	EA				2	3	1		3	7	1											17
4810	Bridge (Continental Key) or approved equal	EA																			1		1
5500	Benches	EA	2							2													4
6001	Removable/Lockable Bollards	EA	3																				3
6002	R-RAP (Sacrete wall)	SY	57																				57
6003	Irrigation Modification	LS								1													1
6004	Rubberized Surface for Jogging Trail	SF											2565	1350	3060								6,975
6005	Tree Trunk Protection	LF	218	58	95	251	176	143	30	47	134	50											1,202
6006	Tree Transplantation	EA								9													9
6618-001	¾" Rigid Aluminum Conduit	LF																				100	100
6618-002	1" PVC Schedule 40 Conduit	LF																				150	150
6618-003	1" PVC Coated Rigid Aluminum Conduit	LF																				40	40
6618-004	¾" Liquid-Tight Flexible Aluminum Conduit	LF																				10	10
6618-005	NEMA 3R Aluminum Enclosure	EA																				1	1
6620-001	#12 AWG Insulated Copper Conductor	LF																				725	725
6620-002	#8 AWG Insulated Copper Conductor	LF																				15	15
6620-003	#4/0 Bare Copper Conductor	LF																				40	40
6691-001	BEGA-US LED Lighting Fixture Type 7911LED (or approved equal)	EA																				2	2
6693-001	Grounding System	EA																				1	1

STATE OF TEXAS
KOVALA D. NARRA
111501
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOVALA D. NARRA, P.E. 111501 ON 05.29.2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
ESTIMATED QUANTITIES
BROOKHAVEN TRAIL CONNECTION
MCIP PROJECT 17701

DESIGNED BY	DRAWN BY	DATE: MAY 2013	ESTIMATED QUANTITIES
APPROVED BY	CHECKED BY	SCALE: N/A	SHEET: 39

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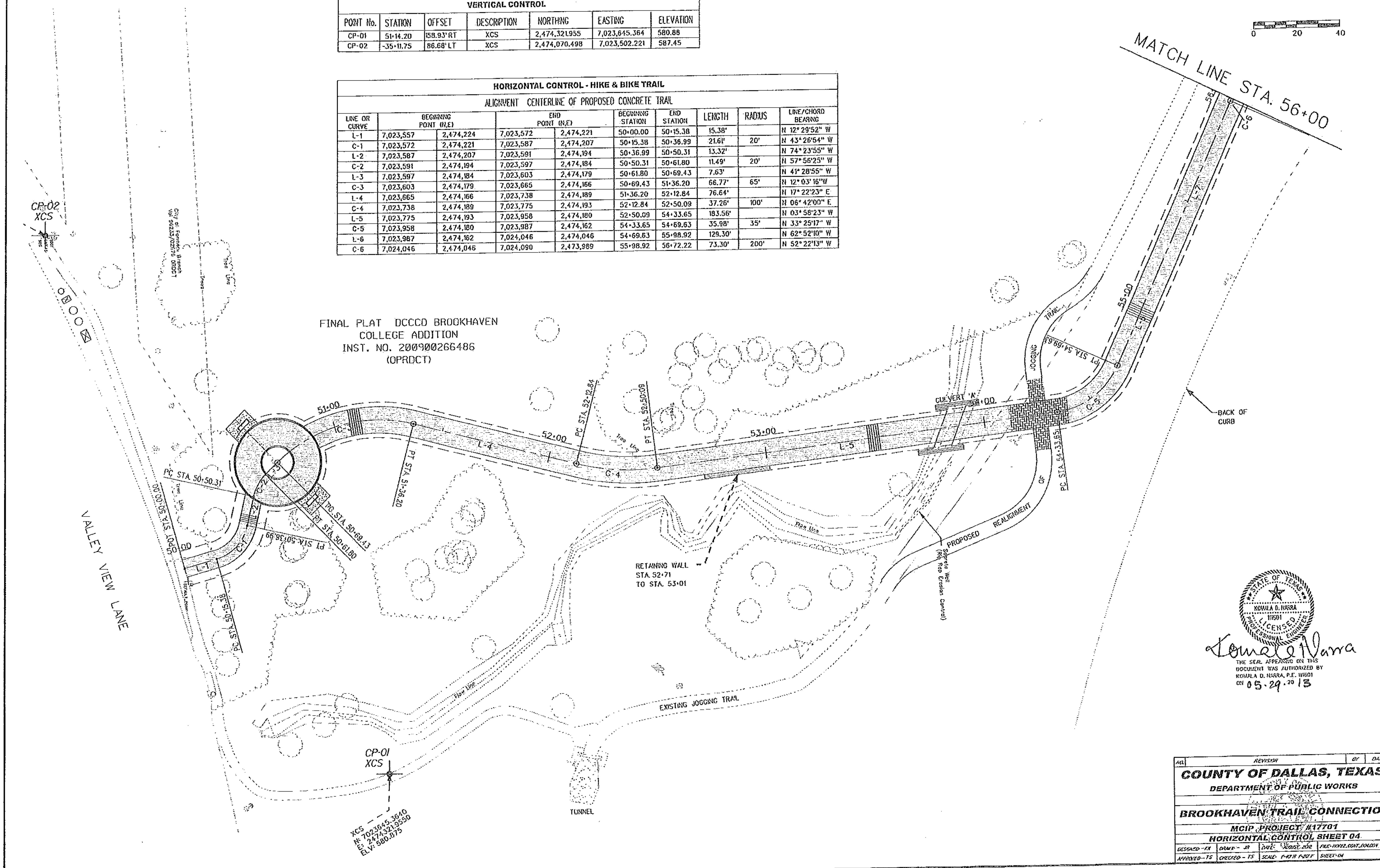
RECORD AS - BUILT DRAWINGS

VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-01	51+14.20	158.93' RT	XCS	2,474,321.955	7,023,645.364	580.88
CP-02	-35+11.75	86.68' LT	XCS	2,474,070.498	7,023,502.221	587.45

HORIZONTAL CONTROL - HIKE & BIKE TRAIL

ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL

LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
L-1	7,023,557	2,474,224	7,023,572	2,474,221	50+00.00	50+15.38	15.38'		N 12° 29'52" W
C-1	7,023,572	2,474,221	7,023,587	2,474,207	50+15.38	50+36.99	21.61'	20'	N 43° 26'54" W
L-2	7,023,587	2,474,207	7,023,591	2,474,194	50+36.99	50+50.31	13.32'		N 74° 23'55" W
C-2	7,023,591	2,474,194	7,023,597	2,474,184	50+50.31	50+61.80	11.49'	20'	N 57° 56'25" W
L-3	7,023,597	2,474,184	7,023,603	2,474,179	50+61.80	50+69.43	7.63'		N 41° 28'55" W
C-3	7,023,603	2,474,179	7,023,665	2,474,166	50+69.43	51+36.20	66.77'	65'	N 12° 03' 16" W
L-4	7,023,665	2,474,166	7,023,738	2,474,189	51+36.20	52+12.84	76.64'		N 17° 22'23" E
C-4	7,023,738	2,474,189	7,023,775	2,474,193	52+12.84	52+50.09	37.26'	100'	N 06° 42'00" E
L-5	7,023,775	2,474,193	7,023,958	2,474,180	52+50.09	54+33.65	183.56'		N 03° 58'23" W
C-5	7,023,958	2,474,180	7,023,987	2,474,162	54+33.65	54+69.63	35.98'	35'	N 33° 25'17" W
L-6	7,023,987	2,474,162	7,024,046	2,474,046	54+69.63	55+98.92	129.30'		N 62° 52'10" W
C-6	7,024,046	2,474,046	7,024,090	2,473,989	55+98.92	56+72.22	73.30'	200'	N 52° 22'13" W



NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 04

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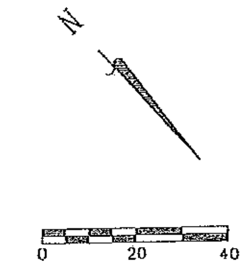
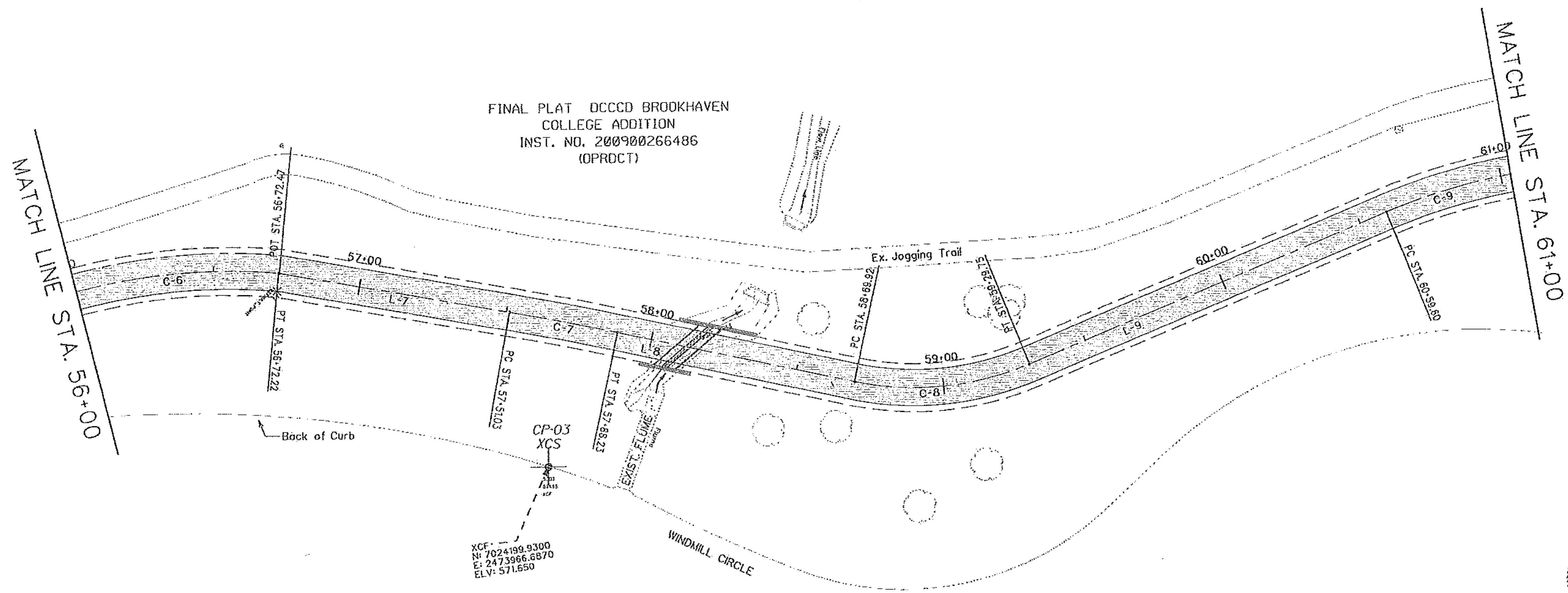
RECORD AS - BUILT DRAWINGS

VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-03	40+58.77	139.39'-LT	XCS	2,473,966.687	7,024,199.930	571.65

HORIZONTAL CONTROL - HIKE & BIKE TRAIL									
ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL									
LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
C-6	7,024,046	2,474,046	7,024,090	2,473,989	55+98.92	56+72.22	73.30'	200'	N 52° 22'13" W
L-7	7,024,090	2,473,989	7,024,153	2,473,941	56+72.22	57+51.03	78.56'		N 37° 04'31" W
C-7	7,024,153	2,473,941	7,024,183	2,473,919	57+51.03	57+88.23	37.20'	1000'	N 36° 00'35" W
L-8	7,024,183	2,473,919	7,024,250	2,473,873	57+88.23	58+69.92	81.69'		N 34° 56'39" W
C-8	7,024,250	2,473,873	7,024,286	2,473,826	58+69.92	59+29.74	59.83'	100'	N 52° 05'00" W
L-9	7,024,286	2,473,826	7,024,333	2,473,705	59+29.74	60+59.60	129.86'		N 69° 13'20" W
C-9	7,024,333	2,473,705	7,024,403	2,473,613	60+59.60	61+77.36	117.76'	200'	N 52° 21'17" W





STATE OF TEXAS
KOMALA D. NASRA
111601
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NASRA, P.E. 111601 ON 05-29-2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION
MCIP PROJECT #17701
HORIZONTAL CONTROL SHEET 05

DESIGNED - KN	DRAWN - JR	DATE: AUGUST, 2012	FILE-HORZ.CONT_05.DGN
APPROVED - TS	CHECKED - TS	SCALE: 1"=20' H 1"=20' F	SHEET- 05

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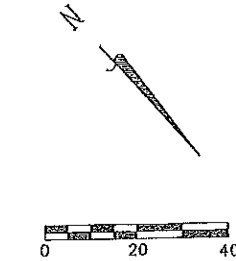
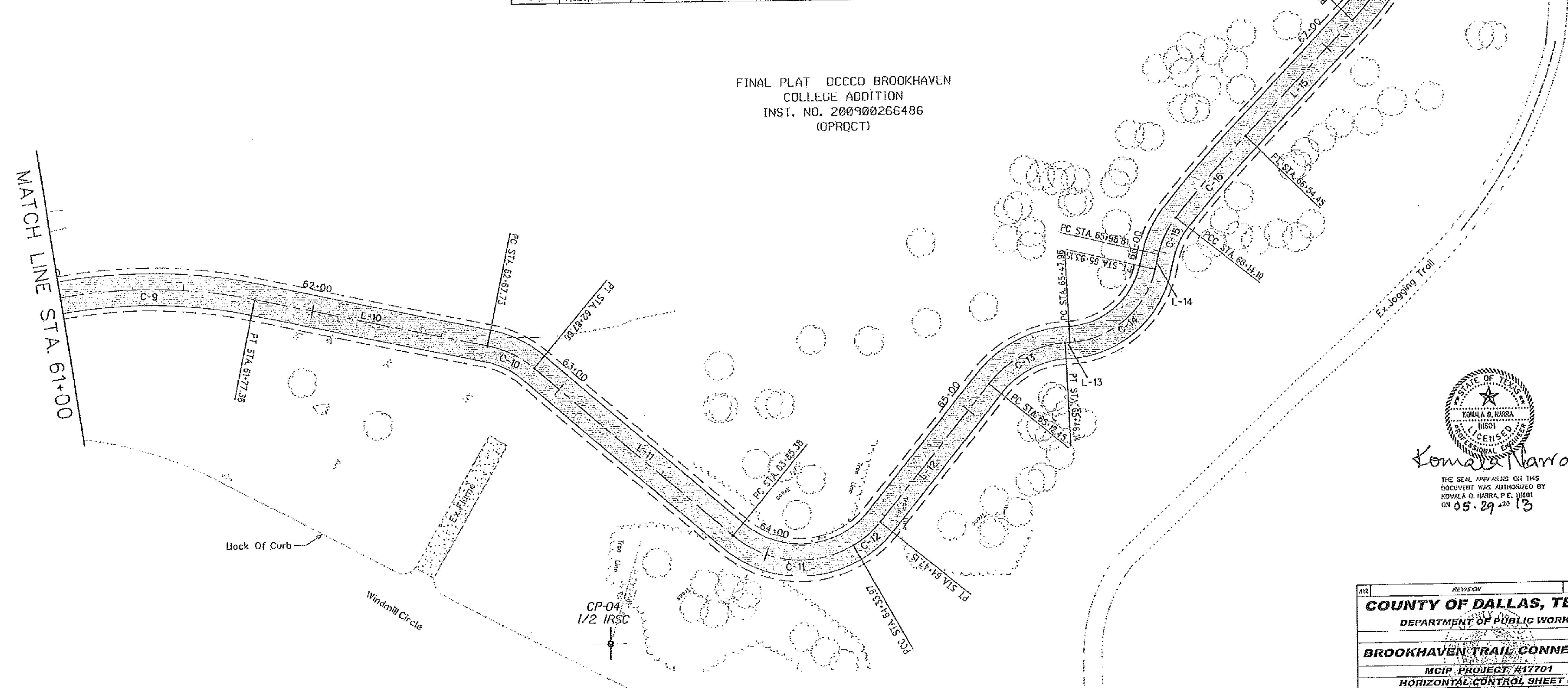
RECORD AS - BUILT DRAWINGS



HORIZONTAL CONTROL - HIKE & BIKE TRAIL									
ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL									
LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
C-9	7,024,333	2,473,705	7,024,403	2,473,613	60+59.60	61+77.36	117.76'	200'	N 52° 21'17" W
L-10	7,024,403	2,473,613	7,024,477	2,473,560	61+77.36	62+67.73	90.37'		N 35° 29'14" W
C-10	7,024,477	2,473,560	7,024,495	2,473,553	62+67.73	62+87.66	19.93'	40'	N 21° 12' 55" W
L-11	7,024,495	2,473,553	7,024,592	2,473,541	62+87.66	63+85.38	97.72'		N 06° 56'36" W
C-11	7,024,592	2,473,541	7,024,626	2,473,511	63+85.38	64+33.97	48.59'	40'	N 41° 44'43" W
C-12	7,024,626	2,473,511	7,024,627	2,473,498	64+33.97	64+47.15	13.18'	35'	N 87° 20'09" W
L-12	7,024,627	2,473,498	7,024,618	2,473,433	64+47.15	65+12.45	65.30'		S 81° 52'30" W
C-13	7,024,618	2,473,433	7,024,627	2,473,402	65+12.45	65+46.14	33.69'	40'	N 73° 59'58" W
L-13	7,024,627	2,473,402	7,024,628	2,473,400	65+46.14	65+47.95	1.82'		N 49° 52'26" W
C-14	7,024,628	2,473,400	7,024,630	2,473,358	65+47.95	65+93.15	45.20'	35'	N 86° 51'02" W
L-14	7,024,630	2,473,358	7,024,627	2,473,354	65+93.15	65+98.81	5.66'		S 56° 08'23" W
C-15	7,024,627	2,473,354	7,024,622	2,473,339	65+98.81	66+14.19	15.38'	35'	S 68° 43'43" W
C-16	7,024,622	2,473,339	7,024,618	2,473,299	66+14.19	66+54.45	65.30'	400'	S 84° 12'03" W
L-15	7,024,618	2,473,299	7,024,615	2,473,240	66+54.45	67+14.10	59.65'		S 87° 05'03" W
C-17	7,024,615	2,473,240	7,024,606	2,473,205	67+14.10	67+49.76	35.67'	100'	S 76° 52'00" W

VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-04	63+32.28	99.73' RT	1/2 IRSC	2,473,602.067	7,024,590.134	566.27'



STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

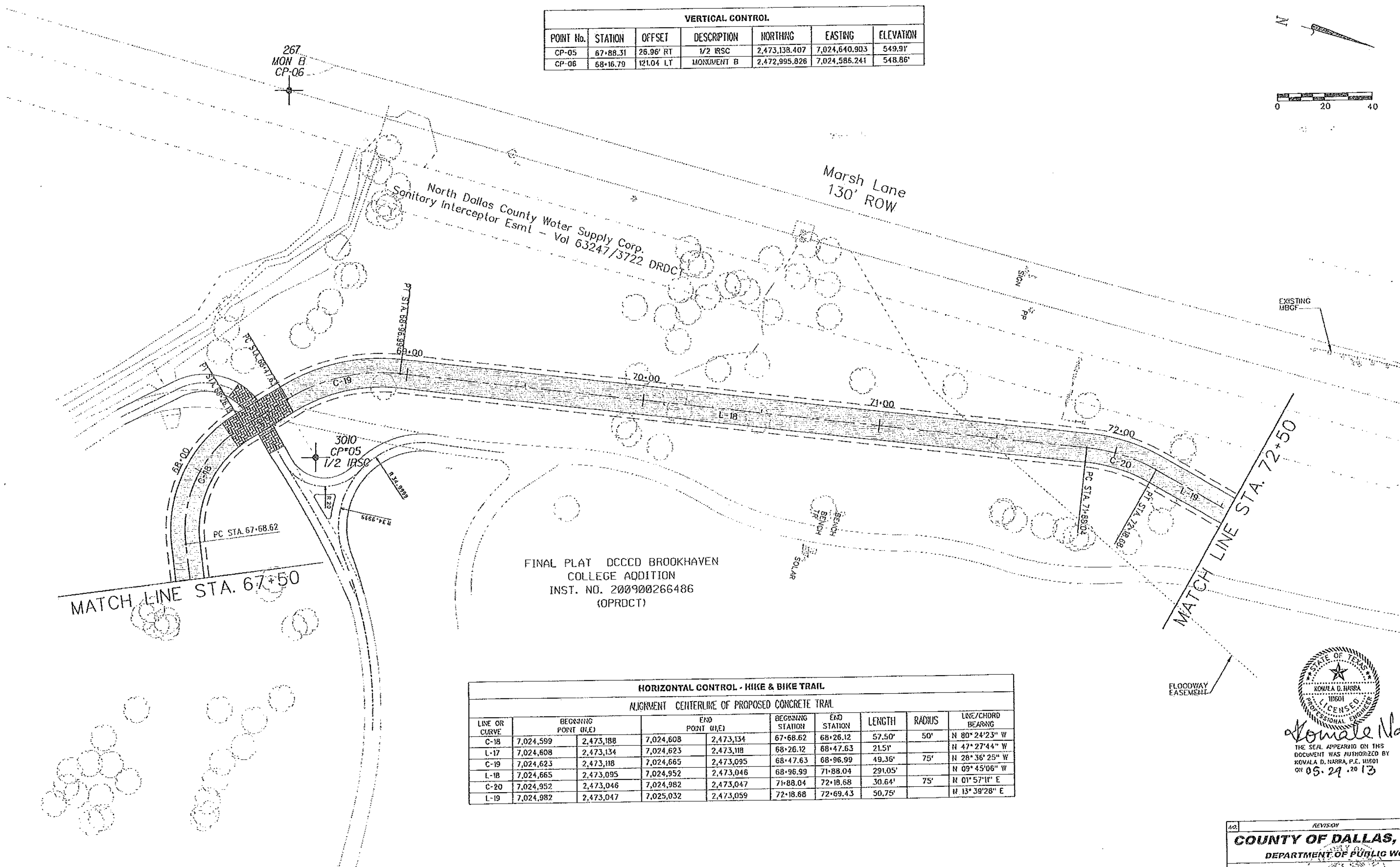
HORIZONTAL CONTROL SHEET 06

DESIGNED - TR	DRAWN - JR	DATE: AUGUST 2012	FILE: HORIZ_CONT.DOS.DGN
APPROVED - TS	CHECKED - TS	SCALE: 1"=40' H 1"=20' F	SHEET - 06

7:38:49 AM 5/23/2013

RECORD AS - BUILT DRAWINGS

VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-05	67+88.31	26.96' RT	1/2 IRSC	2,473,138.407	7,024,640.903	549.91'
CP-06	68+16.79	121.04 LT	MONUMENT B	2,472,995.826	7,024,586.241	548.86'



HORIZONTAL CONTROL - HIKE & BIKE TRAIL									
ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL									
LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
C-18	7,024,599	2,473,188	7,024,608	2,473,134	67+68.62	68+26.12	57.50'	50'	N 80° 24'23" W
L-17	7,024,608	2,473,134	7,024,623	2,473,118	68+26.12	68+47.63	21.51'		N 47° 27'44" W
C-19	7,024,623	2,473,118	7,024,665	2,473,095	68+47.63	68+96.99	49.36'	75'	N 28° 36' 25" W
L-18	7,024,665	2,473,095	7,024,952	2,473,046	68+96.99	71+88.04	291.05'		N 09° 45'06" W
C-20	7,024,952	2,473,046	7,024,982	2,473,047	71+88.04	72+18.68	30.64'	75'	N 01° 57'11" E
L-19	7,024,982	2,473,047	7,025,032	2,473,059	72+18.68	72+69.43	50.75'		N 13° 39'28" E

STATE OF TEXAS
KOVALA D. NARRA
111601
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Kovala Narra

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DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

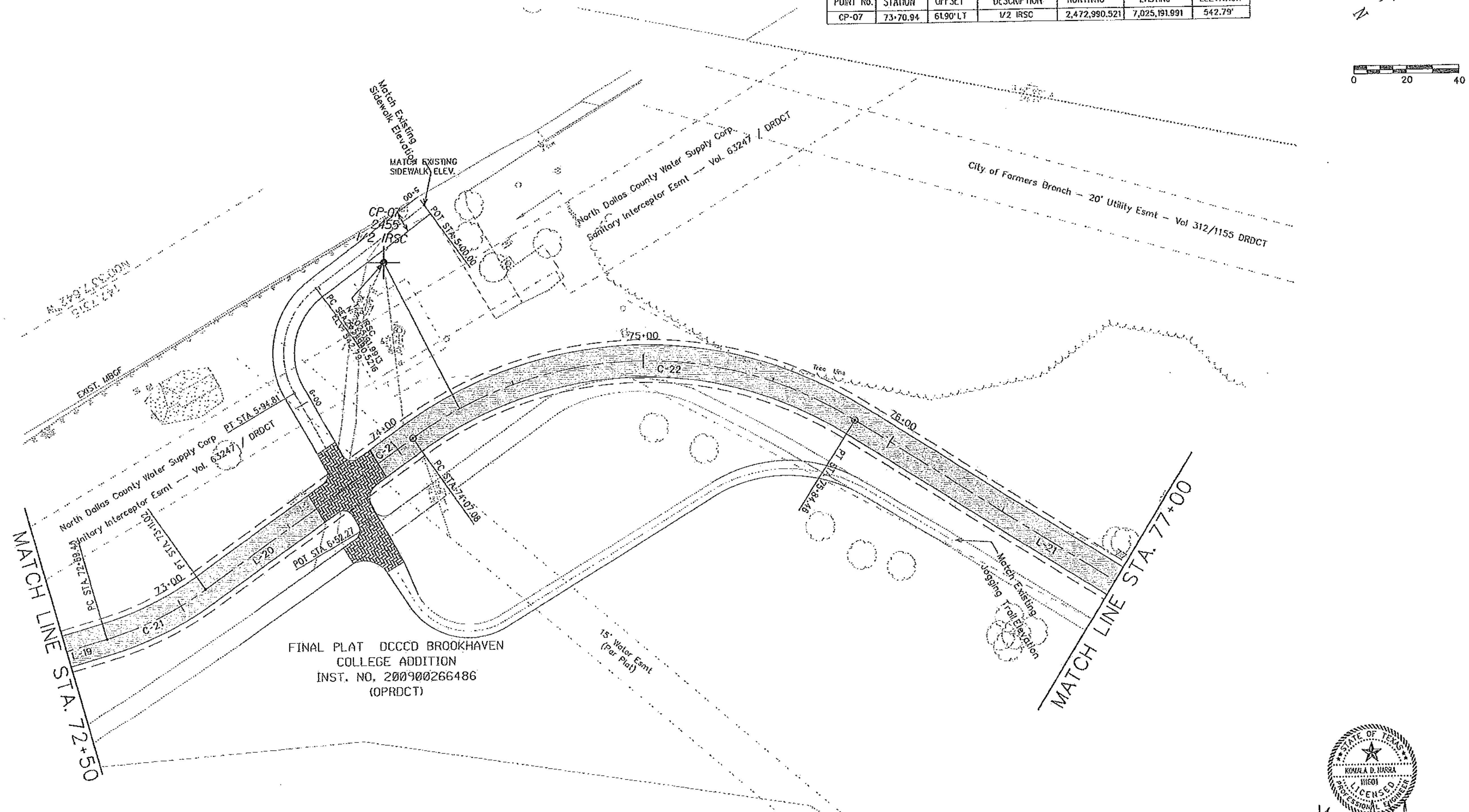
HORIZONTAL CONTROL SHEET 07

DESIGNED - KN	DRAWN - JR	DATE: AUGUST 2012	FILE: HORZ_CONT_07.DGN
APPROVED - TS	CHECKED - TS	SCALE: 1"=40' H 1"=20' F	SHEET: 07

7:39:07 AM 5/23/2013

RECORD AS - BUILT DRAWINGS

VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-07	73+70.94	61.90' LT	1/2 IRSC	2,472,990.521	7,025,191.991	542.79'



HORIZONTAL CONTROL - HIKE & BIKE TRAIL									
ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL									
LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
L-19	7,024,982	2,473,047	7,025,032	2,473,059	72+18.68	72+69.43	50.75'		N 13° 39'18" E
C-21	7,025,032	2,473,059	7,025,073	2,473,062	72+69.43	73+11.02	41.59'	125'	N 04° 07'36" E
L-20	7,025,073	2,473,062	7,025,169	2,473,053	73+11.02	74+07.08	96.06'		N 05° 24'16" W
C-22	7,025,169	2,473,053	7,025,316	2,473,133	74+07.08	75+84.45	177.38'	150'	N 28° 28'20" E
L-21	7,025,316	2,473,133	7,025,431	2,473,353	75+84.45	78+33.36	248.91'		N 62° 20'56" E

STATE OF TEXAS
KOMALA D. NARRA
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Komala Narra

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DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 08

DESIGNED – [illegible]	DRAWN – JR	DATE: AUGUST 2012	FILE: HORZ_CONT_08.DGN
APPROVED – TS	CHECKED – TS	SCALE: 1"=40' H 1"=20' F	SHEET: 08

5/29/2013 11:09:08 AM

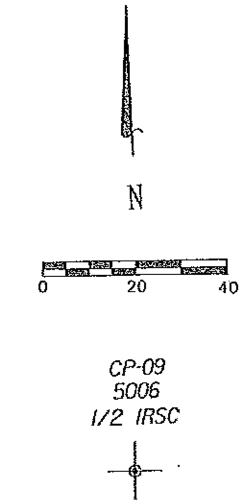
RECORD AS - BUILT DRAWINGS

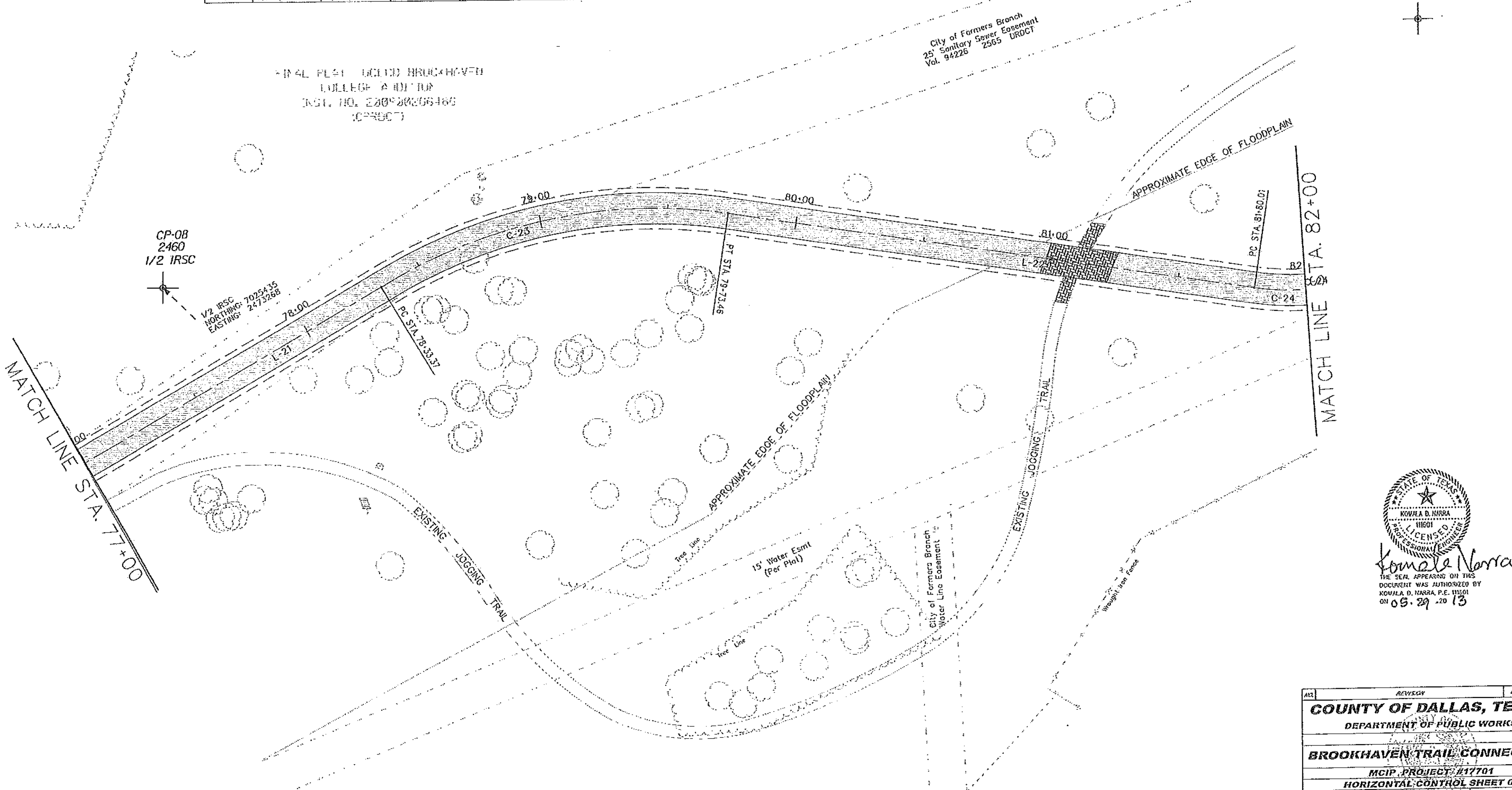
VERTICAL CONTROL						
POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-08	77+02.98	42.90' LT	1/2 IRSC	2,473,268.194	7,025,435.100	541.52'
CP-09	81+84.94	109.37' LT	1/2 IRSC	2,473,759.831	7,025,512.401	549.92'

HORIZONTAL CONTROL - HIKE & BIKE TRAIL

ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL

LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
L-21	7,025,316	2,473,133	7,025,431	2,473,353	75+84.45	78+33.36	248.91'		N 62° 20'56" E
C-23	7,025,431	2,473,353	7,025,453	2,473,489	78+33.36	79+73.46	139.87'	200'	N 81° 00'45" E
L-22	7,025,453	2,473,489	7,025,413	2,473,691	79+73.46	81+80.01	206.55'		S 78° 55'13" E
C-24	7,025,413	2,473,691	7,025,415	2,473,739	81+80.01	82+28.35	48.34'	100'	N 87° 13'57" E





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DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

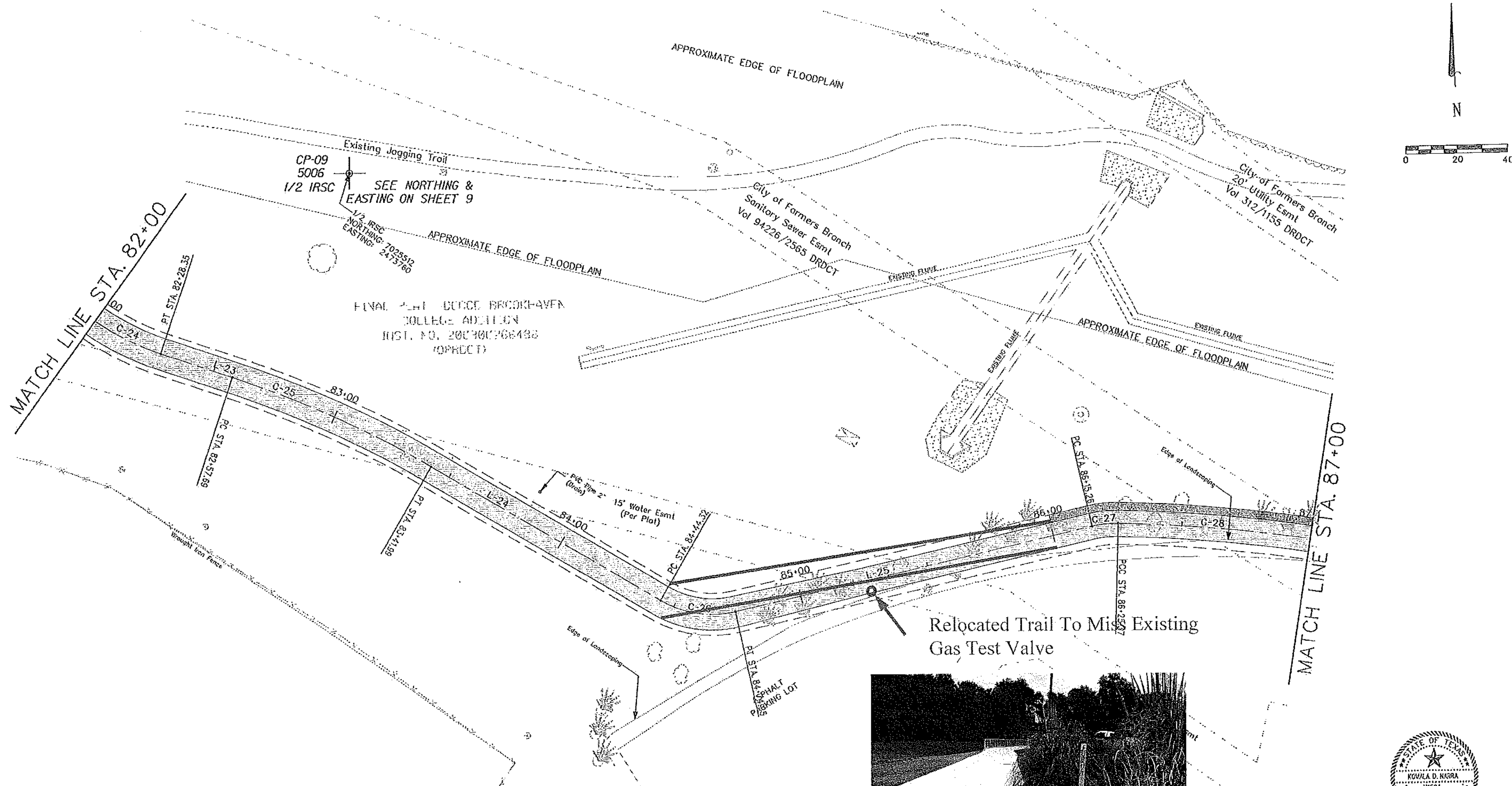
MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 09

DESIGNED - KN	DRAWN - AR	DATE - AUGUST 2012	FILE - HORIZ_CONT_009.DGN
APPROVED - TS	CHECKED - TS	SCALE - 1"=40' H 1"=20' F	SHEET - 09

7:39:44 AM 5/23/2013

RECORD AS - BUILT DRAWINGS



HORIZONTAL CONTROL - HIKE & BIKE TRAIL									
ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL									
LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
C-24	7,025,413	2,473,691	7,025,415	2,473,739	81+80.01	82+28.35	48.34'	100'	N 87° 13'57" E
L-23	7,025,415	2,473,739	2,473,739	7,025,439	82+28.35	82+57.69	29.34'		N 73° 23'08" E
C-25	7,025,424	2,473,767	7,025,439	2,473,850	82+57.69	83+41.99	84.30'	400'	N 79° 25'23" E
L-24	7,025,439	2,473,850	2,473,850	7,025,460	83+41.99	84+44.32	102.33'		N 85° 27'39" E
C-26	7,025,447	2,473,952	7,025,460	2,473,978	84+44.32	84+74.25	29.94'	40'	N 64° 01'15" E
L-25	7,025,460	2,473,978	2,473,978	7,025,571	84+74.25	86+15.25	141.00'		N 42° 15'48" E
C-27	7,025,564	2,474,073	7,025,571	2,474,081	86+15.25	86+25.36	10.11'	40'	N 49° 30'19" E
C-28	7,025,571	2,473,081	7,025,635	2,474,211	86+25.37	87+71.03	145.71'	602'	N 63° 40'51" E

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

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COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 10

DESIGNED - EH	DRAWN - JR	DATE - AUGUST, 2012	FILE - HORIZ_CONT_00.DGN
APPROVED - TS	CHECKED - TS	SCALE - 1"=40'H 1"=20'F	SHEET - 10

11:28:38 AM 5/29/2013

RECORD AS - BUILT DRAWINGS

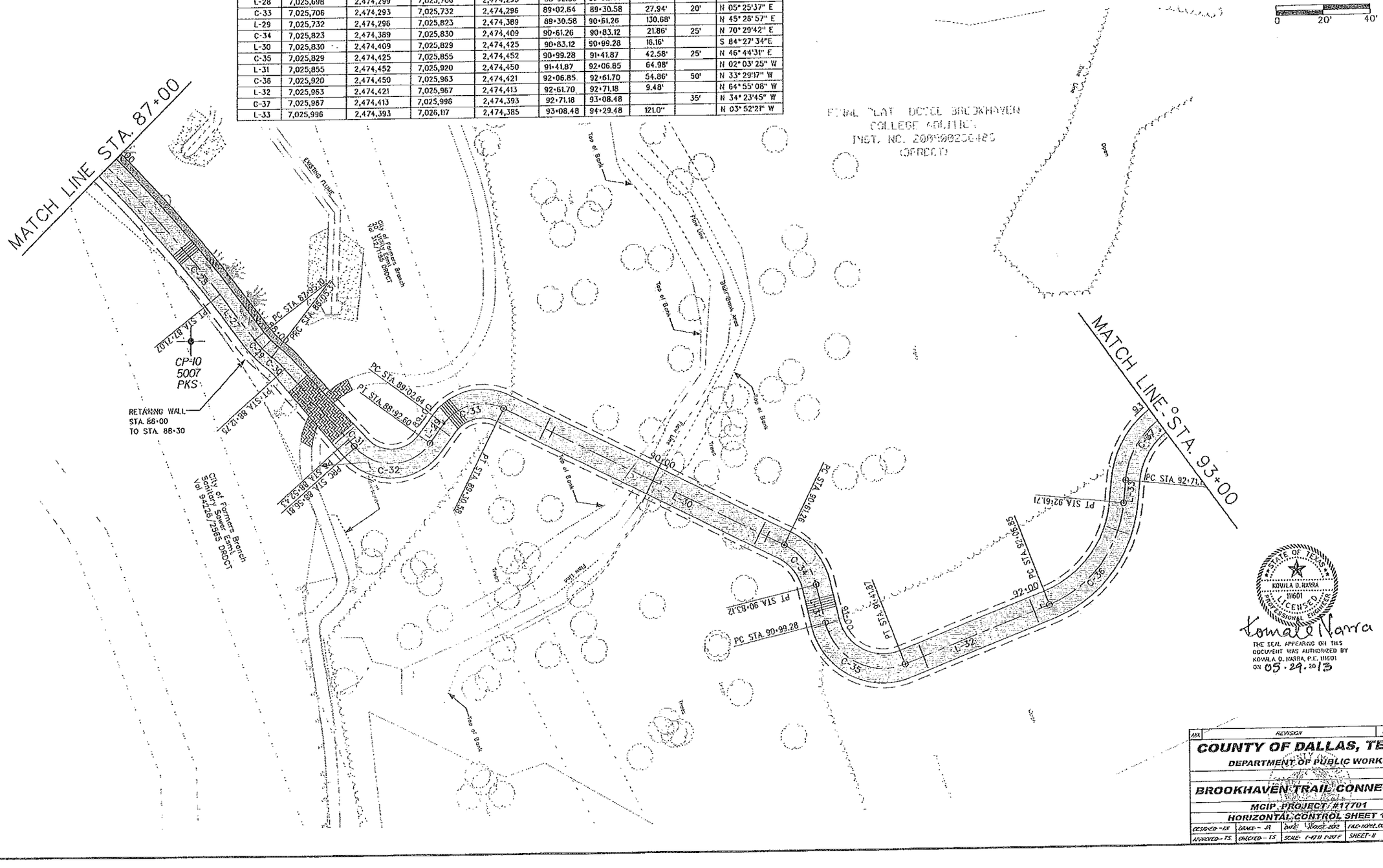
HORIZONTAL CONTROL - HIKE & BIKE TRAIL

ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL

LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
C-28	7,025,571	2,474,081	7,025,635	2,474,211	86+25.36	87+71.07	145.71'	602'	N 63° 40' 51" E
L-26	7,025,635	2,474,211	7,025,643	2,474,234	87+71.07	87+95.09	24.02'		N 71° 27' 01" E
C-29	7,025,643	2,474,234	7,025,647	2,474,243	87+95.09	88+05.37	10.28'	40'	N 64° 05' 21" E
C-30	7,025,647	2,474,243	7,025,651	2,474,250	88+05.37	88+12.75	7.38'	40'	N 62° 00' 41" E
L-27	7,025,651	2,474,250	7,025,666	2,474,286	88+12.75	88+52.43	39.68'		N 67° 17' 41" E
C-31	7,025,666	2,474,286	7,025,668	2,474,290	88+52.43	88+56.81	4.38'	400'	N 67° 36' 31" E
C-32	7,025,668	2,474,290	7,025,698	2,474,299	88+56.81	88+92.59	35.79'	20'	N 16° 39' 49" E
L-28	7,025,698	2,474,299	7,025,706	2,474,293	88+92.59	89+02.64	10.04'		N 34° 35' 43"W
C-33	7,025,706	2,474,293	7,025,732	2,474,296	89+02.64	89+30.58	27.94'	20'	N 05° 25' 37" E
L-29	7,025,732	2,474,296	7,025,823	2,474,389	89+30.58	90+61.26	130.68'		N 45° 28' 57" E
C-34	7,025,823	2,474,389	7,025,830	2,474,409	90+61.26	90+83.12	21.86'	25'	N 70° 29' 42" E
L-30	7,025,830	2,474,409	7,025,829	2,474,425	90+83.12	90+99.28	16.16'		S 84° 27' 34"E
C-35	7,025,829	2,474,425	7,025,855	2,474,452	90+99.28	91+41.87	42.58'	25'	N 46° 44' 31" E
L-31	7,025,855	2,474,452	7,025,920	2,474,450	91+41.87	92+06.85	64.98'		N 02° 03' 25" W
C-36	7,025,920	2,474,450	7,025,963	2,474,421	92+06.85	92+61.70	54.86'	50'	N 33° 29' 17" W
L-32	7,025,963	2,474,421	7,025,967	2,474,413	92+61.70	92+71.18	9.48'		N 64° 55' 08" W
C-37	7,025,967	2,474,413	7,025,996	2,474,393	92+71.18	93+08.48		35'	N 34° 23' 45" W
L-33	7,025,996	2,474,393	7,026,017	2,474,385	93+08.48	94+29.48	121.0'		N 03° 52' 21" W

VERTICAL CONTROL

POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-10	87+21.10	25.78' RT	PKS	2,474,225.444	7,025,617.390	555.33'



STATE OF TEXAS
KOWLA D. NASRA
111601
LICENSED
PROFESSIONAL ENGINEER

Kowla D. Nasra

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COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 11

DESIGNED - KK	DRAWN - JR	DATE: March 2013	FILE: HORZ_CONT_SHEET
APPROVED - TS	CHECKED - TS	SCALE: 1"=40' (1:240)	SHEET #

5/30/2013 7:40:37 AM

RECORD AS - BUILT DRAWINGS

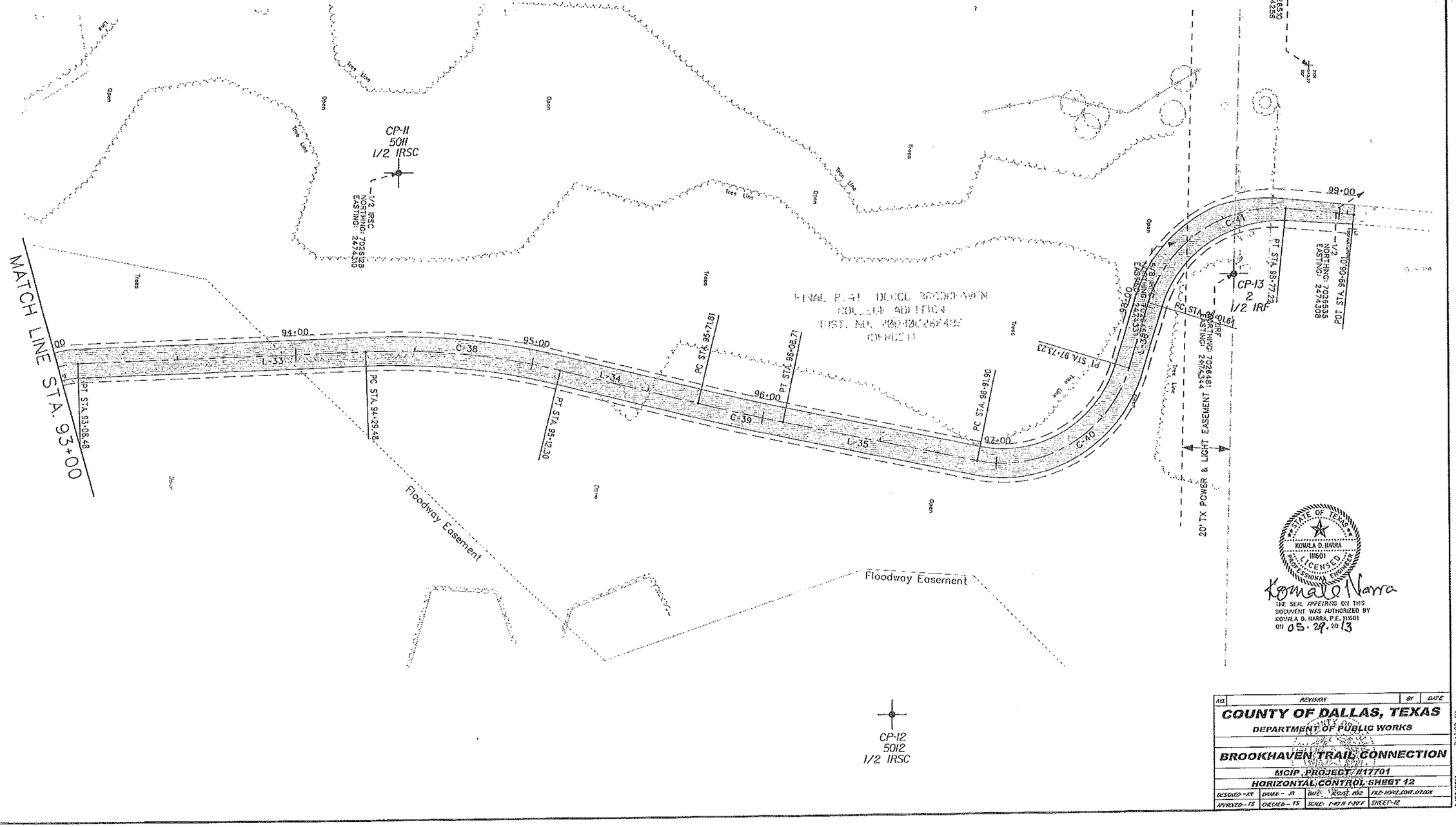
HORIZONTAL CONTROL - HIKE & BIKE TRAIL

ALIGNMENT CENTERLINE OF PROPOSED CONCRETE TRAIL

LINE OR CURVE	BEGINNING POINT (N,E)		END POINT (N,E)		BEGINNING STATION	END STATION	LENGTH	RADIUS	LINE/CHORD BEARING
L-33	7,025,996	2,474,393	7,026,117	2,474,385	93+08.48	94+29.48	121.0'		N 03° 52' 21" W
C-38	7,026,117	2,474,385	7,026,119	2,474,390	94+29.48	95+12.29	82.82'	300'	N 04° 02' 09" E
L-34	7,026,119	2,474,390	7,026,258	2,474,403	95+12.29	95+71.81	59.52'		N 11° 56' 39" E
C-39	7,026,258	2,474,403	7,026,294	2,474,410	95+71.81	96+08.71	36.90'	1000'	N 10° 53' 13" E
L-35	7,026,294	2,474,410	7,026,376	2,474,424	96+08.71	96+91.90	83.18'		N 09° 49' 48" E
C-40	7,026,376	2,474,424	7,026,438	2,474,384	96+91.90	97+73.23	81.33'	55'	N 32° 31' 57" W
L-36	7,026,438	2,474,384	7,026,446	2,474,357	97+73.23	98+01.64	28.42'		N 74° 53' 41" W
C-41	7,026,446	2,474,357	7,026,503	2,474,316	98+01.64	98+77.22	75.58'	55'	N 35° 31' 47" W

VERTICAL CONTROL

POINT No.	STATION	OFFSET	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP-11	93+85.55	74.28' LT	1/2 IRSC	2,474,309.674	7,026,128.092	548.38'
CP-12	95+21.08	74.28' LT	1/2 IRSC	2,474,529.360	7,026,343.256	567.99'
CP-13	97+85.53	22.63' RT	1/2 IRF	2,474,343.625	7,026,481.367	549.51'



STATE OF TEXAS
KOMLA D. NARRA
111601
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PROFESSIONAL ENGINEER

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COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION

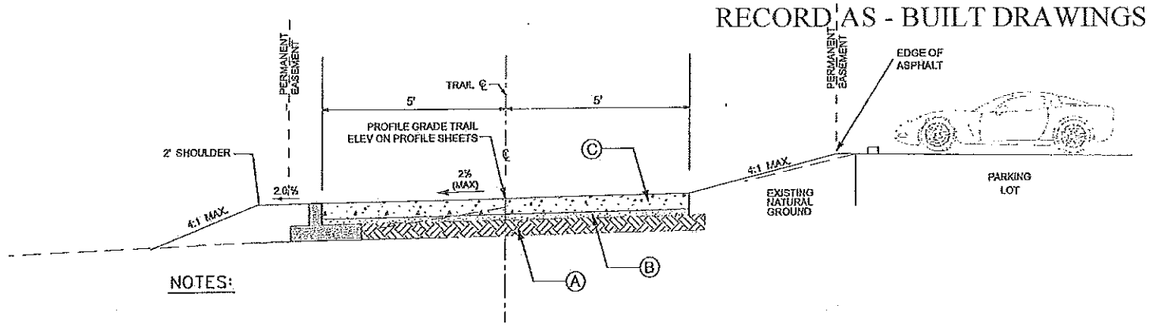
MCIP PROJECT #17701

HORIZONTAL CONTROL SHEET 12

DESIGNED - KN	DRAWN - JB	DATE: AUGUST 2012	FILE: HORZ_CONT_DESIGN
APPROVED - TS	CHECKED - TS	SCALE: 1"=50' H 1"=5' V	SHEET - 12

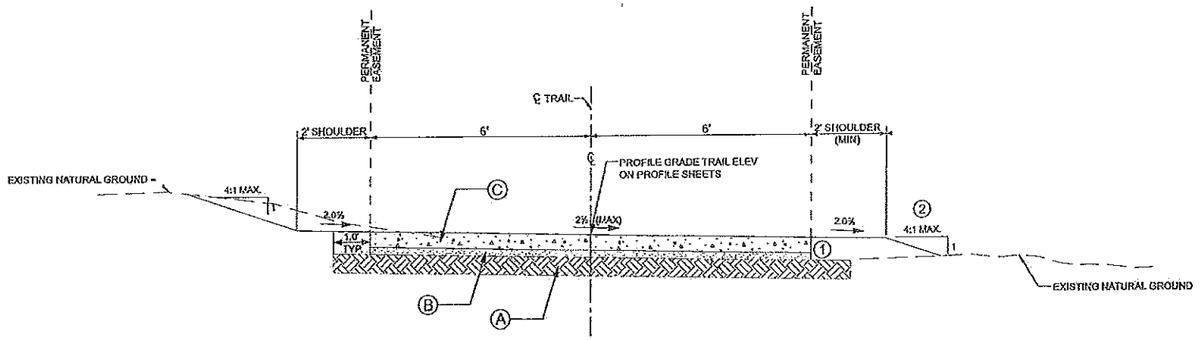
5/23/2013 7:43:29 AM

RECORD AS - BUILT DRAWINGS

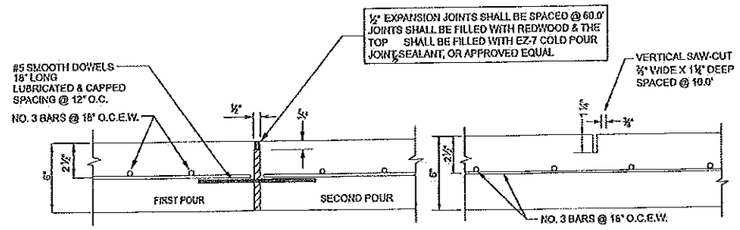


NOTES:

TRAIL TYPICAL SECTION AT RETENTION POND
FROM STA. 86+00 TO STA. 88+30
NTS

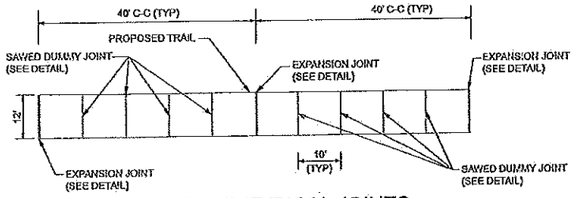


TRAIL TYPICAL SECTION
NTS

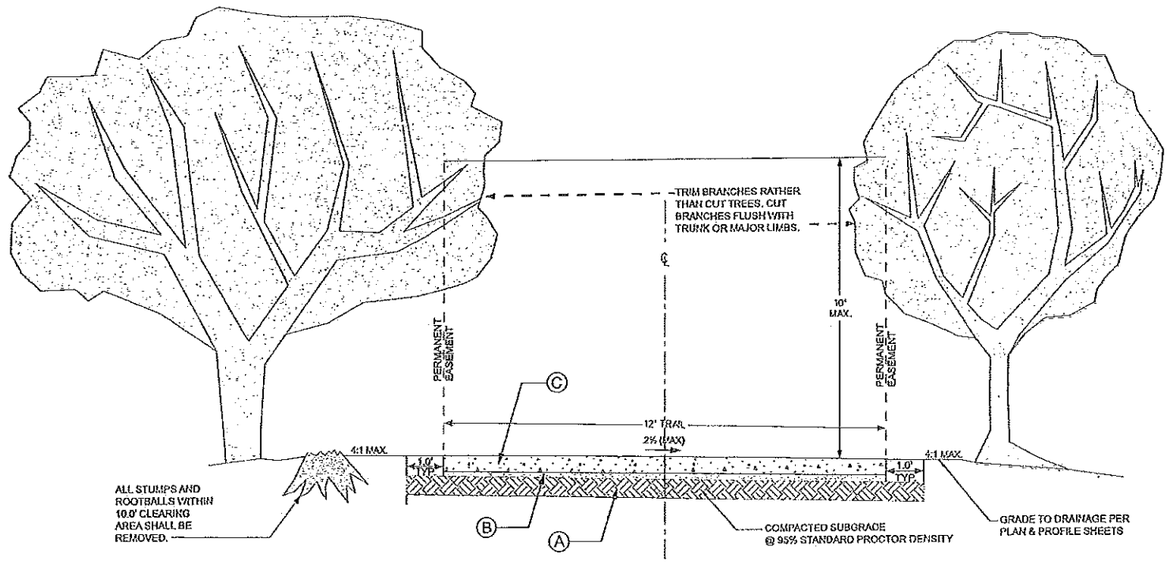


EXPANSION JOINT DETAIL
NTS

SAWED DUMMY JOINT DETAIL
NTS



TRAIL TYPICAL JOINTS
NTS



TRAIL TYPICAL CLEARING SECTION
NTS

Ⓐ COMPACTED SUBGRADE @ 95% MODIFIED PROCTOR WITH OPTIMUM MOISTURE DENSITY -2% - +4%

Ⓑ 2" SAND CUSHION SUBSIDIARY TO ITEM 531 - SIDEWALKS

Ⓒ 6" CLASS 'C' REINFORCED CONC. TRAIL PVMT W/#3 BARS @18" O.C.E.W. TXDOT ITEM 531 - SIDEWALKS

① REFER TO PLAN & PROFILE SHEETS FOR CROSS SLOPES.

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED PROFESSIONAL ENGINEER

Komala Narra

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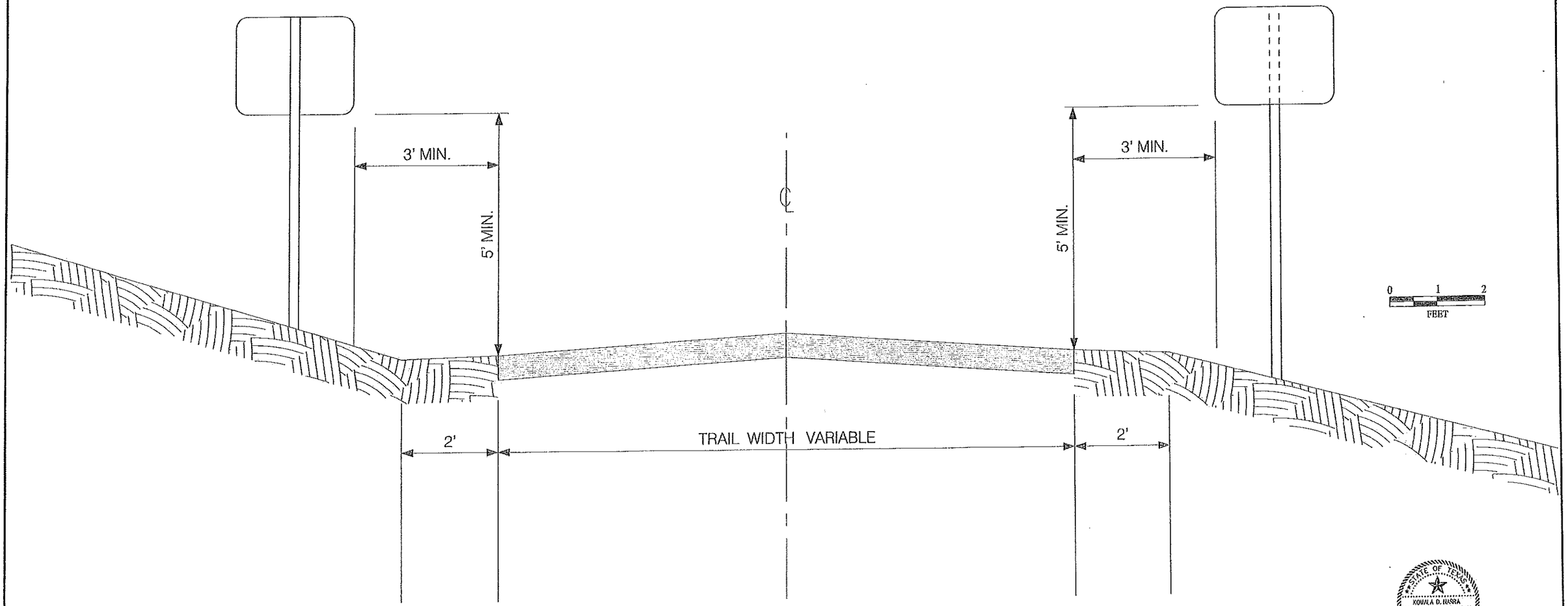
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
TYPICAL SECTIONS
BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
FROM S. PEDESTRIAN BRIDGE TO VALLEY VIEW ROAD

DESIGNED-KN	DRAWN-KN	DATE- 5/29/2013	FILE- TYP .DGN
APPROVED-TS	CHECKED-KN	SCALE- 1"=10' / 1"=20'	SHEET 13

RECORD AS - BUILT DRAWINGS



MINIMUM VERTICAL AND HORIZONTAL CLEARANCES FOR TRAIL SIGN INSTALLATION

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL
ENGINEER

Komala Narra

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
SIGN CLEARANCE REQUIREMENTS
BROOKHAVEN TRAIL CONNECTION
FROM S. PEDESTRIAN BRIDGE TO VALLEY VIEW ROAD
MCIP PROJECT NO. 17701

DESIGNED - KH	DRAWN - JR	DATE: 5/28/2013	FILE: VERT & HORIZ SIGN PLACEMENT
APPROVED - TS	CHECKED - KH	SCALE:	SHEET: 14

RECORD AS - BUILT DRAWINGS

NOTES FOR TEMPORARY TRAFFIC CONTROL:

1. ALL WORK AND MATERIALS REQUIRED FOR TRAFFIC HANDLING SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED PART OF ITEM 502 "BARRICADES, SIGNS, AND TRAFFIC HANDLING." ALL BARRICADES AND SIGNS SHALL BE INSTALLED BY THE CONTRACTOR. AT ALL TIMES THE CONTRACTOR SHALL HAVE ENOUGH BARRICADES AND/OR SIGNS TO REPLACE THOSE DAMAGED.

2. THE SIGNS, BARRICADES, ETC LISTED HEREIN ARE CONSIDERED TO BE THE MINIMUM REQUIRED FOR TRAFFIC HANDLING ON THIS PROJECT. ALL SIGNS AND BARRICADES SHALL BE STANDARD IN SHAPE, LEGEND AND COLOR. ALL SIGNS SHALL BE REFLECTORIZED ON BIKEWAYS, INCLUDING SHARED-USE PATHS. NO PORTION OF A SIGN OR ITS SUPPORT SHALL BE PLACED LESS THAN 3 FEET LATERALLY FROM THE NEAR EDGE OF THE PATH, OVER THE ENTIRE WIDTH OF THE SHARED-USE PATH. MOUNTING HEIGHT FOR POST-MOUNTED SIGNS ON SHARED-USE PATHS SHALL BE A MINIMUM OF 4 FEET, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE ELEVATION OF THE NEAR EDGE OF THE PATH SURFACE.

3. SIGNS/BARRICADES MAINTENANCE SHALL BE DONE ON A REGULAR BASIS. THE MAINTENANCE OF THESE SIGNS/BARRICADES IS THE RESPONSIBILITY OF THE CONTRACTOR.

4. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ADJACENT PROPERTY AT ALL TIMES DURING CONSTRUCTION. DRUMS AND SIGNS SHALL BE PLACED IN SUCH A MANNER AS TO NOT INTERFERE WITH DRIVEWAY OPERATIONS.

5. SIGN LOCATIONS ARE APPROXIMATE ONLY, AND SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST TMUTCD AND TRAFFIC STANDARD SHEETS, AND SHALL BE MODIFIED AS DIRECTED BY THE ENGINEER.

6. THE CONTRACTOR MAY, WITH THE APPROVAL OF AND AS DIRECTED BY THE ENGINEER, BE REQUIRED TO VARY THE NUMBER AND LOCATION OF SIGNS AND BARRICADES AS INDICATED ON THE PLANS IN ORDER TO MAINTAIN A SAFE AND UNINTERRUPTED FLOW OF TRAFFIC PARTICULARLY IN THOSE AREAS OF IMMEDIATE WORK.

7. THE CONSTRUCTION SEQUENCING AND TRAFFIC CONTROL SHOWN ON THESE PLANS IS A "SUGGESTED SEQUENCE" ONLY. CONTRACTOR TO PROVIDE SIGNED & SEALED TRAFFIC CONTROL SEQUENCE FOR APPROVAL BY THE ENGINEER.

8. THE CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE DURING THE TRAIL AND BRIDGE CONSTRUCTION. THE CONTRACTOR SHALL ENSURE THAT THE WATER/RUNOFF THAT IS ACCUMULATED IN THE SUMPHOLES BE REMOVED, WHERE AND WHEN NECESSARY. THIS IS NOT A SEPARATE PAYITEM BUT SUBSIDIARY TO OTHER CONSTRUCTION PAYITEMS.

9. WORKING AREAS AND TRAVEL LANES SHALL BE SEPARATED BY APPROPRIATE TRAFFIC CONTROL DEVICES.

10. THE CONTRACTOR SHALL INSTALL FINAL SIGNS IN ACCORDANCE WITH THE SIGNING LAYOUT AND INACCORDANCE WITH LATETEST TXMUTCD.

TRAFFIC CONTROL NARRATIVE

PHASE I - [STA.65+00 TO STA. 83+50]

1. ALL PROJECT LIMIT SIGNS SHALL BE INSTALLED PRIOR TO BEGINNING OF WORK.
2. INSTALL BARRICADES, SIGNS AND TEMPORARY TRAFFIC CONTROL DEVICES PRIOR TO ANY ACTIVITY IN THE ACTIVE WORK AREA.
3. INSTALL PROPER TEMPORARY TRAFFIC CONTROL DEVICES FOR JOGGING TRAIL CLOSURE .
4. PLACE ALL ADVANCE WARNING SIGNS AS SHOWN IN PLANS IN ACCORDANCE WITH LATEST TEXAS MUTCD IN ADDITION TO TXDOT STANDARDS BC (1-12)-03.
5. CONSTRUCT THE WORK ZONE ENTRANCE.
6. PAVE TRAIL FROM STA. 65+00 TO STA. 83+50.
7. CONSTRUCT REALIGNMENT OF JOGGING TRAIL AND GRADE SITE ACCORDINGLY

PHASE II - [STA.50+00 TO STA. 65+00]

1. ALL PROJECT LIMIT SIGNS SHALL BE INSTALLED PRIOR TO BEGINNING OF WORK.
2. INSTALL BARRICADES, SIGNS AND TEMPORARY TRAFFIC CONTROL DEVICES PRIOR TO ANY ACTIVITY IN THE ACTIVE WORK AREA.
3. TEMPORARILY CLOSE THE JOGGING TRAIL FROM TUNNEL AT VALLEY VIEW LANE TO PAVING STATION 83+50.
4. PAVE TRAIL FROM STATION 50+00.00 TO 65+00.00 INCLUDING RETAINING WALL
5. INSTALL CROSS DRAINAGE STRUCTURES AND GRADE SITE ACCORDINGLY AS SHOWN IN PLANS
6. REALIGN JOGGING TRAIL and SITE GRADE ACCORDINGLY

PHASE III - [STA.83+50.00 TO STA. 87+00]

1. INSTALL BARRICADES, SIGNS AND TEMPORARY TRAFFIC CONTROL DEVICES PRIOR TO ANY ACTIVITY IN THE ACTIVE WORK AREA.
2. INSTALL PROPER TEMPORARY TRAFFIC CONTROL DEVICES. CLOSE JOGGING TRAIL PER SUGGESTED JOGGING TRAIL CLOSURE PLANS.
3. PAVE TRAIL FROM STA. 83+50 TO 87+00.
4. IF POSSIBLE, CONSTRUCT THIS PHASE DURING DAYS WITH LESS STUDENT TRAFFIC.
5. CONTRACTOR TO OBTAIN PRIOR APPROVAL OF CONSTRUCTION SCHEDULE FOR THIS PHASE OF CONSTRUCTION FROM COUNTY AND COLLEGE.

PHASE IV - [STA.87+00 TO END OF PROJECT]

1. ALL PROJECT LIMIT SIGNS SHALL BE INSTALLED PRIOR TO BEGINNING OF WORK.
2. INSTALL BARRICADES, SIGNS AND TEMPORARY TRAFFIC CONTROL DEVICES PRIOR TO ANY ACTIVITY IN THE ACTIVE WORK AREA.
3. INSTALL PROPER TRAFFIC CONTROL DEVICES FOR CLOSING THE JOGGING TRAIL
4. POUR ABUTMENTS AND SET BRIDGE ACCORDINGLY
5. PAVE TRAIL FROM STATION 87+00.00 TO VITRUVIAN TRAIL. GRDE SITE ACCORDINGLY.

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

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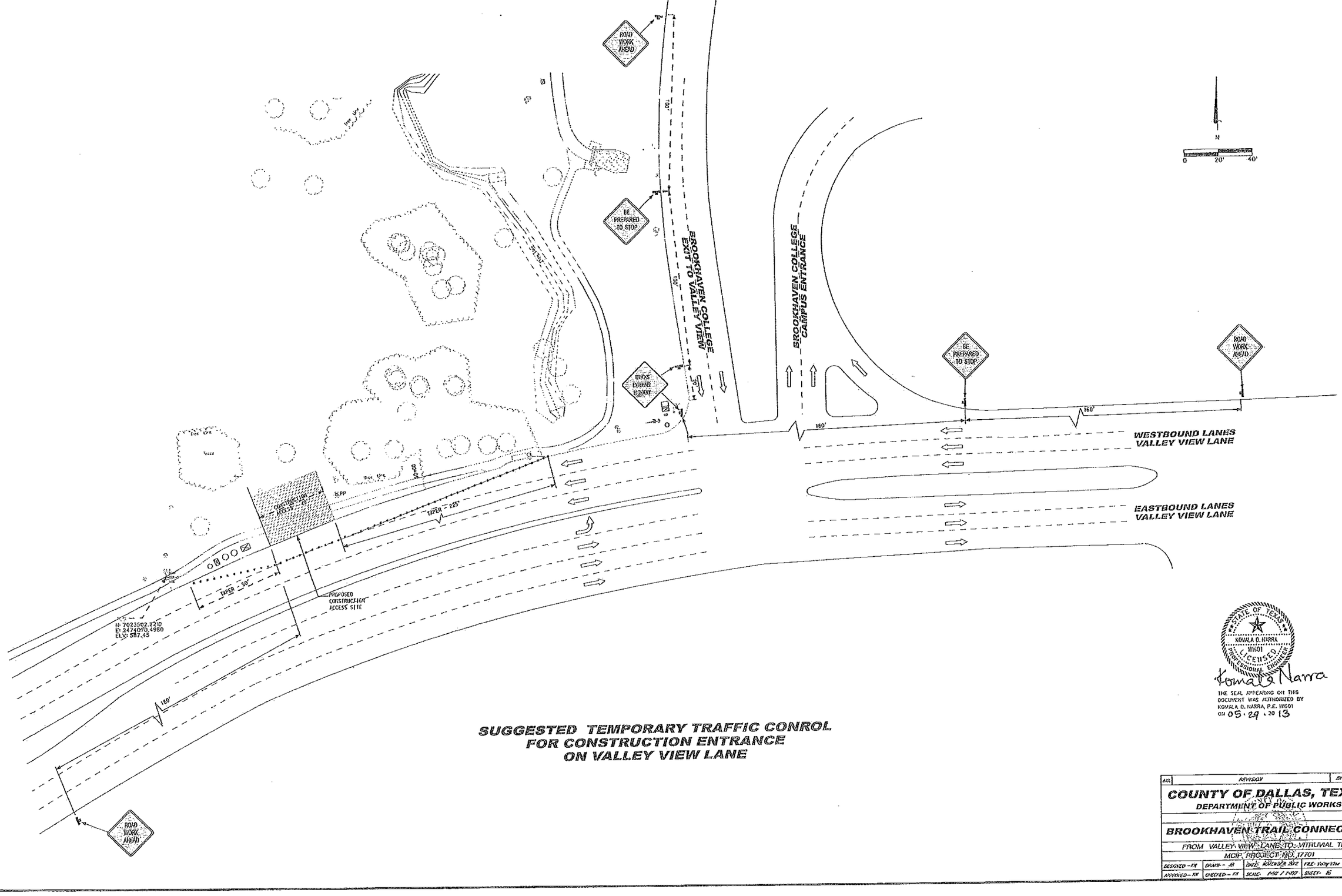
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION SEQUENCE NOTES
BROOKHAVEN TRAIL CONNECTION
HIKE AND BIKE TRAIL

DESIGNED- NA	DRAWN- NA	DATE- MAY 2013	FILE- NARR. SH. 15
APPROVED- KM	CHECKED- KN	SCALE- NTS	SHEET 15

RECORD AS - BUILT DRAWINGS



SUGGESTED TEMPORARY TRAFFIC CONROL FOR CONSTRUCTION ENTRANCE ON VALLEY VIEW LANE

STATE OF TEXAS
KOMLA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komla D Narra

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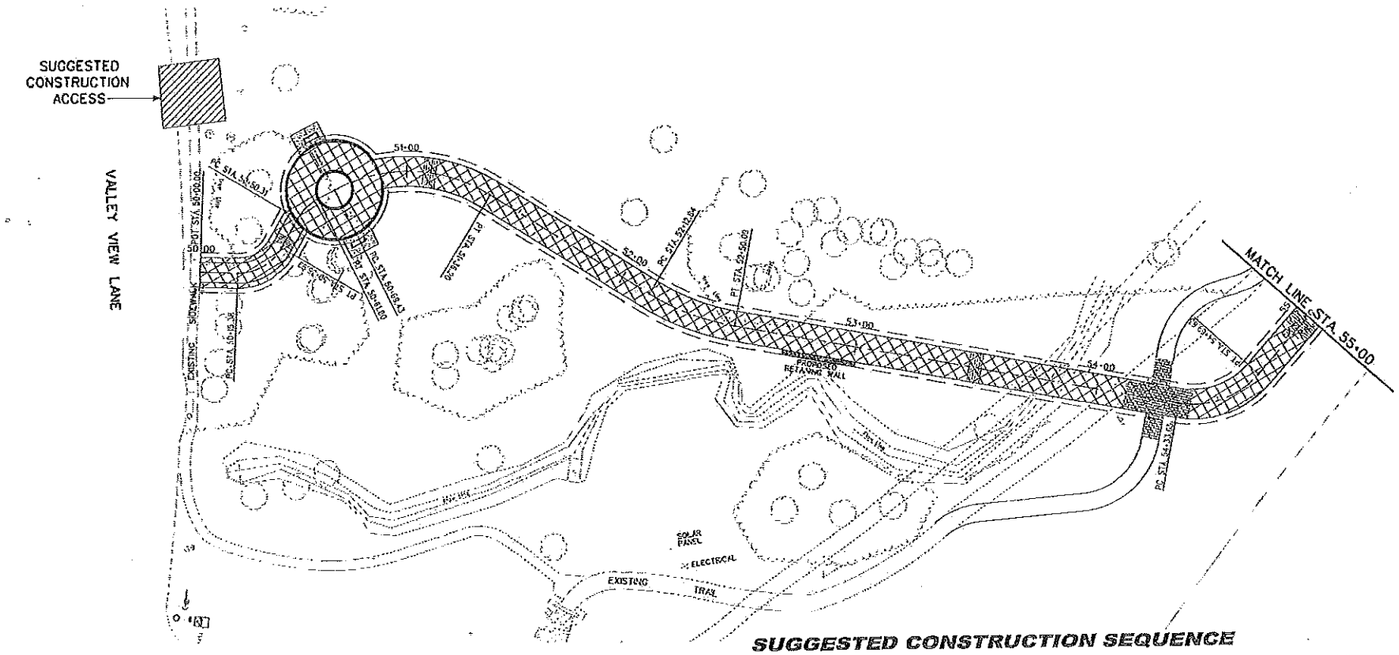
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW LANE TO VITRUVIAL TRAIL
MCIP PROJECT NO. 17701

DESIGNED – KN	DRAWN – AB	DATE: NOVEMBER 2012	FILE: Valley View TC
APPROVED – KN	CHECKED – KN	SCALE: HOR 1"=20'	SHEET: 16

RECORD AS - BUILT DRAWINGS



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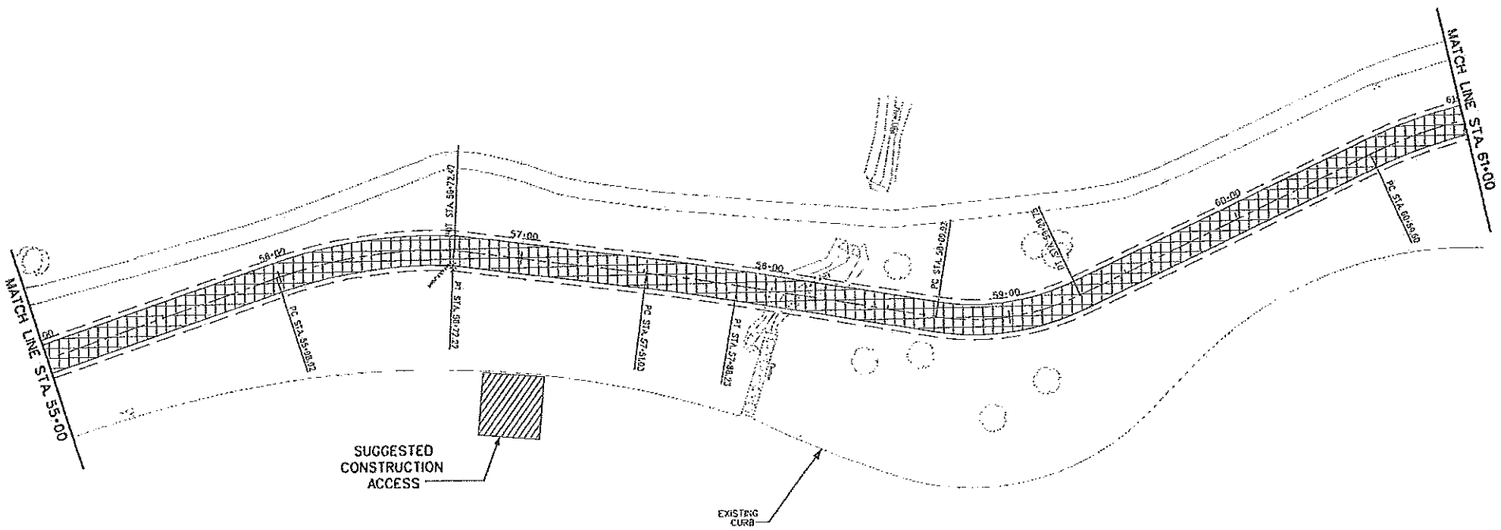

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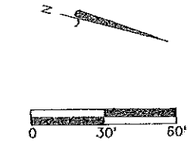

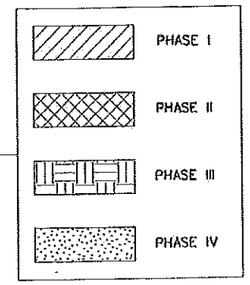

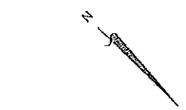

Komala Nasra

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION SEQUENCE

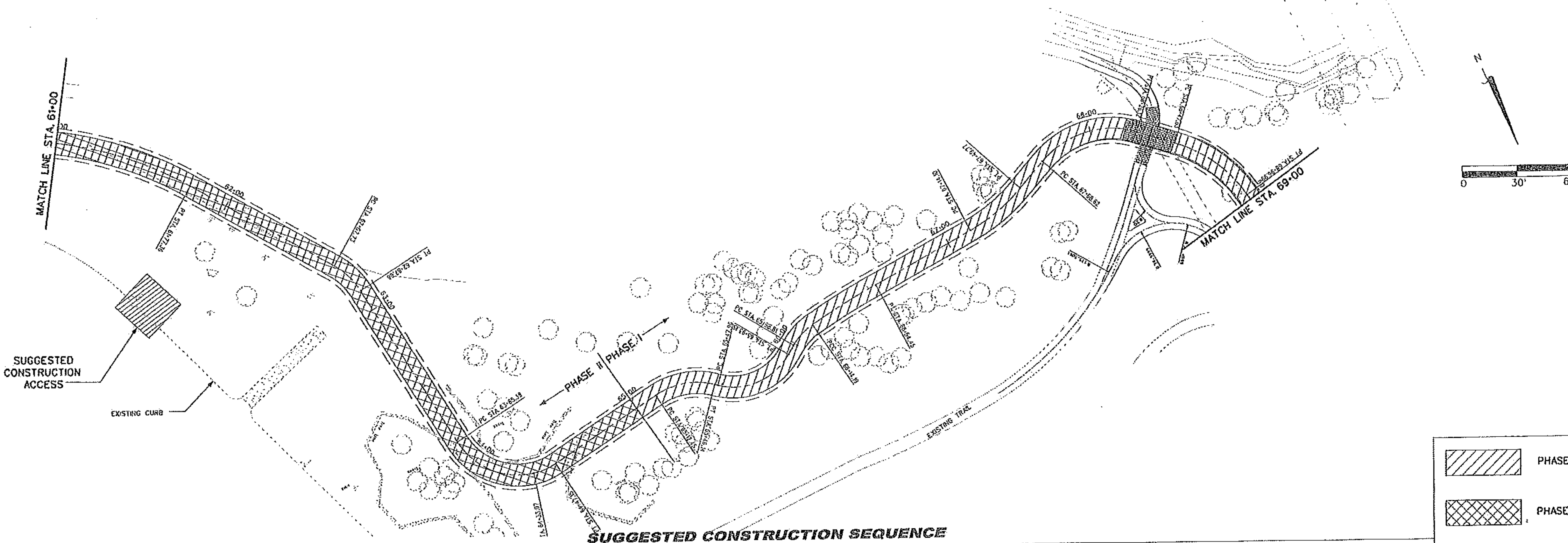
BROOKHAVEN TRAIL CONNECTION

FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL

MCIP PROJECT NO. 17101

DESIGNED – KN	DRAWN – AVDC	DATE: May 22, 2013	FILE: CONS_SEQ_SHEET 17
APPROVED – TS	CHECKED – KN	SCALE: 1"=30'	SHEET: 17

RECORD AS - BUILT DRAWINGS



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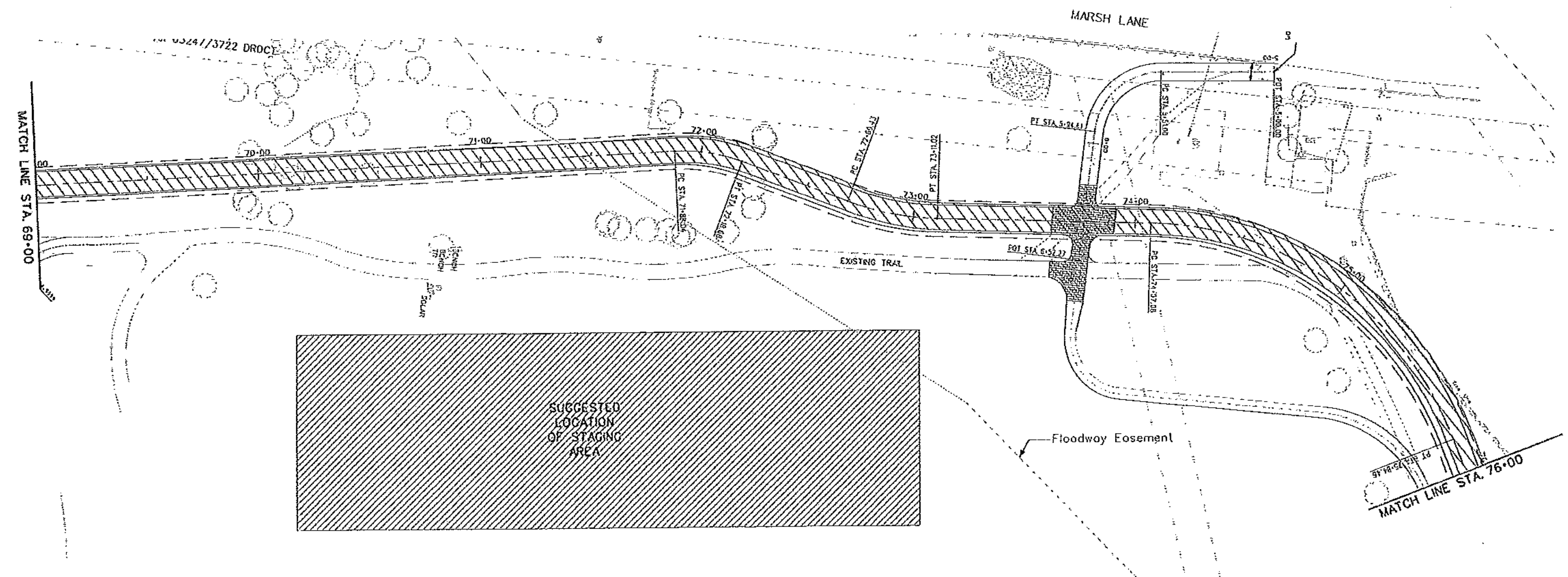

SUGGESTED CONSTRUCTION SEQUENCE

STATE OF TEXAS
KOVALA D. NARRA
11601
LICENSED
PROFESSIONAL ENGINEER

Kovala Narra

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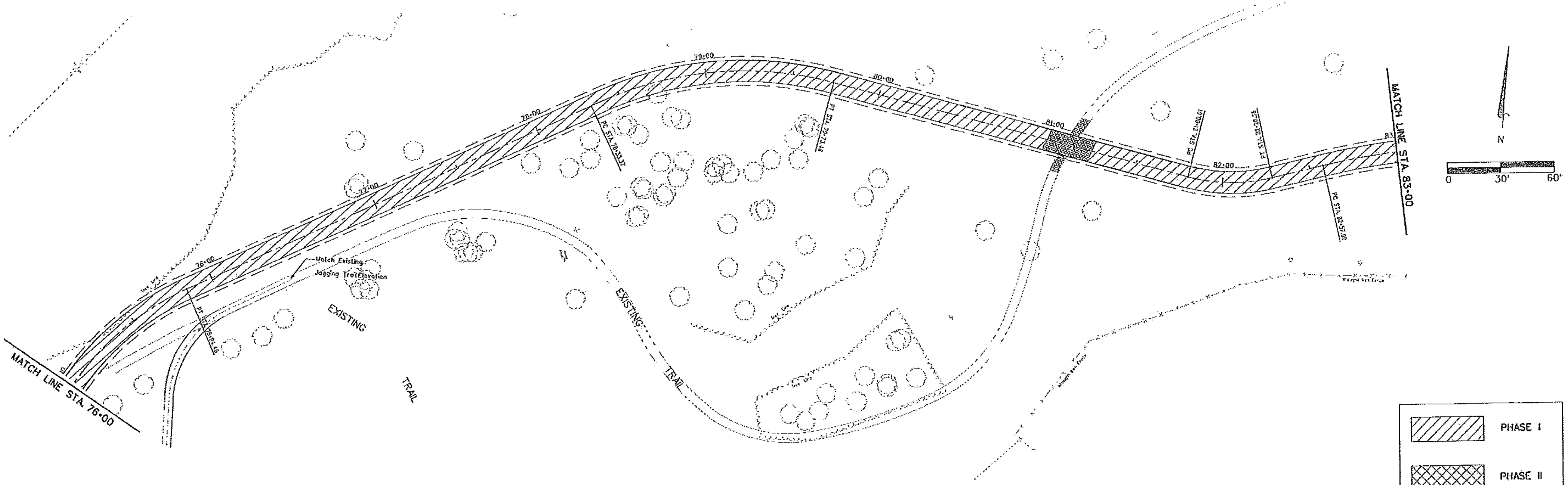
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION SEQUENCE
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED – KN	DRAWN – JB/CC	DATE – MAY 22, 2013	FILE – CONS_SEQ_SHEET 13
APPROVED – TS	CHECKED – KN	SCALE – 1"=20'	SHEET – 13

RECORD AS - BUILT DRAWINGS



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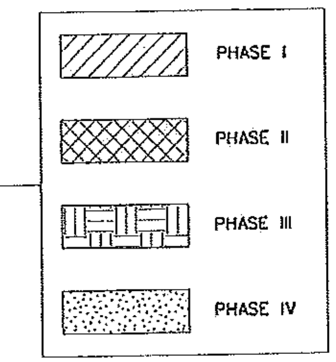
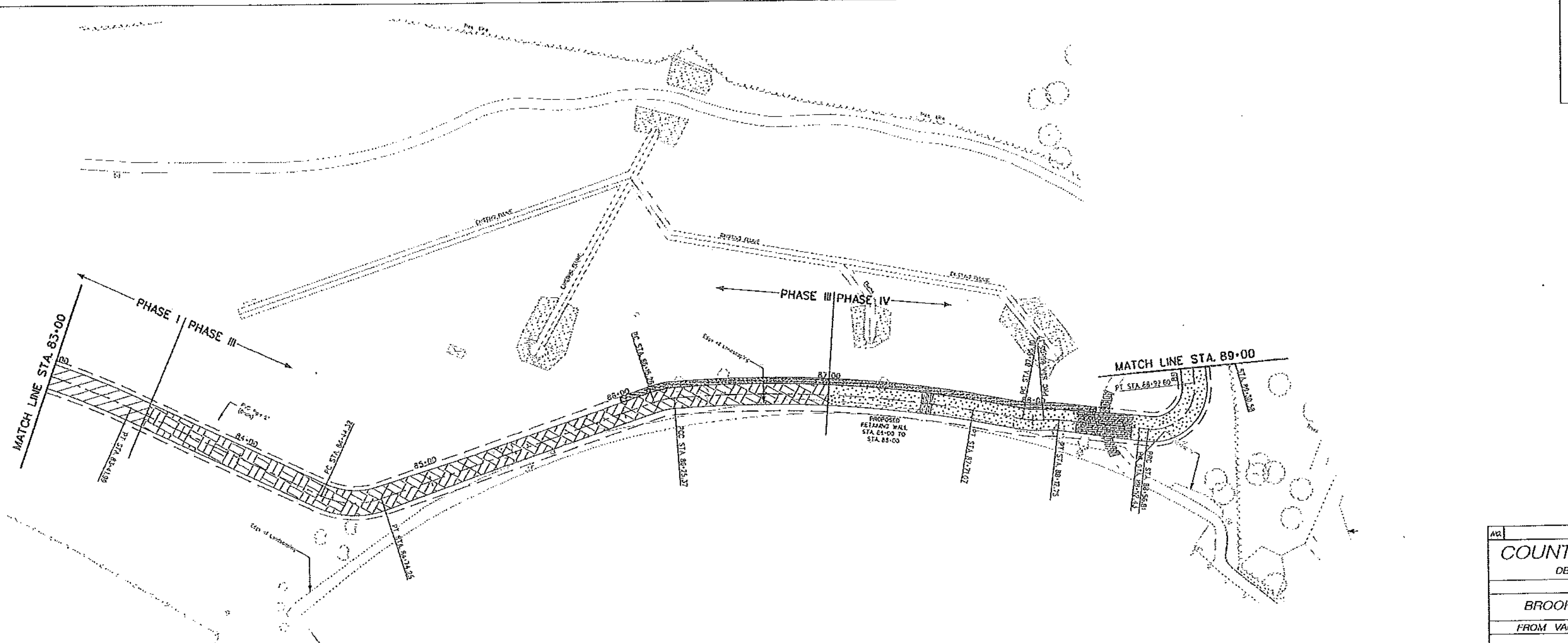
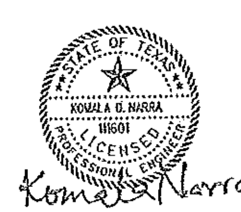




SUGGESTED CONSTRUCTION SEQUENCE



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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION SEQUENCE

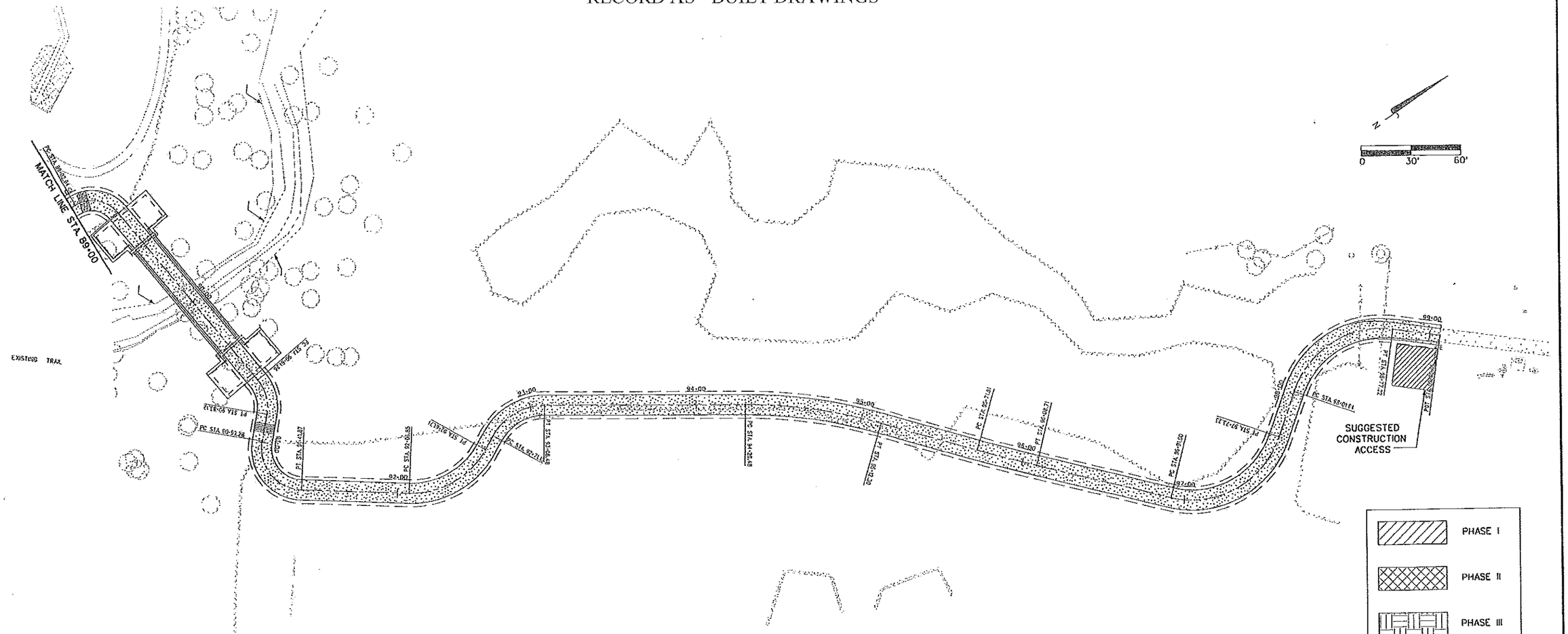
BROOKHAVEN TRAIL CONNECTION

FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL

MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JRXX	DATE: MAY 22, 2013	FILE- CONS_SEQ.SHEET 13
APPROVED - TS	CHECKED - KN	SCALE- 1"=30'	SHEET- 13

RECORD AS - BUILT DRAWINGS



STATE OF TEXAS
KOWLA D. NARRA
111601
LICENSED PROFESSIONAL ENGINEER

Kowla Narra

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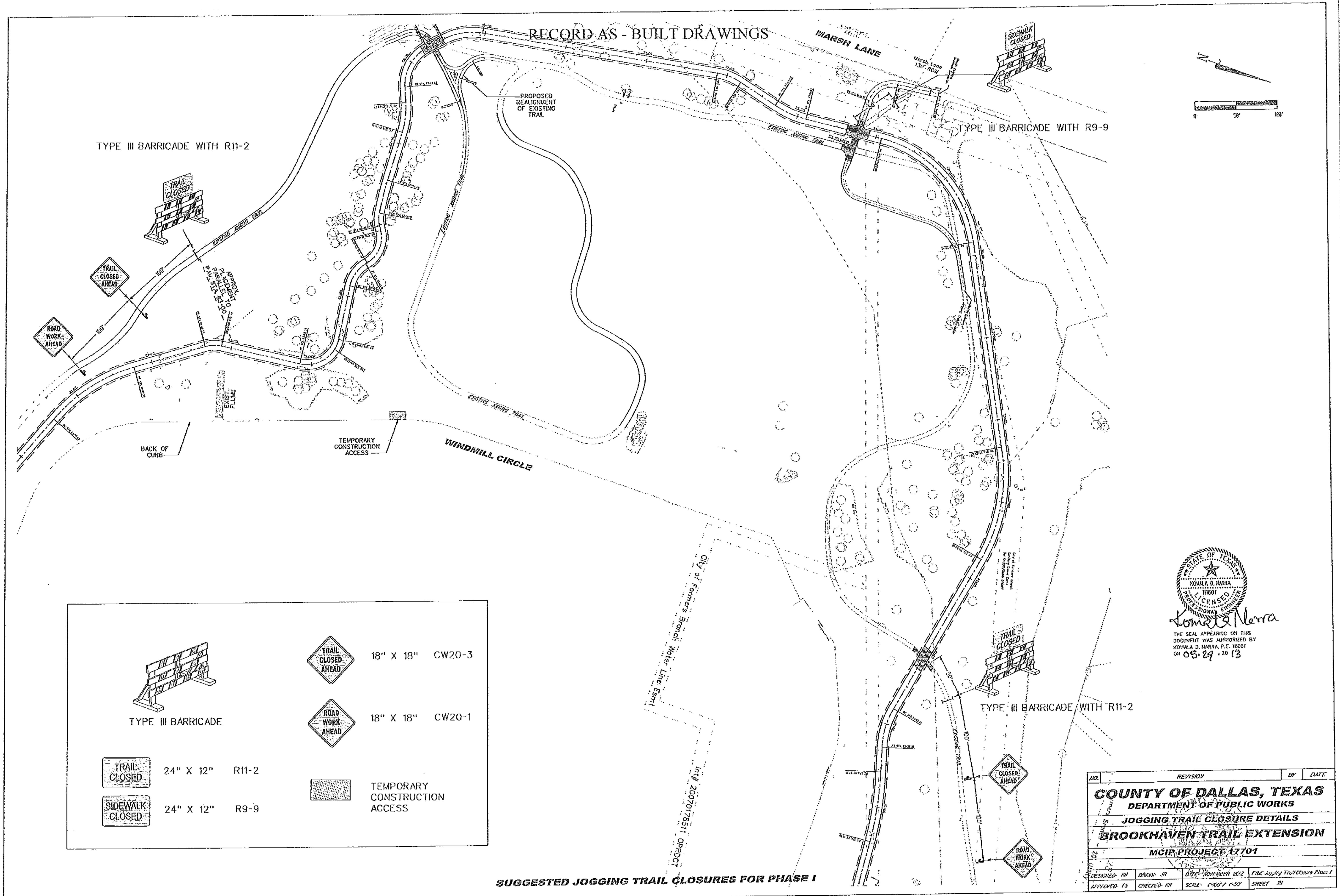
SUGGESTED CONSTRUCTION SEQUENCE

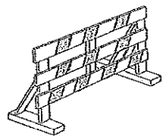
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION SEQUENCE
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KR	DRAWN - RVDS	DATE: May 29, 2013	FILE: CONS_SEQ_SHEET 20
APPROVED - TS	CHECKED - KR	SCALE: 1"=60'	SHEET 20


RECORD AS - BUILT DRAWINGS
MARSH LANE
Marsh Lane 130' ROW
SIDEWALK CLOSED
TYPE III BARRICADE WITH R9-9
TYPE III BARRICADE WITH R11-2
TRAIL CLOSED
TRAIL CLOSED AHEAD
ROAD WORK AHEAD
PROPOSED REALIGNMENT OF EXISTING TRAIL
EXISTING JOGGING TRAIL
APPROX. PLACEMENT PARALLEL TO PAV. STA. 5+00
EXIST. FLUME
BACK OF CURB
TEMPORARY CONSTRUCTION ACCESS
WINDMILL CIRCLE
City of Farmers Branch Water Line Esmt
Inst# 20070178511 OPRDCT
100'
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NARRA, P.E. 111601 ON 05.29.2013
TYPE III BARRICADE
18" X 18" CW20-3
18" X 18" CW20-1
24" X 12" R11-2
24" X 12" R9-9
TEMPORARY CONSTRUCTION ACCESS
SUGGESTED JOGGING TRAIL CLOSURES FOR PHASE I
NO. | REVISION | BY | DATE
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
JOGGING TRAIL CLOSURE DETAILS
BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
DESIGNED- KN | DRAWN- JR | DATE- NOVEMBER 2012 | FILE-Jogging Trail Closure Phase I
APPROVED- TS | CHECKED- KN | SCALE- 1"=100' / 1"=50' | SHEET 21

RECORD AS - BUILT DRAWINGS



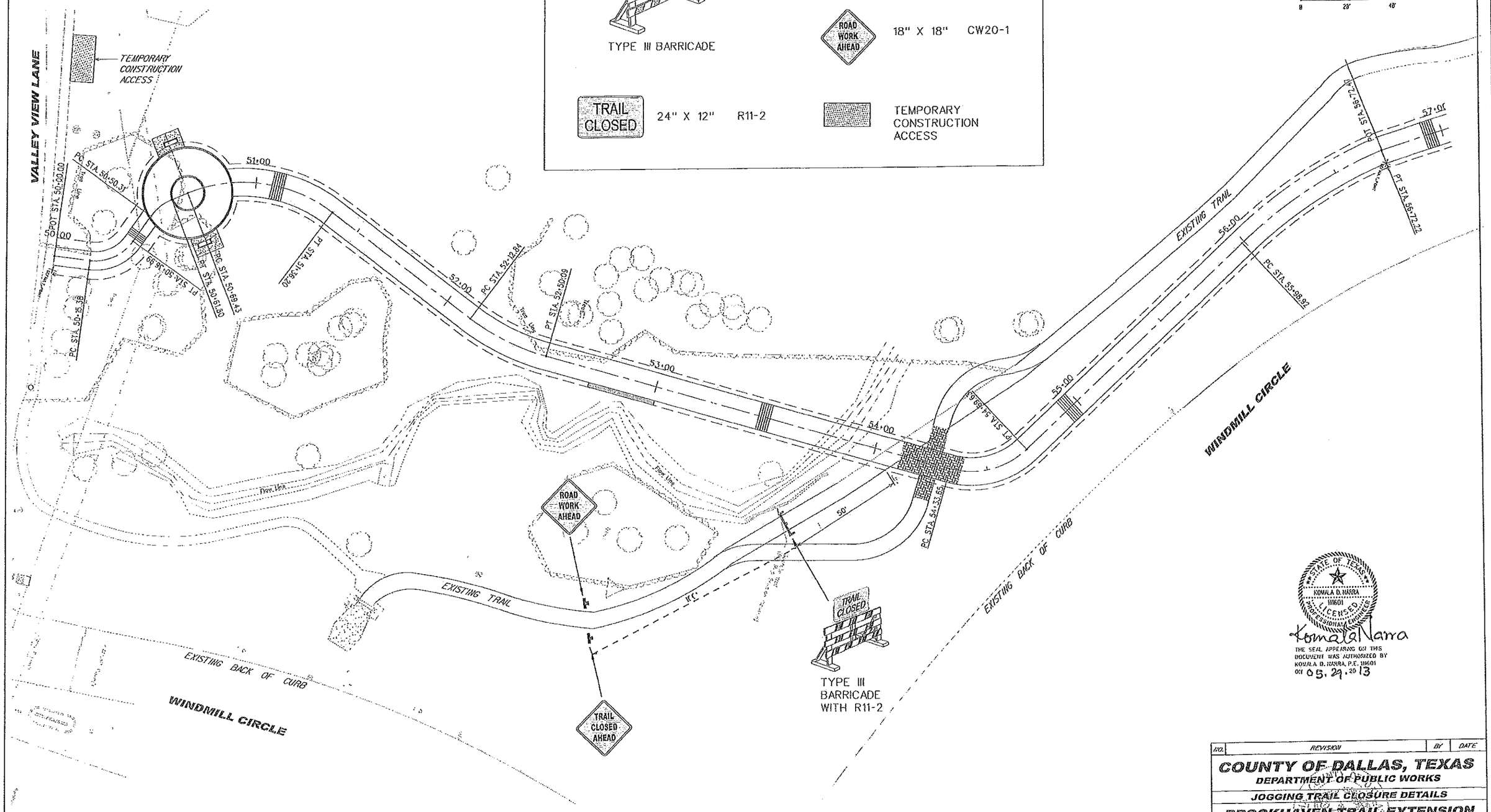
TYPE III BARRICADE

TRAIL CLOSED AHEAD — 18" X 18" CW20-3

ROAD WORK AHEAD — 18" X 18" CW20-1

TRAIL CLOSED — 24" X 12" R11-2

TEMPORARY CONSTRUCTION ACCESS



STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

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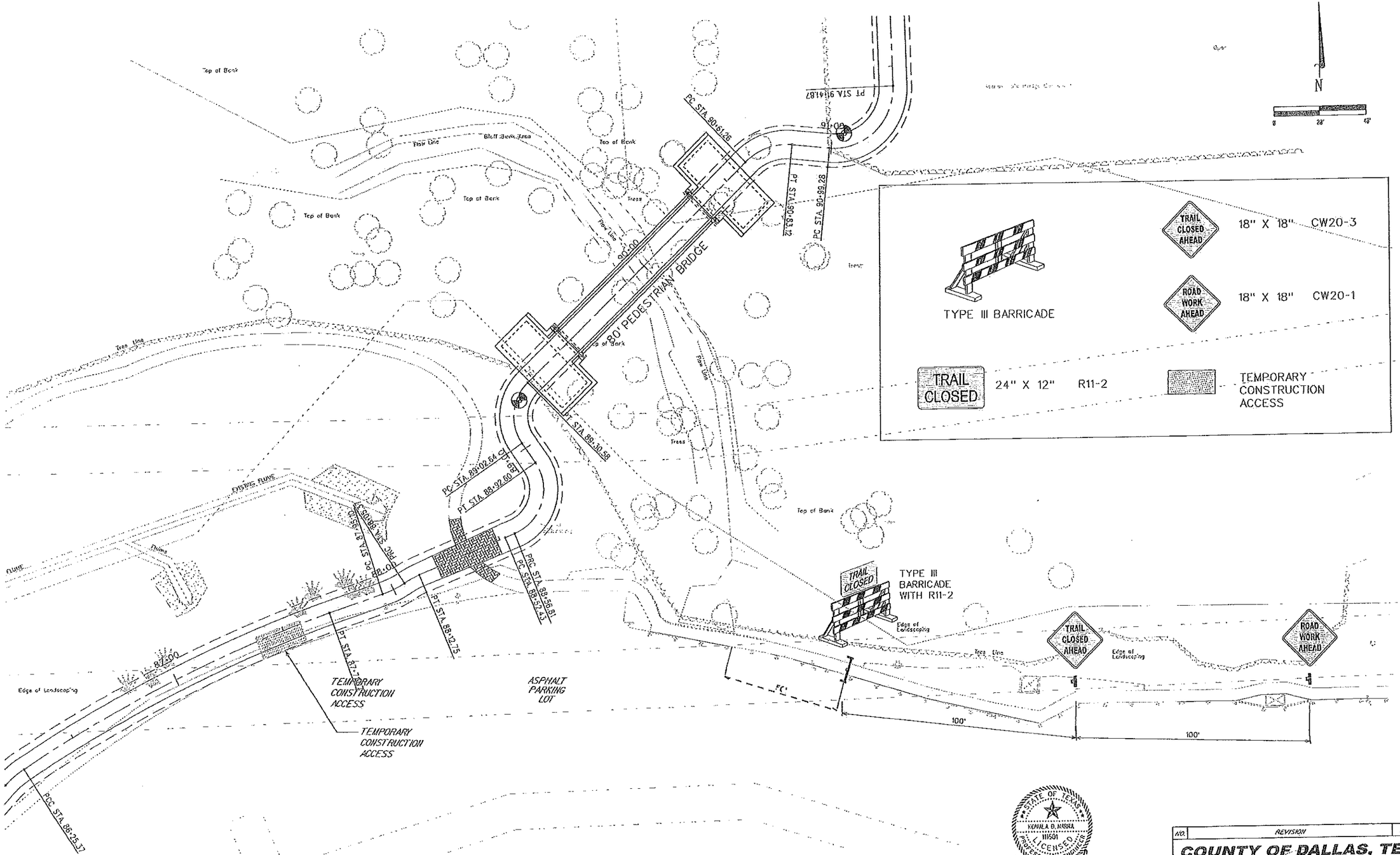
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
JOGGING TRAIL CLOSURE DETAILS
BROOKHAVEN TRAIL EXTENSION
MCIR PROJECT 17701

DESIGNED: KN	DRAWN: JR	DATE: NOVEMBER 2012	FILE: Jogging Trail Closure Phase II
APPROVED: TS	CHECKED: TS	SCALE: 1"=40' / 1"=20'	SHEET 22

SUGGESTED JOGGING TRAIL CLOSURES FOR PHASE II

RECORD AS - BUILT DRAWINGS



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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
JOGGING TRAIL CLOSURE DETAILS
BROOKHAVEN TRAIL EXTENSION
MCIR PROJECT 17701

DESIGNED- KH	DRAWN- SB	DATE- NOVEMBER 2012	FILE- Jogging Trail Closure Phase 3
APPROVED- TS	CHECKED- TS	SCALE- 1"=1' / 1"=20'	SHEET 23

SUGGESTED JOGGING TRAIL CLOSURES FOR PHASE III

RECORD AS - BUILT DRAWINGS

Curve No.	1	2	3	4	5
PC Sta:	STA 50+15.38	STA 50+50.31	STA 50+69.43	STA 52+12.84	STA 54+33.65
PT Sta:	STA 50+36.99	STA 50+61.80	STA 51+36.20	STA 52+50.09	STA 54+69.63
Delta:	-61-54-03	32-55-00	58-51-18	-21-20-46	-58-53-47
Radius:	20.00	20.00	65.00	100.00	35.00
Curve Length:(ft)	21.61	11.49	66.77	37.26	35.98
Chord Length:(ft)	20.57	11.33	63.87	37.04	34.41
Chord Bearing:(ft)	N 43-26-54 W	N 57-56-25 W	N 12-03-16 W	N 06-42-00 E	N 33-25-17 W
Tangent Length:(ft)	11.99	5.91	36.67	18.85	18.78

5 BOLLARDS PLACED 5.0' C-C (SEE BOLLARD DETAIL SHEETS 47 & 48)

One Bollard

PROVIDE PRE-FABRICATED BENCH PER SPECIFICATION

INSTALL RUMBLE WARNING STRIPS STA. 51+10 (SEE DETAIL SHEET 50)

6" THICK PAV. MARK. TY(1) (Y) (BROKEN) (3" STRIPE) (9' SPACING)

TREE PROTECTION FENCE

BEGIN PROJECT STA. 50+00

TIE IN TO ELEV. & MATCH EXIST. SURFACE

CONCRETE SLABS WITH BENCHES (SEE DETAIL SHEET 49)

INSTALL RUMBLE WARNING STRIPS STA. 50+42 (SEE DETAIL SHEET 50)

PROPOSED CENTERLINE

Add 48" High Guardrail & Mow Strip

Delete Guardrail

Delete Retaining Wall

BROOKHAVEN COLLEGE CAMPUS

FINAL PLAT DCCCD BROOKHAVEN COLLEGE ADDITION INST. NO. 200900266486 (OPRDCT)

REMOVE EXISTING TRAIL

STAMPED CONCRETE 'BRICK' PATTERN

INSTALL RUMBLE WARNING STRIPS STA. 54+95 (SEE DETAIL SHEET 50)

SEE TXDOT STANDARD SHEET MBGF-03A

INSTALL RUMBLE WARNING STRIPS STA. 53+50 (SEE DETAIL SHEET 50)

MATCH LINE STA. 55+00

CULVERT 'A' 6' X 3' BOX (SEE DETAIL SHEET 38)

RELOCATE EXISTING SIGNS

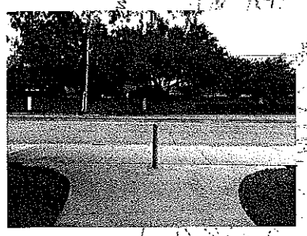
JOGGING TRAIL REALIGNMENT DETAILS SEE SHEET 35

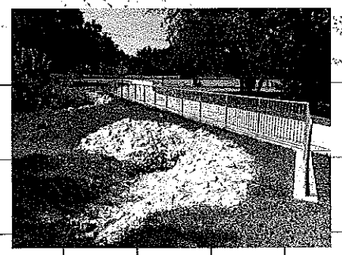
KEY MAP

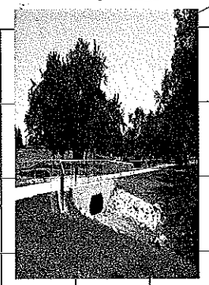
CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS. NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

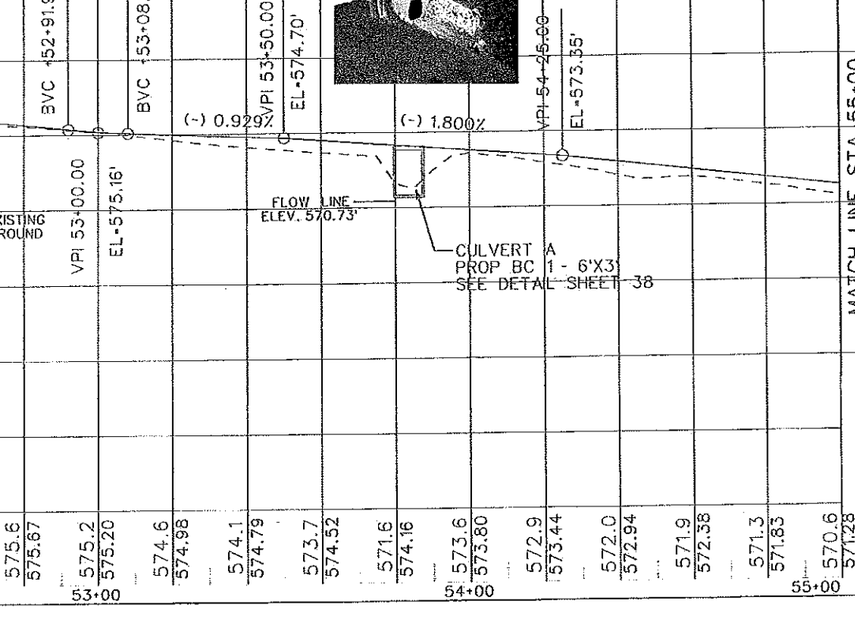
MAXIMUM CROSS SLOPE IS 2% PER ADA. MAXIMUM RUNNING SLOPE IS 5% PER ADA.

Yellow Shaded Areas - Added Grouted Stone Rip Rap









NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 11701

DESIGNED-KN	DRAWN-JR	DATE-01/29/2013	FILE- Plan Sheet 24
APPROVED-TS	CHECKED-KN	SCALE- 1"=40' / 1"=80'	SHEET 24

THE STATE OF TEXAS — KOMALA D. NARSA — 111601 — LICENSED PROFESSIONAL ENGINEER

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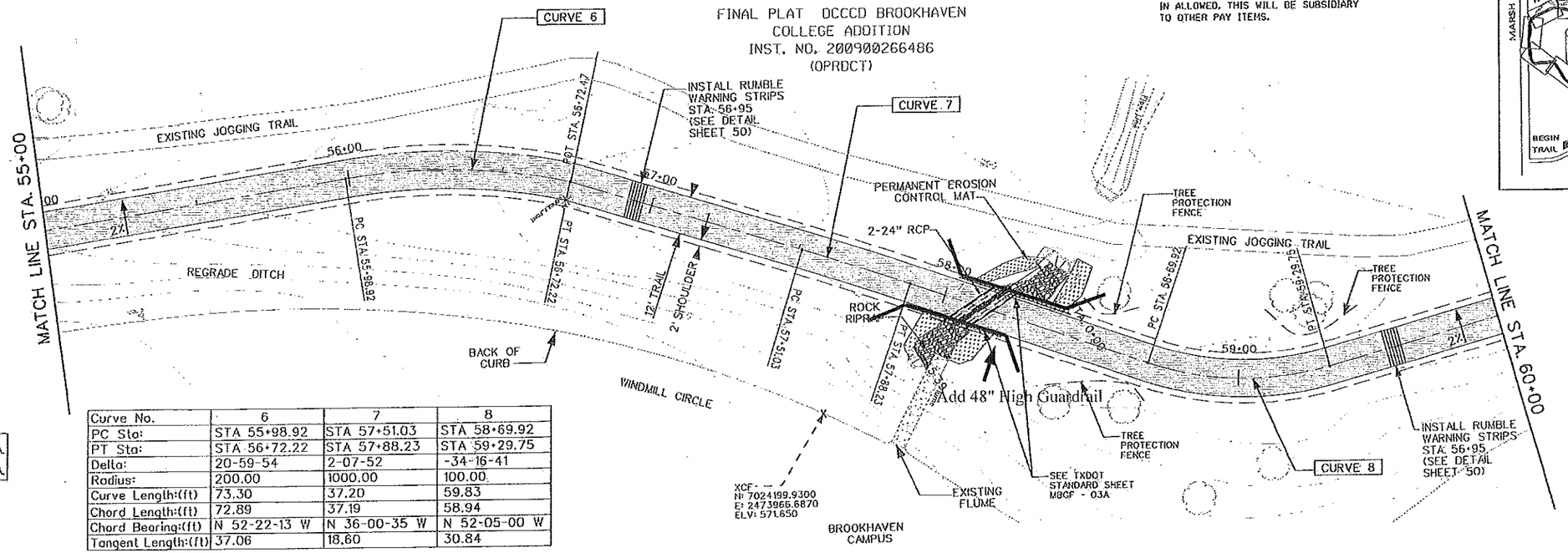
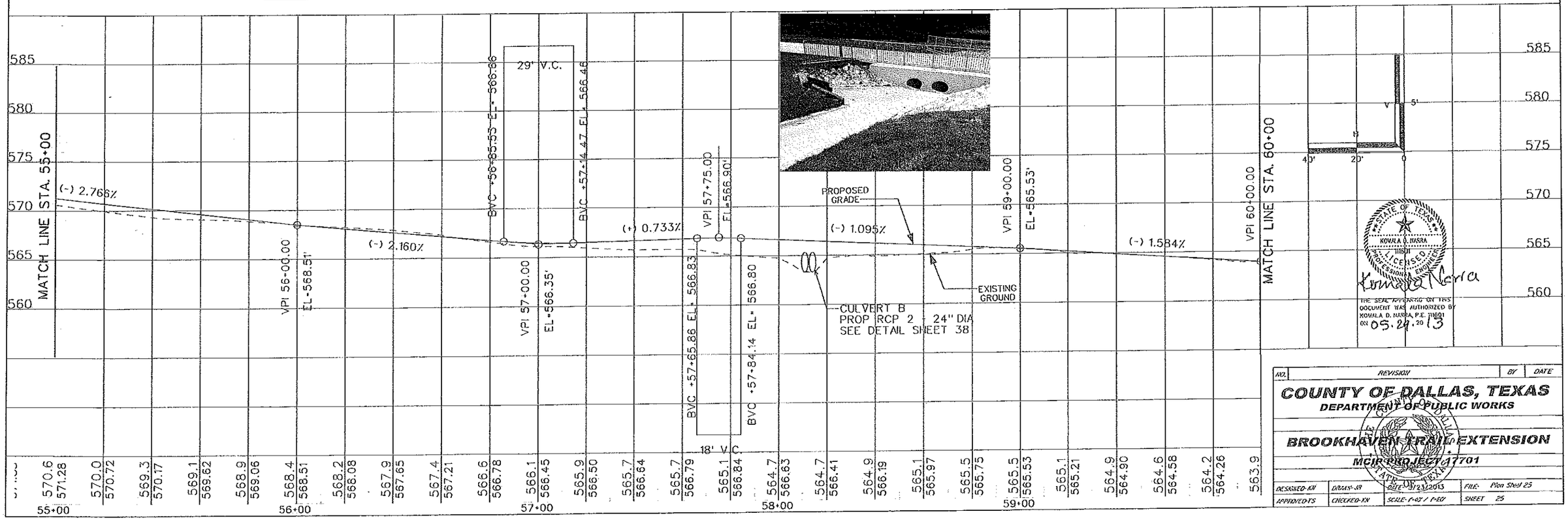
RECORD AS - BUILT DRAWINGS



MAXIMUM CROSS SLOPE IS 2% PER ADA. MAXIMUM RUNNING SLOPE IS 5% PER ADA.

Curve No.	6	7	8
PC Sta:	STA 55+98.92	STA 57+51.03	STA 58+69.92
PT Sta:	STA 56+72.22	STA 57+88.23	STA 59+29.75
Delta:	20-59-54	2-07-52	-34-16-41
Radius:	200.00	1000.00	100.00
Curve Length:(ft)	73.30	37.20	59.83
Chord Length:(ft)	72.89	37.19	58.94
Chord Bearing:(ft)	N 52-22-13 W	N 36-00-35 W	N 52-05-00 W
Tangent Length:(ft)	37.06	18.60	30.84



STATE OF TEXAS
KOWLA D. NASRA
115011
LICENSED PROFESSIONAL ENGINEER
Kowla Nasra
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NO.	REVISION	BY	DATE

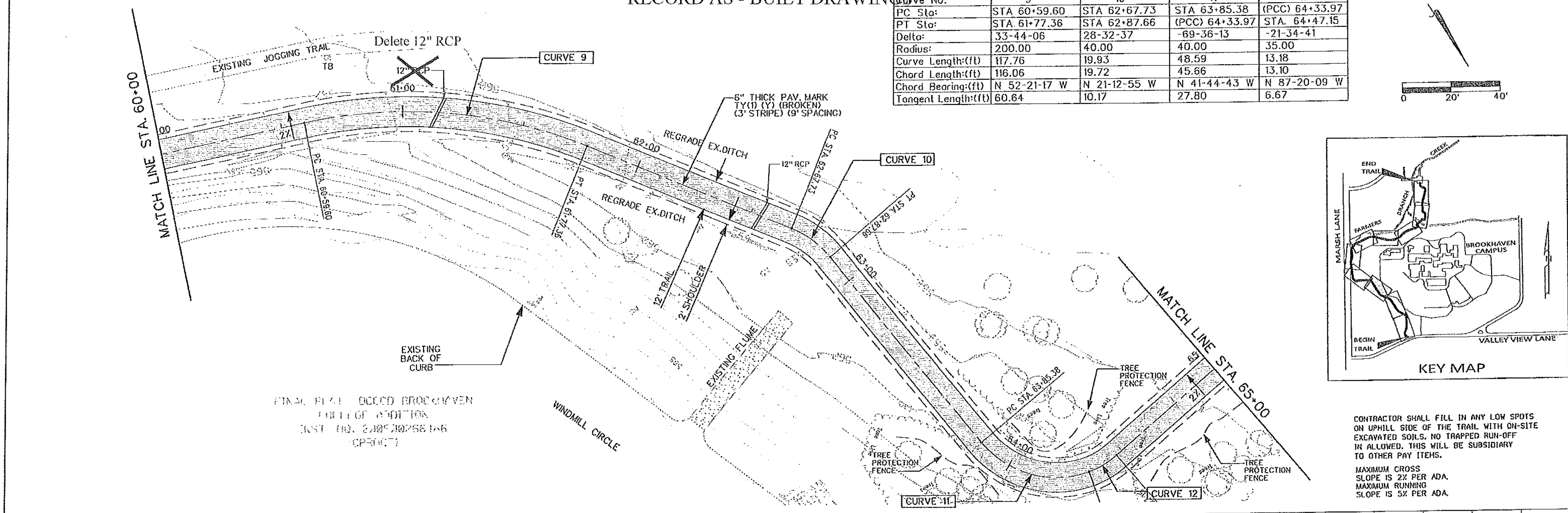
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIR PROJECT: 17701

DESIGNED-KN	DRAWN-KN	DATE: 5/23/2013	FILE: Plan Shed 25
APPROVED-TS	CHECKED-KN	SCALE: 1"=40' / 1"=5'	SHEET 25

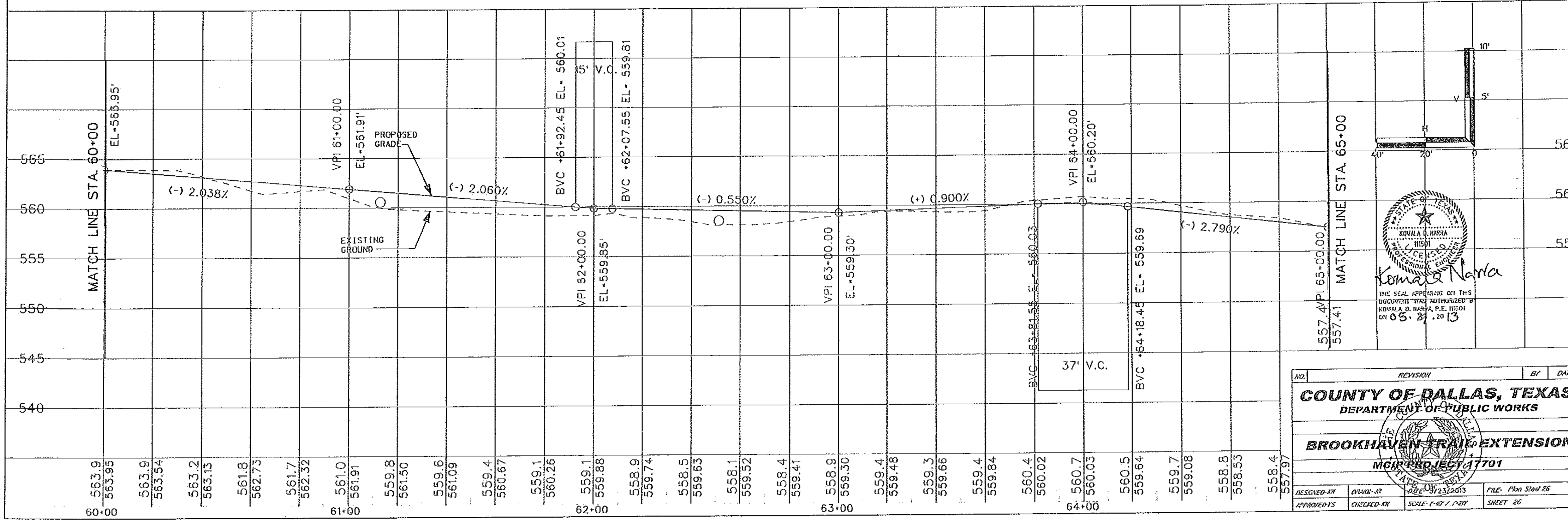
RECORD AS - BUILT DRAWINGS

Curve No.	9	10	11	12
PC Sta:	STA 60+59.60	STA 62+67.73	STA 63+85.38	(PCC) 64+33.97
PT Sta:	STA 61+77.36	STA 62+87.66	(PCC) 64+33.97	STA. 64+47.15
Delta:	33-44-06	28-32-37	-69-36-13	-21-34-41
Radius:	200.00	40.00	40.00	35.00
Curve Length:(ft)	117.76	19.93	48.59	13.18
Chord Length:(ft)	116.06	19.72	45.66	13.10
Chord Bearing:(ft)	N 52-21-17 W	N 21-12-55 W	N 41-44-43 W	N 87-20-09 W
Tangent Length:(ft)	60.64	10.17	27.80	6.67



CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS. NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

MAXIMUM CROSS SLOPE IS 2% PER ADA.
MAXIMUM RUNNING SLOPE IS 5% PER ADA.



THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOVALA O. NARRA, P.E. 11501 ON 05. 21. 2013

NO.	REVISION	BY	DATE

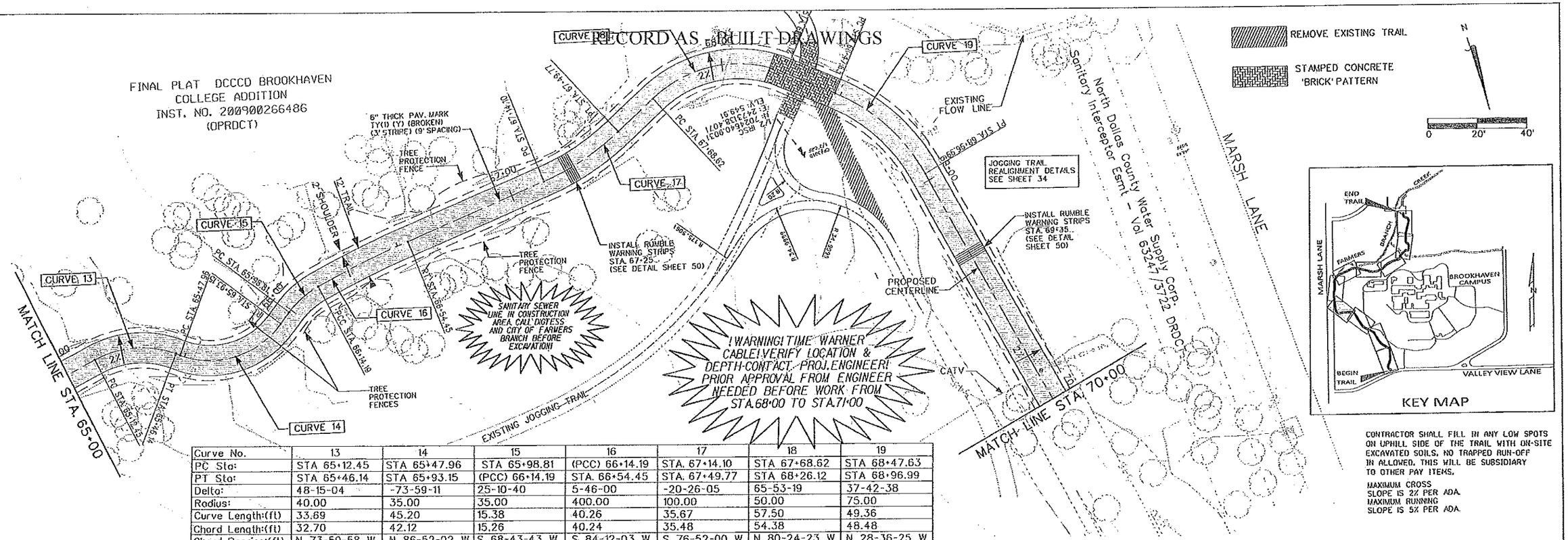
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

DESIGNED-KN	DRAWN-JR	DATE- 5/23/2013	FILE- Plan Sheet 26
APPROVED-TS	CHECKED-KN	SCALE- 1"=40' / 1"=20'	SHEET 26

RECORD AS BUILT DRAWINGS

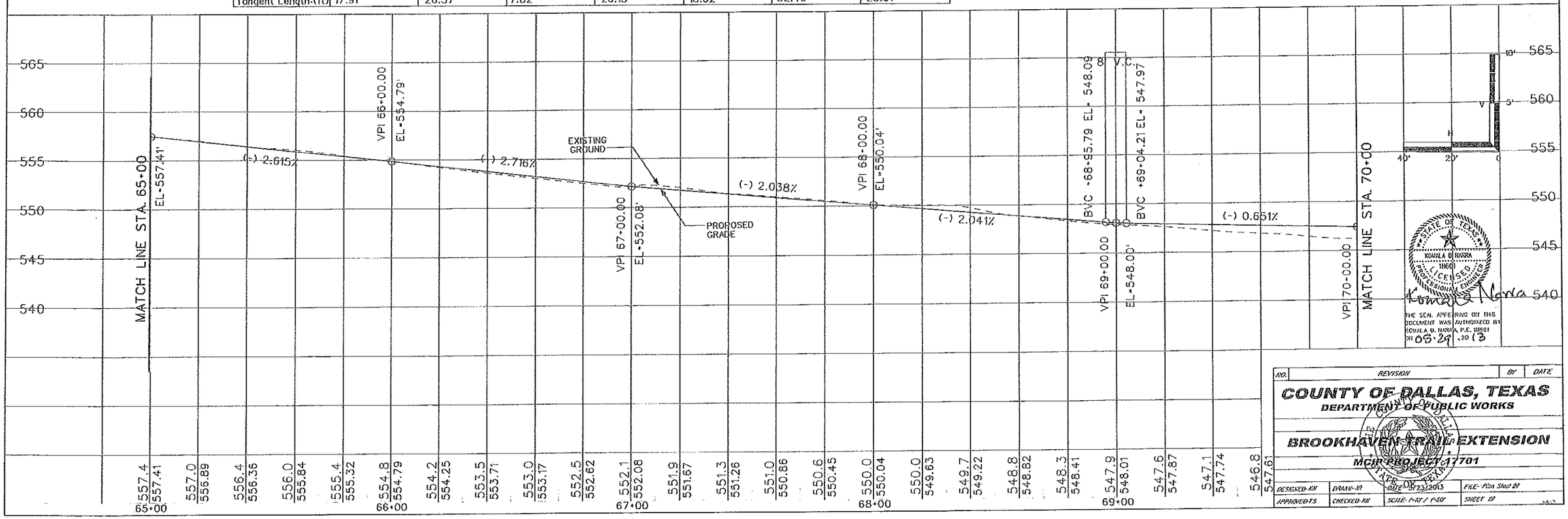
FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. NO. 200900266486
(OPRDCT)



Curve No.	13	14	15	16	17	18	19
PC Sta:	STA 65+12.45	STA 65+47.96	STA 65+98.81	(PCC) 66+14.19	STA. 67+14.10	STA 67+68.62	STA 68+47.63
PT Sta:	STA 65+46.14	STA 65+93.15	(PCC) 66+14.19	STA. 66+54.45	STA. 67+49.77	STA 68+26.12	STA 68+96.99
Delta:	48-15-04	-73-59-11	25-10-40	5-46-00	-20-26-05	65-53-19	37-42-38
Radius:	40.00	35.00	35.00	400.00	100.00	50.00	75.00
Curve Length:(ft)	33.69	45.20	15.38	40.26	35.67	57.50	49.36
Chord Length:(ft)	32.70	42.12	15.26	40.24	35.48	54.38	48.48
Chord Bearing:(ft)	N 73-59-58 W	N 86-52-02 W	S 68-43-43 W	S 84-12-03 W	S 76-52-00 W	N 80-24-23 W	N 28-36-25 W
Tangent Length:(ft)	17.91	26.37	7.82	20.15	18.02	32.40	25.61

CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS, NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

MAXIMUM CROSS SLOPE IS 2% PER ADA.
MAXIMUM RUNNING SLOPE IS 5% PER ADA.



STATE OF TEXAS
KOMLA D. NUKPA
116611
LICENSED PROFESSIONAL ENGINEER
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMLA D. NUKPA, P.E. 116611 ON 05-29-2013

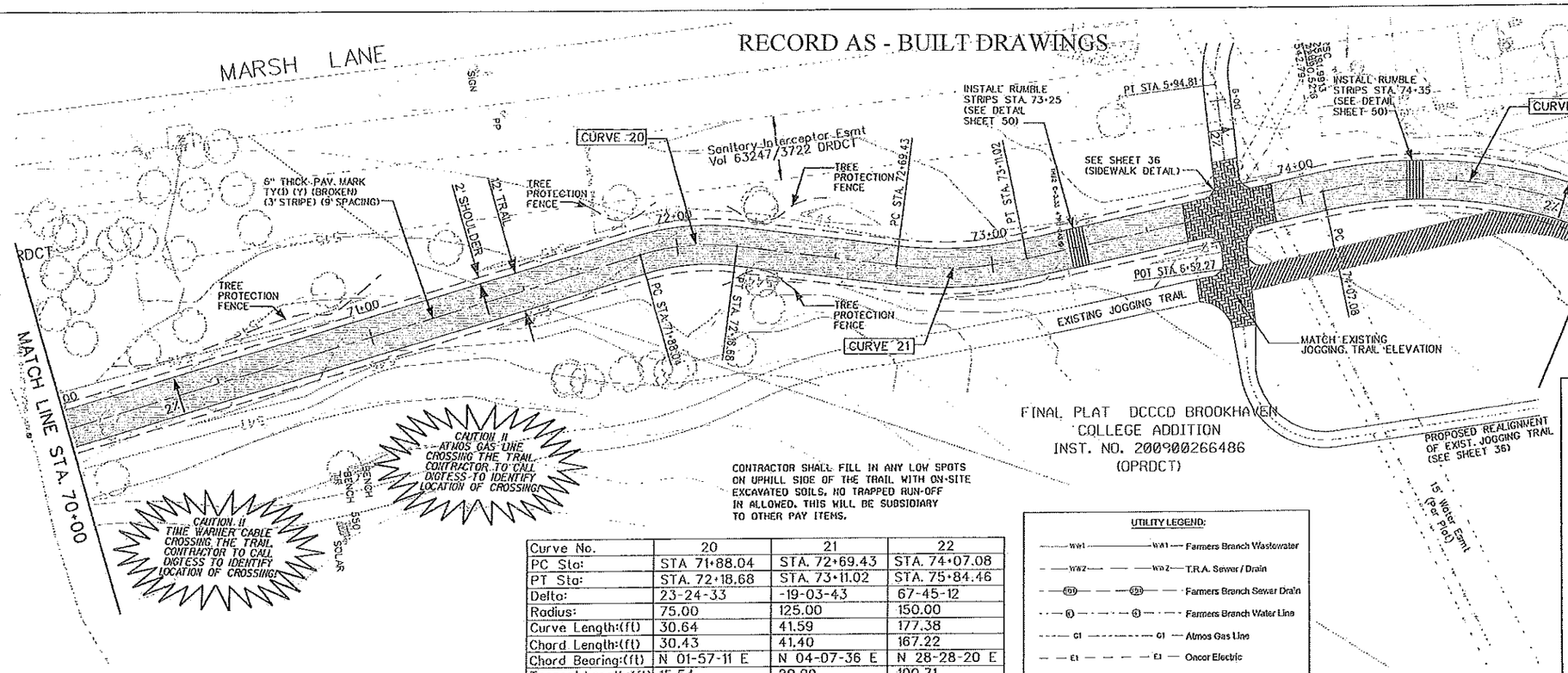
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT # 17701

DESIGNED-KN	DRAWN-KN	DATE- 3/23/2013	FILE- Plan Sheet 27
APPROVED-TS	CHECKED-KN	SCALE- 1"=20' / 1"=50'	SHEET 27

RECORD AS - BUILT DRAWINGS

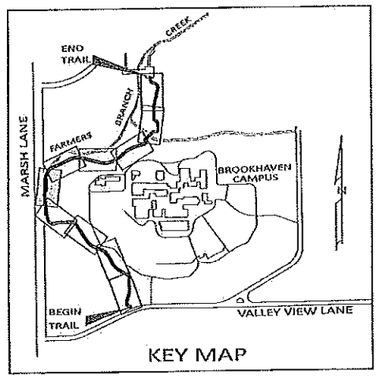


CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS, NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

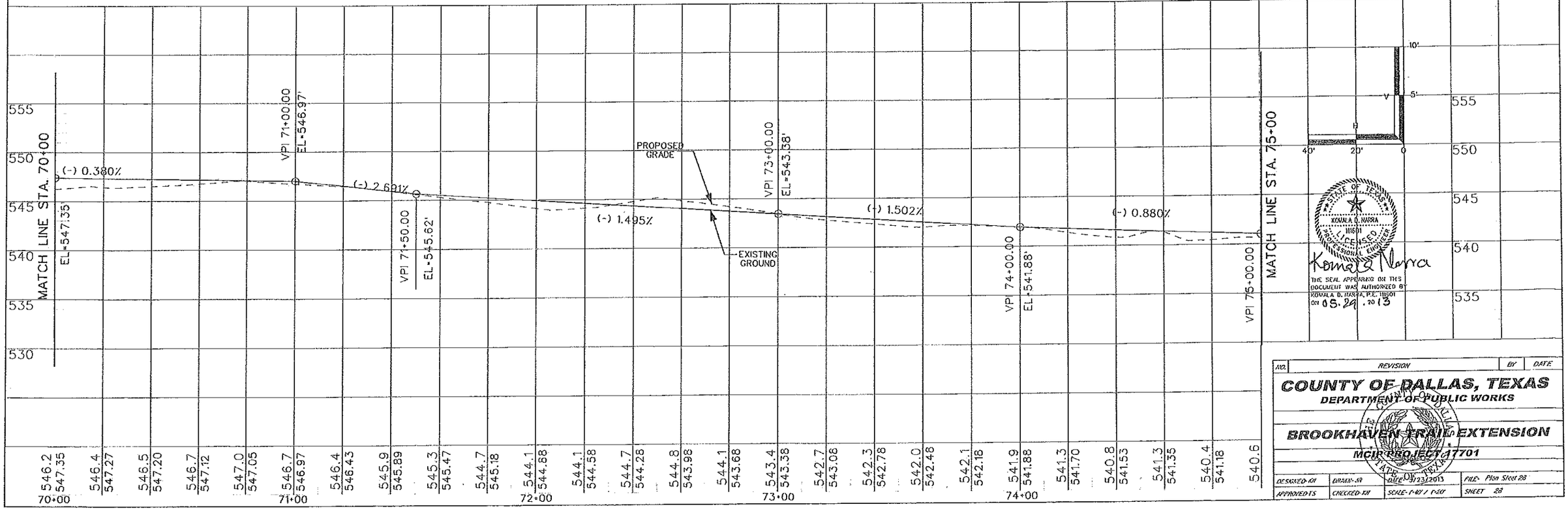
Curve No.	20	21	22
PC Sta:	STA 71+88.04	STA. 72+69.43	STA. 74+07.08
PT Sta:	STA. 72+18.68	STA. 73+11.02	STA. 75+84.46
Delta:	23-24-33	-19-03-43	67-45-12
Radius:	75.00	125.00	150.00
Curve Length:(ft)	30.64	41.59	177.38
Chord Length:(ft)	30.43	41.40	167.22
Chord Bearing:(ft)	N 01-57-11 E	N 04-07-36 E	N 28-28-20 E
Tangent Length:(ft)	15.54	20.99	100.71

UTILITY LEGEND:

- WW1 — WW1 — Farmers Branch Wastewater
- WW2 — WW2 — T.R.A. Sewer / Drain
- SD1 — SD2 — Farmers Branch Sewer Drain
- W — W — Farmers Branch Water Line
- G1 — G1 — Atmos Gas Line
- E1 — E1 — Oncor Electric



KEY MAP



NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

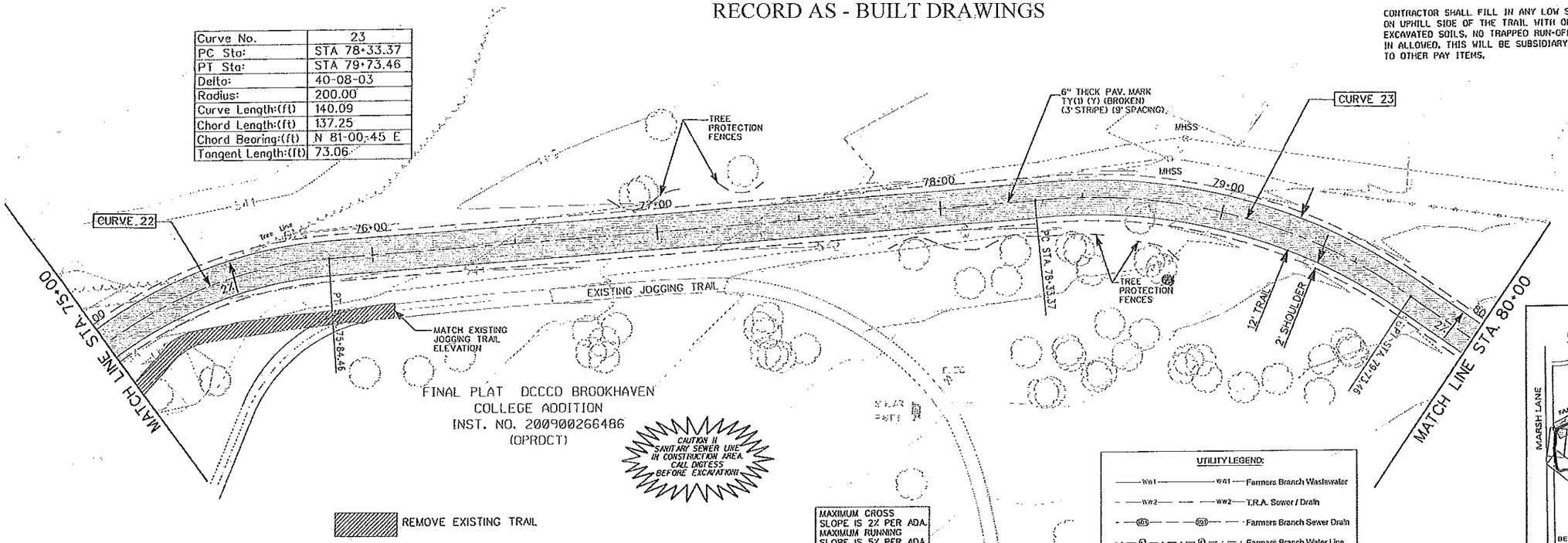
BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

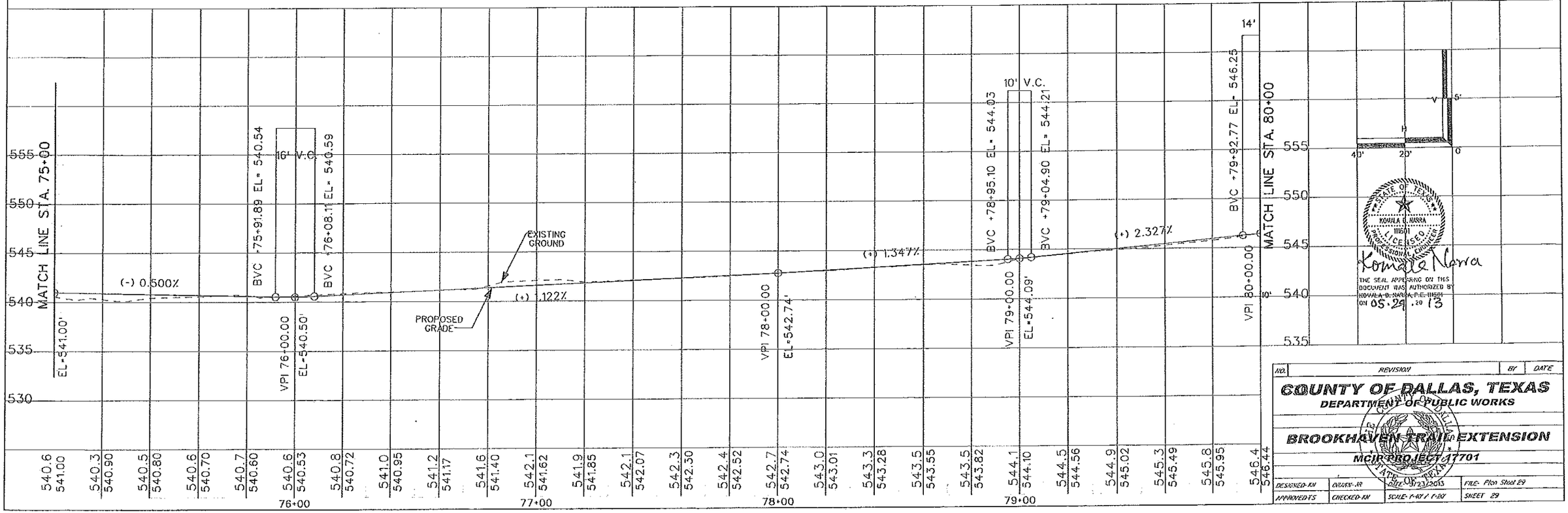
DESIGNED-KN	DRAWN-KN	DATE- 5/23/2013	FILE- Plan Sheet 28
APPROVED TS	CHECKED-KN	SCALE- 1"=40' / 1"=10'	SHEET 28

RECORD AS - BUILT DRAWINGS

Curve No.	23
PC Sta:	STA 78+33.37
PT Sta:	STA 79+73.46
Delta:	40-08-03
Radius:	200.00
Curve Length:(ft)	140.09
Chord Length:(ft)	137.25
Chord Bearing:(ft)	N 81-00-45 E
Tangent Length:(ft)	73.06

CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS, NO TRAPPED RUN-OFF IN ALLOWED, THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.





THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA B. NARRA, P.E. 111501 ON 05.29.2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

DESIGNED-KN	DRAWN-JR	DATE: 5/23/2013	FILE: Plan Sheet 29
APPROVED-TS	CHECKED-KN	SCALE: 1"=40' / 1"=80'	SHEET 29

RECORD AS - BUILT DRAWINGS

City of Farmers Branch
Sanitary Sewer Esmt
Vol 94226/2565 DRDCT

Sanitary Sewer Esm.
Vol 94226/2565 DRD

MATCH LINE STA. 80+00

CAUTION ! CONTRACTOR TO VERIFY THE LOCATION OF UTILITIES BEFORE DIGGING

SIGN

EXISTING JOGGING TRAIL

TB

1/2 IRSC
NORTHING: 7025512
EASTING: 2473760

FLOODWAY EASEMENT

INSTALL RUMBLE STRIPS STA. 80+60.0 (SEE DETAIL SHEET 50)

6" THICK PAV. MARK TY(1) (Y) (BROKEN) (3" STRIPE) (9' SPACING)

PC STA. 81+80.01

PT STA. 82+28.35

RETENTION POND

INSTALL RUMBLE STRIPS STA. 81+60.0 (SEE DETAIL SHEET 50)

15' Water Easement (Per Plat)

PVC Pipe 2" (Drain)

PC STA. 82+57.69

PT STA. 83+41.99

PC STA. 84+44.32

PT STA. 84+74.25

MATCH LINE STA. 85+00

CURVE 24

CURVE 25

CURVE 26

12' TRAIL

2' SHOULDER

Edge of Landscaping

PARKING LOT

EDGE OF EXISTING ASPHALT PAVEMENT

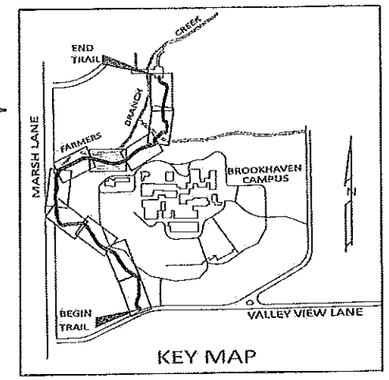
Wrought Iron Fence

CAUTION ! SANITARY SEWER WATER LINES IN CONSTRUCTION AREA CONTRACTOR TO CALL DIGTESS BEFORE CONSTRUCTION!!

CAUTION ! BURIED ELECTRIC LINES IN CONSTRUCTION AREA CONTRACTOR TO CALL DIGTESS BEFORE CONSTRUCTION!!

CAUTION ! ONCOR BURIED CABLE CROSSING! CONTRACTOR TO VERIFY LOCATIONS AND DEPTH BEFORE EXCAVATION CALL DIGTESS!!

N
0 20' 40'



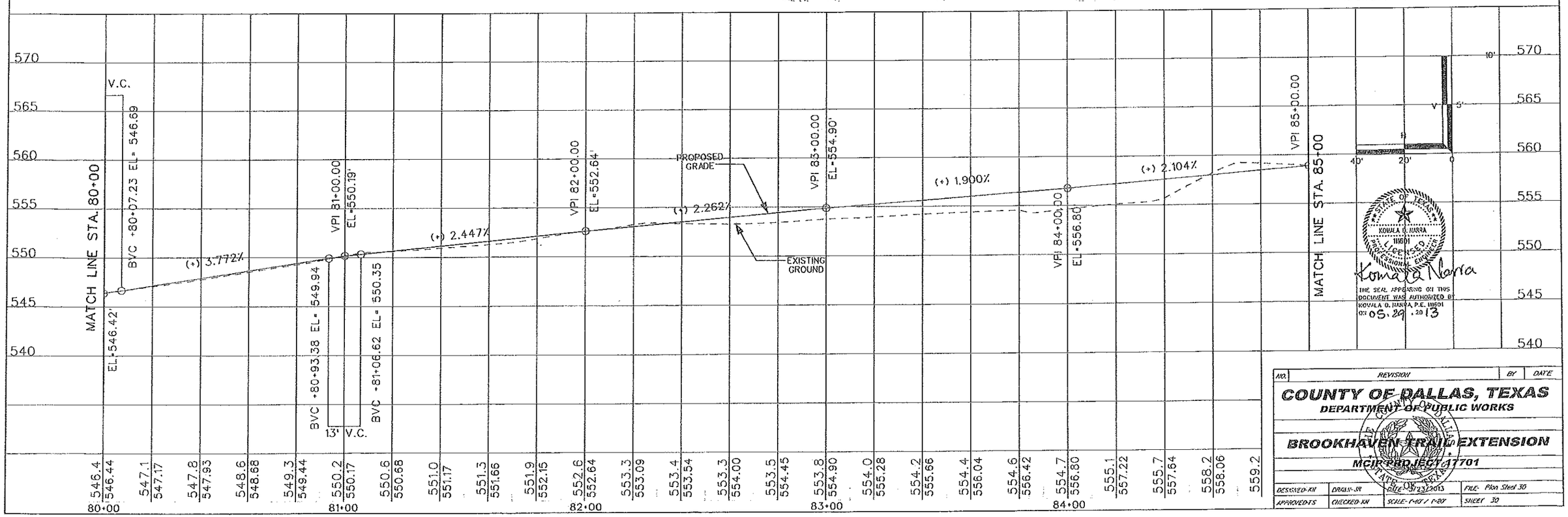
KEY MAP

CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS. NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

UTILITY LEGEND:

- FW1 — Farmers Branch Wastewater
- FW2 — T.R.A. Sewer / Drain
- SD1 — Farmers Branch Sewer Drain
- W — Farmers Branch Water Line
- G1 — Atmos Gas Line
- E1 — Oncor Electric

Curve No.	24	25	26
PC Sta:	STA 81+80.01	STA 82+57.69	STA. 84+44.32
PT Sta:	STA 82+28.35	STA. 83+41.99	STA. 84+74.25
Delta:	-27-41-39	12-04-31	-42-52-46
Radius:	100.00	400.00	40.00
Curve Length:(ft)	48.34	84.30	29.94
Chord Length:(ft)	47.87	84.14	29.24
Chord Bearing:(ft)	N 87-13-57 E	N 79-25-23 E	N 64-01-15 E
Tangent Length:(ft)	24.65	42.31	15.71



NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 11701

DESIGNED-KH	DRAWN-JR	DATE: 5/23/2013	FILE: Plan Sheet 30
APPROVED:S	CHECKED-KH	SCALE: 1"=40' / 1"=20'	SHEET 30

RECORD AS - BUILT DRAWINGS

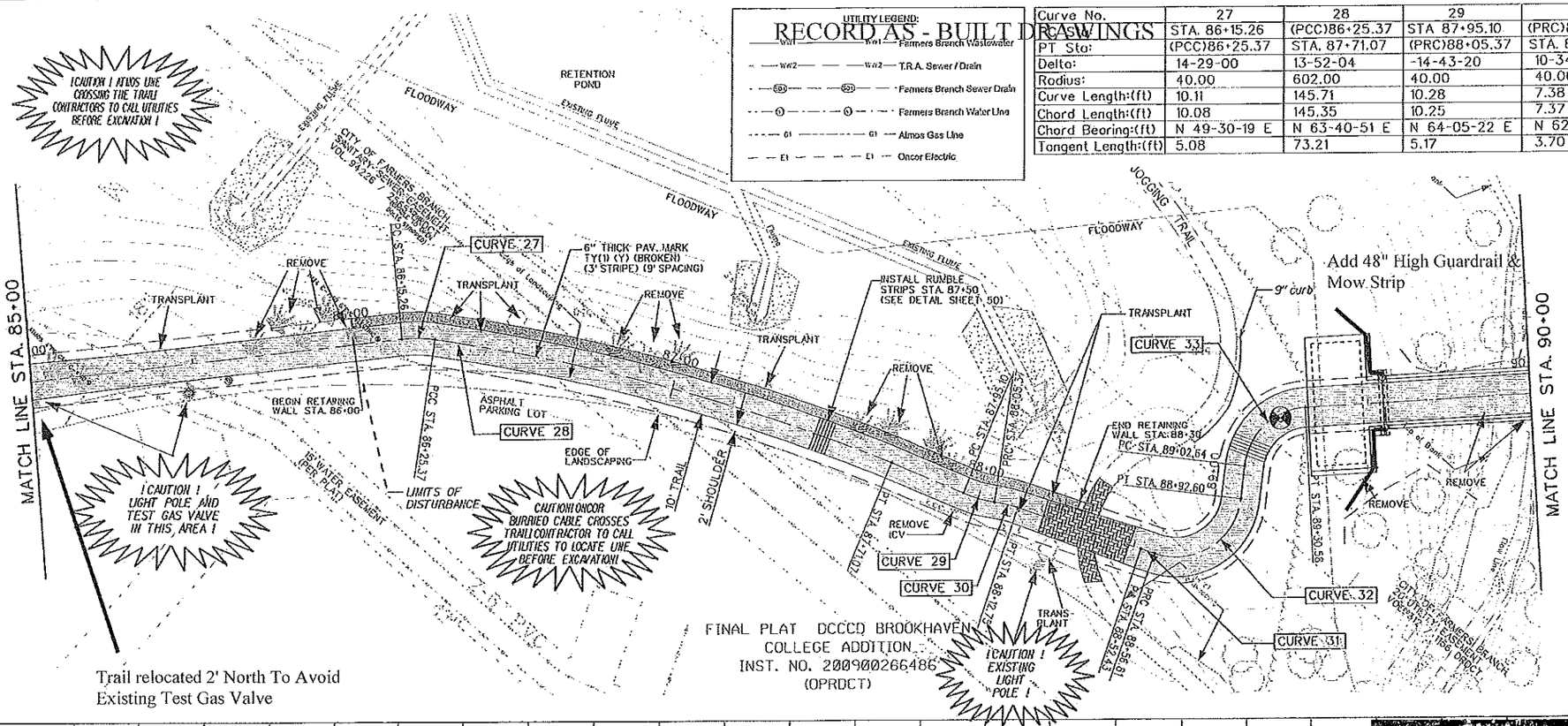
Curve No.	27	28	29	30	31	32	33
PT Sta:	(PCC)86+25.37	STA. 87+71.07	(PRC)88+05.37	STA. 88+12.75	(PRC)88+56.81	STA. 88+92.60	STA 89+30.58
Delta:	14-29-00	13-52-04	-14-43-20	10-34-02	0-37-40	-102-31-04	80-02-40
Radius:	40.00	602.00	40.00	40.00	400.00	20.00	20.00
Curve Length:(ft)	10.11	145.71	10.28	7.38	4.38	35.79	27.94
Chord Length:(ft)	10.08	145.35	10.25	7.37	4.38	31.20	25.72
Chord Bearing:(ft)	N 49-30-19 E	N 63-40-51 E	N 64-05-22 E	N 62-00-41 E	N 67-36-31 E	N 16-39-49 E	N 05-25-37 E
Tangent Length:(ft)	5.08	73.21	5.17	3.70	2.19	24.93	16.80

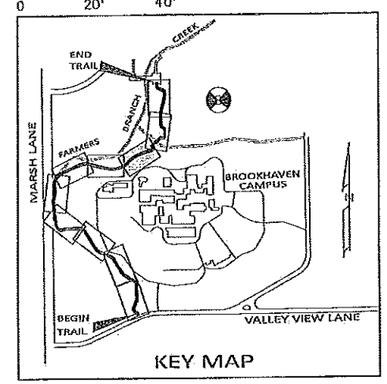
UTILITY LEGEND:
- WW1 — WW1 — Farmers Branch Wastewater
- WW2 — WW2 — T.R.A. Sewer / Drain
- SD — SD — Farmers Branch Sewer Drain
- W — W — Farmers Branch Water Line
- G1 — G1 — Atmos Gas Line
- E1 — E1 — Oncor Electric

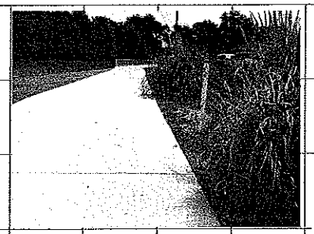
CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS. NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

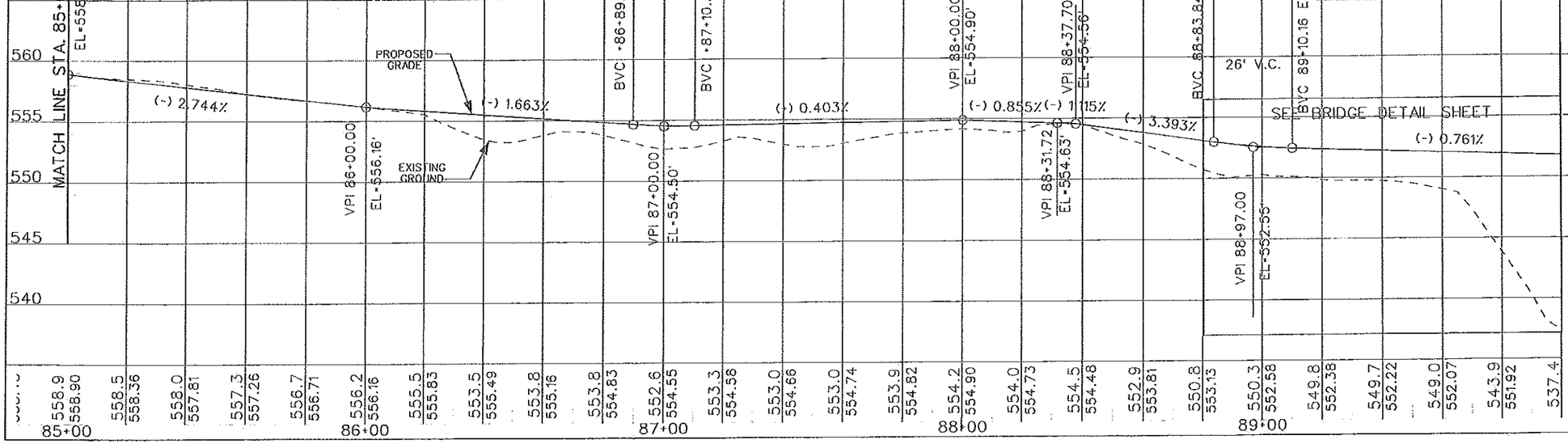
MAXIMUM CROSS SLOPE IS 2% PER ADA. MAXIMUM RUNNING SLOPE IS 5% PER ADA.

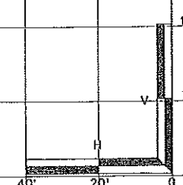
REMOVE EXISTING IRRIGATION SYSTEM PLUG THE WATER MAIN DETENTION POND. BEFORE REMOVING GET APPROVAL FROM ENGINEER AND COLLEGE AUTHORITIES.











STATE OF TEXAS
KOVALA D. NARRA
111501
LICENSED PROFESSIONAL ENGINEER
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOVALA D. NARRA, P.E. 111501 ON 05.29.2013

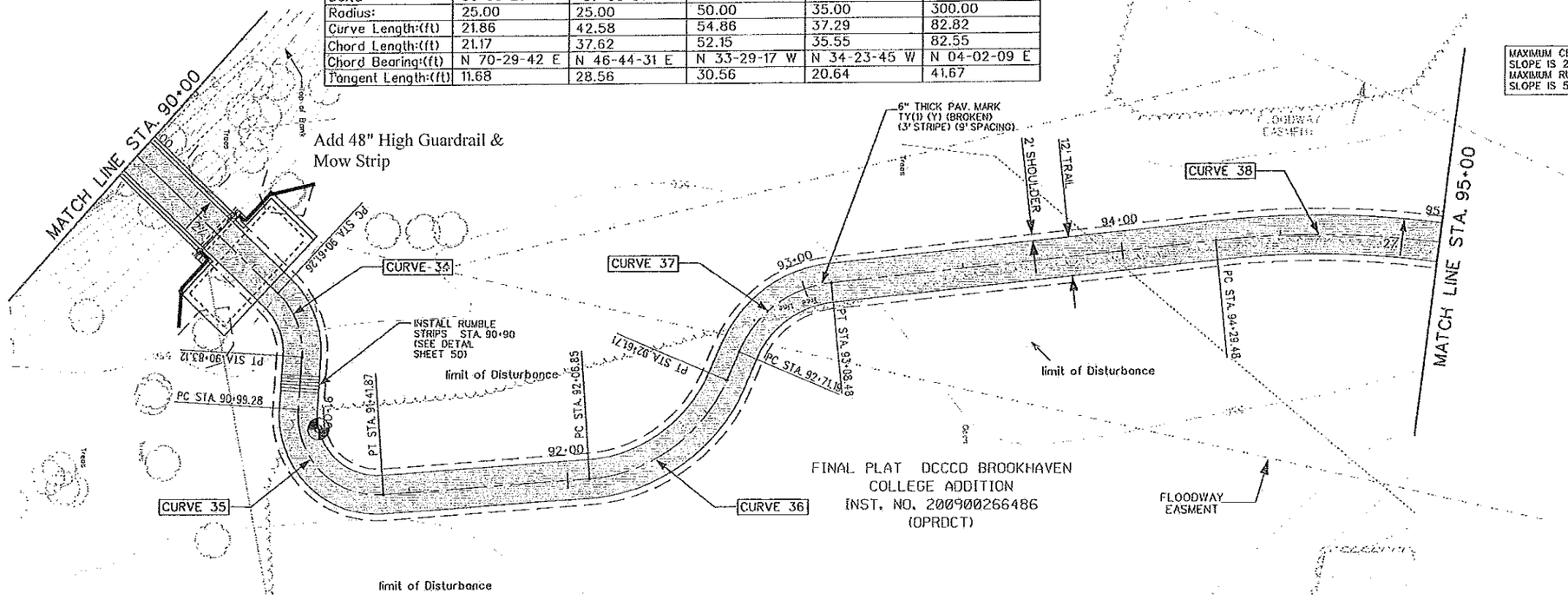
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

DESIGNED-KN	DRAWN-JR	DATE: 5/29/2013	FILE- Plan Sheet 31
APPROVED-TS	CHECKED-KN	SCALE: 1"=5' / 1"=20'	SHEET 31

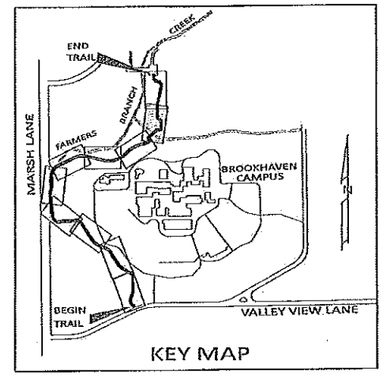
Curve No.	34	35	36	37	38
PC Sta:	STA 90+61.26	STA 90+99.28	STA. 92+05.85	STA. 92+71.19	STA 94+23.48
PT Sta:	STA 90+83.12	STA 91+41.87	STA. 92+61.71	STA. 93+08.48	STA 95+12.30
Delta:	50-05-29	-97-35-51	-62-51-43	61-02-47	15-49-00
Radius:	25.00	25.00	50.00	35.00	300.00
Curve Length:(ft)	21.86	42.58	54.86	37.29	82.82
Chord Length:(ft)	21.17	37.62	52.15	35.55	82.55
Chord Bearing:(ft)	N 70-29-42 E	N 46-44-31 E	N 33-29-17 W	N 34-23-45 W	N 04-02-09 E
Tangent Length:(ft)	11.68	28.56	30.56	20.64	41.67



MAXIMUM CROSS SLOPE IS 2% PER ADA. MAXIMUM RUNNING SLOPE IS 5% PER ADA.

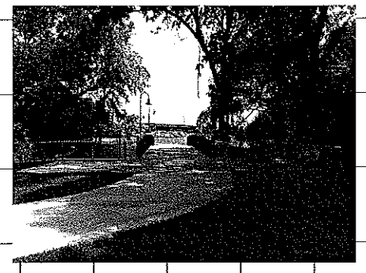
0 20' 40'

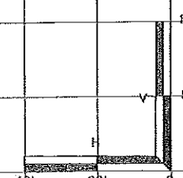
CAUTION! CONTRACTOR TO VERIFY THE LOCATION OF UTILITIES BEFORE EXCAVATION !



KEY MAP

CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS, NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.





THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NARRA, P.E. 111601 ON 05.29.2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

DESIGNED-KN	DRAWN-JR	DATE: 5/29/2013	FILE: Plan Sheet 32
APPROVED-TS	CHECKED-KN	SCALE: 1"=10' / 1"=20'	SHEET 32

RECORD AS - BUILT DRAWINGS

UTILITY LEGEND:

- WW1 — Farmers Branch Wastewater
- WW2 — T.R.A. Sewer / Drain
- SD — Farmers Branch Sewer Drain
- W — Farmers Branch Water Line
- G1 — Atmos Gas Line
- E1 — Oncor Electric

ICAUTION ! CONTRACTOR TO VERIFY THE LOCATION OF UTILITIES BEFORE EXCAVATION !

FINAL PLAT - DCCCD BROOKHAVEN COLLEGE ADDITION INST. NO. 200900266486 (OPRDCT)

MATCH LINE STA. 95+00

Install (2) 24" RCP, Cast In Place Headwalls and Grouted Stone Rip Rap (See Sheet 38A for Culvert "C" Detail)

CURVE 39 · CURVE 40 · CURVE 41

PC STA 95+71.81 · PT STA 96+08.71 · PC STA 96+91.90 · PT STA 97+73.23 · PC STA 98+01.64 · PT STA 98+77.22 · POT STA 99+06.01

6" THICK PAV. MARK TY(I) (Y)-(BROKEN) (3" STRIPE) (9' SPACING)

2' TRAIL · 2' SHOULDER · 20' TX POWER & LIGHT EASEMENT

TIE PROPOSED TRAIL TOP ELEVATION TO EXISTING VITRUVIAN TRAIL ELEVATION.

Raise Two Existing Manholes

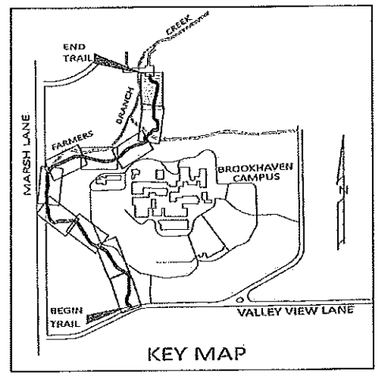
ICAUTION ! OVERHEAD ELECTRICAL & BURIED ELECTRIC LINES! CONTRACTOR TO USE EXTRA CAUTION/CAL DIGTESS TO LOCATE LINES BEFORE CONSTRUCTION!

CONTRACTOR SHALL FILL IN ANY LOW SPOTS ON UPHILL SIDE OF THE TRAIL WITH ON-SITE EXCAVATED SOILS. NO TRAPPED RUN-OFF IN ALLOWED. THIS WILL BE SUBSIDIARY TO OTHER PAY ITEMS.

MAXIMUM CROSS SLOPE IS 2% PER ADA. MAXIMUM RUNNING SLOPE IS 5% PER ADA.

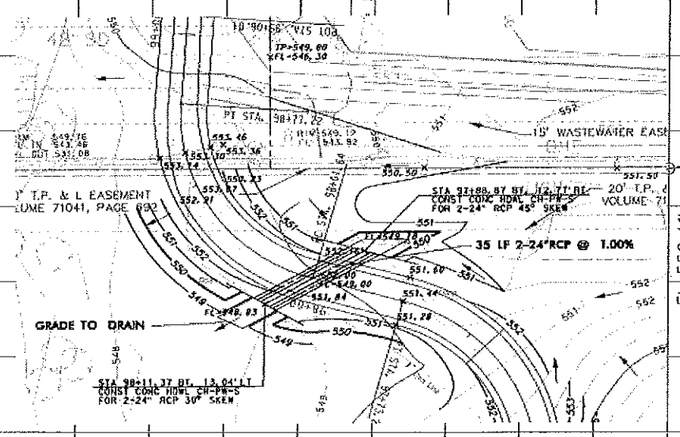
N

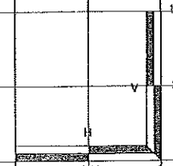
0 20' 40'



KEY MAP

Curve No.	39	40	41
PC Sta:	STA 95+71.81	STA 96+91.90	STA 98+01.64
PT Sta:	STA 96+08.71	STA 97+73.23	STA 98+77.22
Delta:	-2-06-51	-84-43-29	78-43-49
Radius:	1000.00	55.00	55.00
Curve Length:(ft)	36.90	81.33	75.58
Chord Length:(ft)	36.90	74.12	69.77
Chord Bearing:(ft)	N 10-53-13 E	N 32-31-57 W	N 35-31-47 W
Tangent Length:(ft)	18.45	50.16	45.12





Komala Narra

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOMALA D. NARRA, P.E. 111601 ON 05 · 29 · 2013

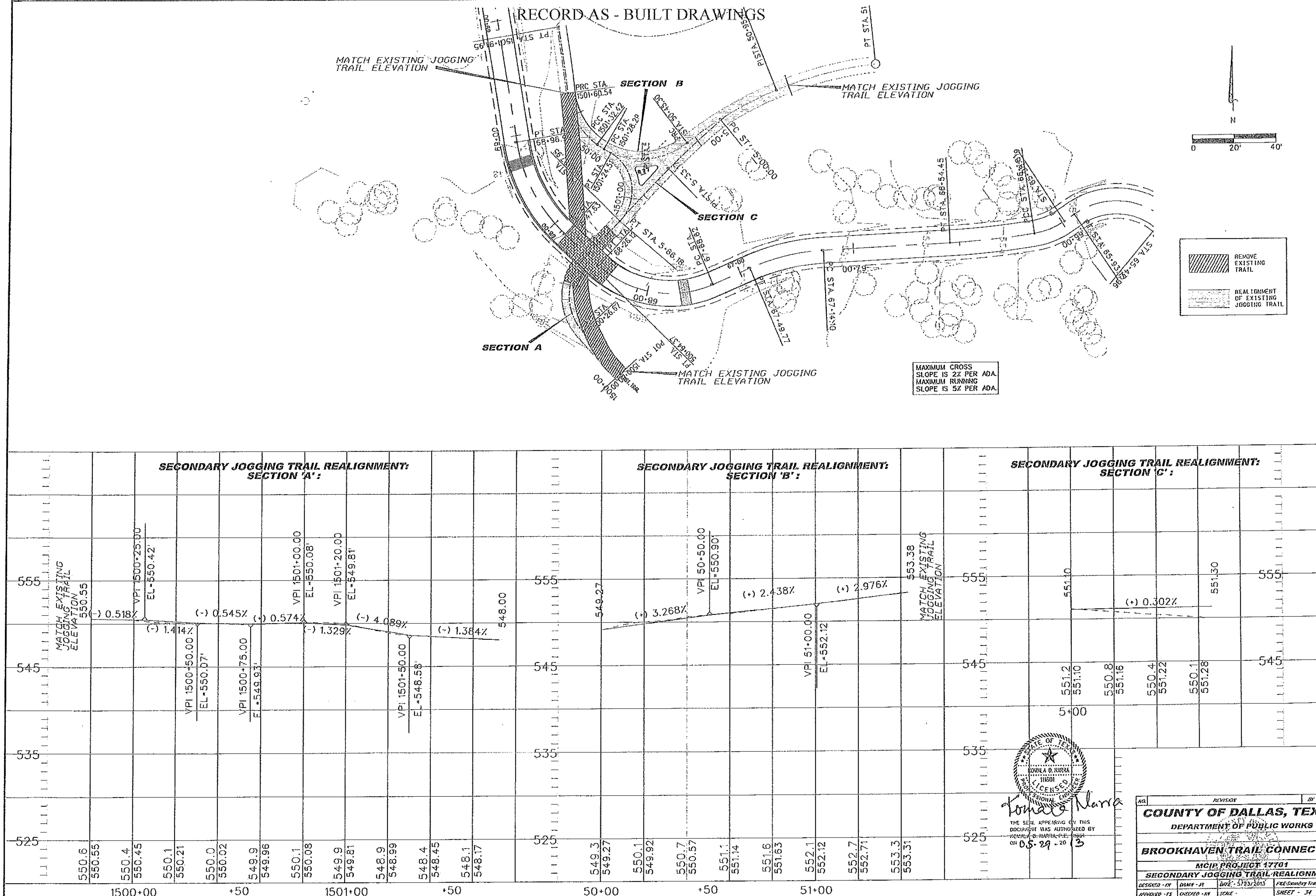
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIR PROJECT 17701

DESIGNED-KW	DRAWN-JR	DATE- 5/23/2013	FILE- Plan Sheet 33
APPROVED	CHECKED-KN	SCALE- 1"=40' / 1"=20'	SHEET 33

RECORD AS - BUILT DRAWINGS



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KOMALA D. NARRA
111501
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PROFESSIONAL ENGINEER

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

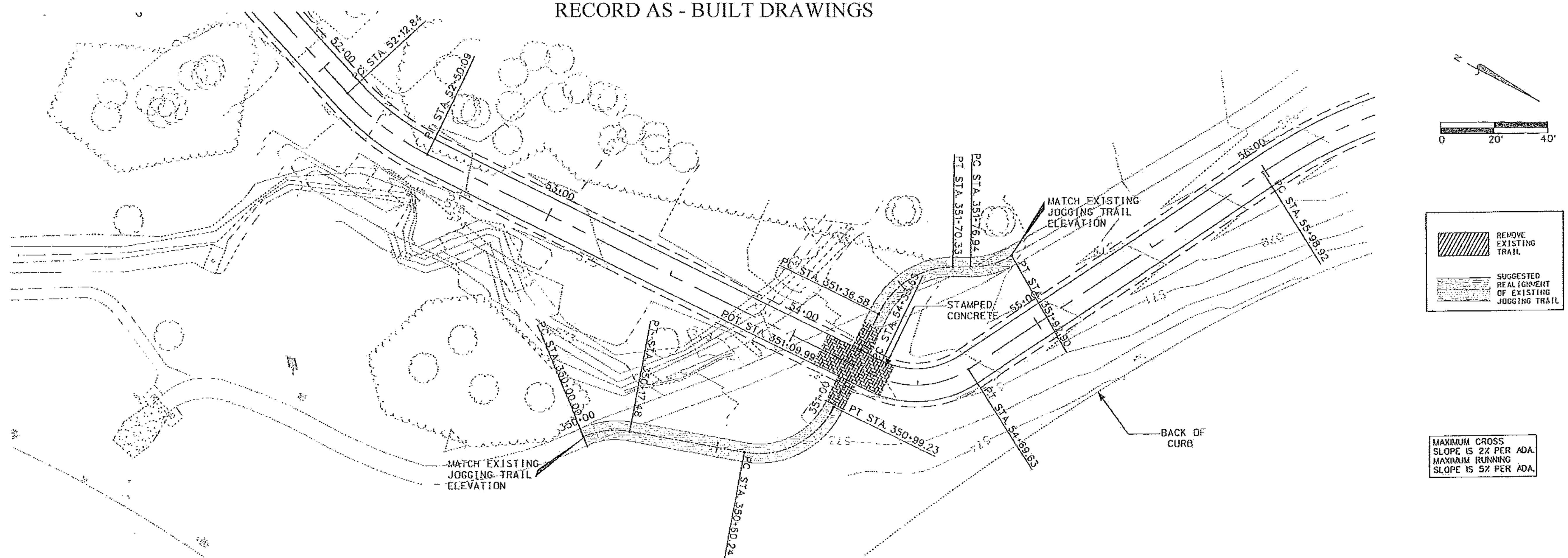
BROOKHAVEN TRAIL CONNECTION

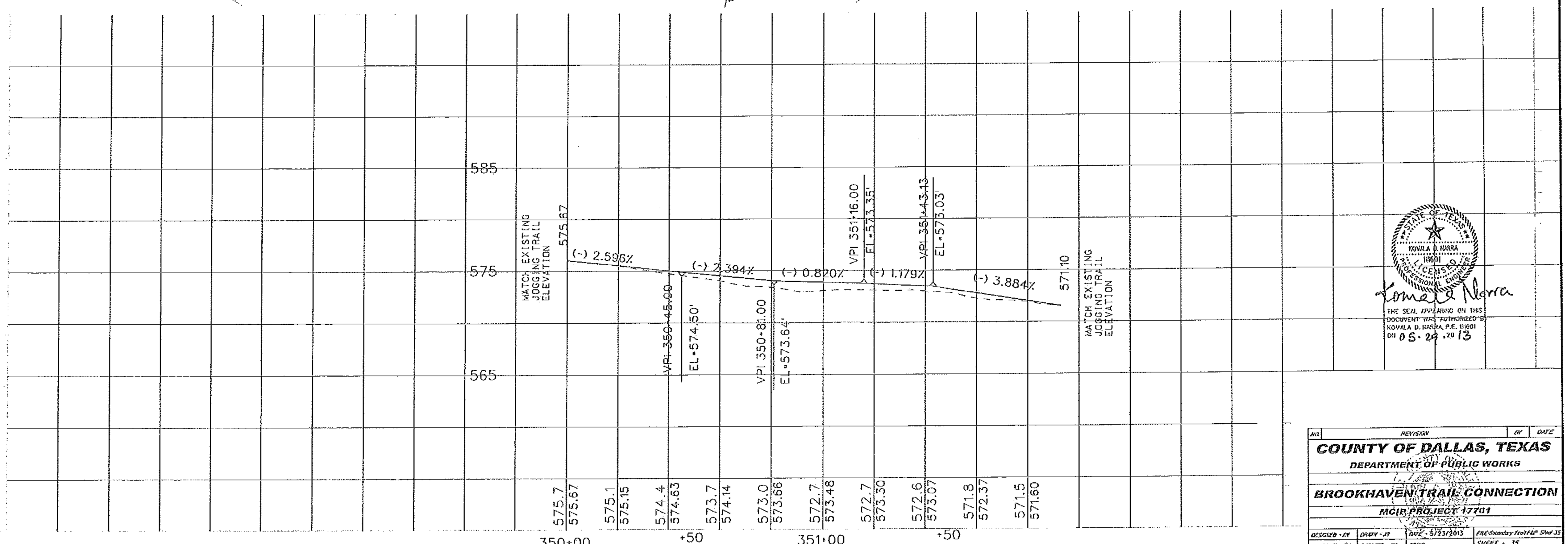
MCIP PROJECT 17701

SECONDARY JOGGING TRAIL REALIGNMENT

DESIGNED - KN	DRAWN - JT	DATE - 5/23/2013	FILE: Secondary Trail P&P Sheet 34
APPROVED - TS	CHECKED - KN	SCALE -	SHEET - 34

RECORD AS - BUILT DRAWINGS





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COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

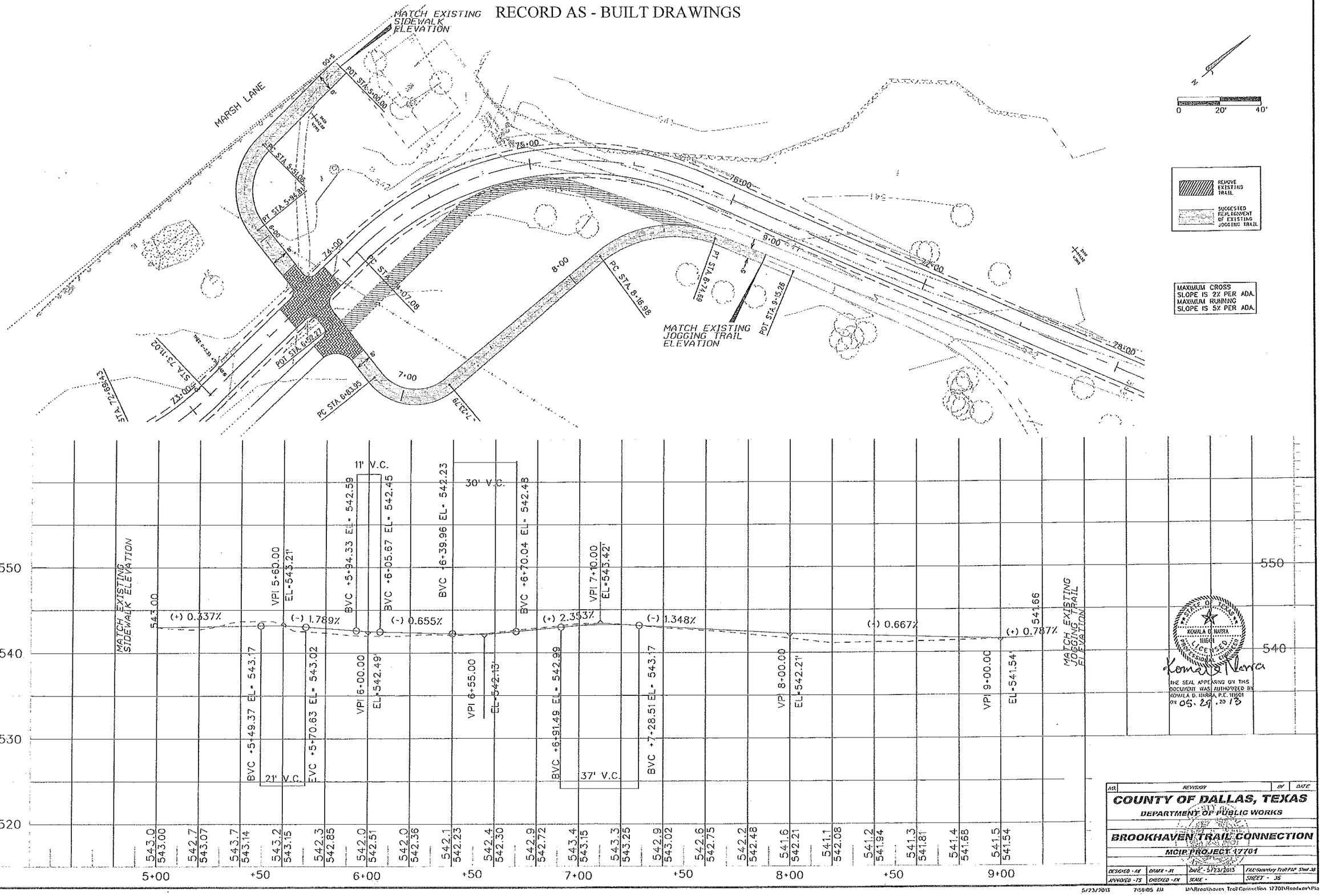
BROOKHAVEN TRAIL CONNECTION

MCIR PROJECT 17701

DESIGNED - KN	DRAWN - JR	DATE - 5/23/2013	FILE-Secondary TrailP&P Shed 35
APPROVED - TS	CHECKED - KN	SCALE -	SHEET - 35

5/23/2013 7:55:11 AM H:\Brookhaven Trail Connection 17701\Roadway\Pl4

RECORD AS - BUILT DRAWINGS



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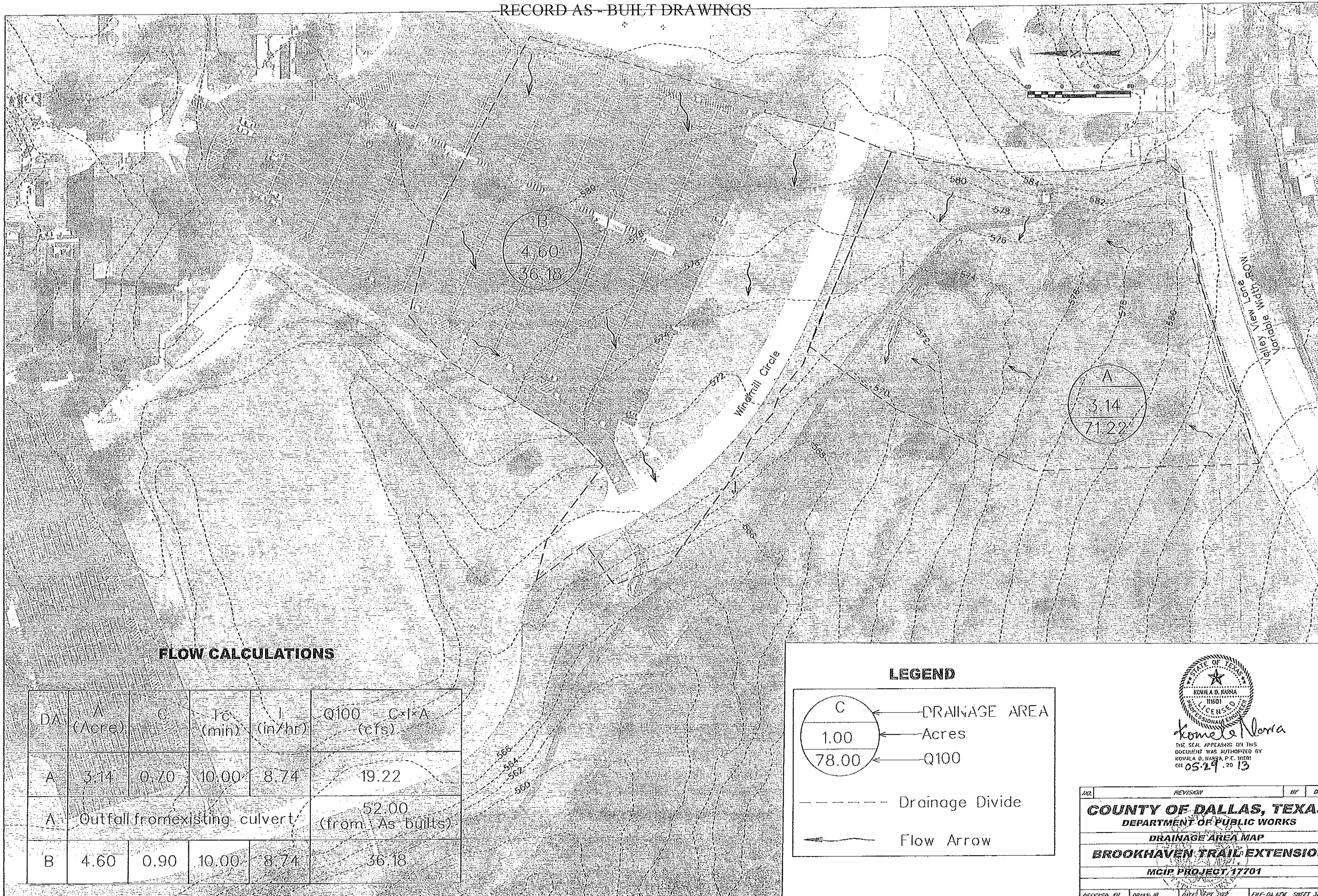
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION
MCIP PROJECT 17701

DESIGNED - KI	DRAFT - JR	DATE - 5/23/2013	FILE\Boarding Trail Plan Sheet.dgn
APPROVED - TS	CHECKED - KI	SCALE -	SHEET - 36

5/23/2013 7:56:05 AM th\Brookhaven Trail Connection 17701\Roadway\Plans

RECORD AS - BUILT DRAWINGS



FLOW CALCULATIONS

DA	A (Acre)	C	Tc (min)	I (in/hr)	Q100 = C×I×A (cfs)
A	3.14	0.70	10.00	8.74	19.22
A	Outfall from existing culvert				52.00 (from As builts)
B	4.60	0.90	10.00	8.74	36.18

LEGEND

C	DRAINAGE AREA
1.00	Acres
78.00	Q100
— — — —	Drainage Divide
⟵	Flow Arrow

STATE OF TEXAS
KOVALA D. NARRA
116011
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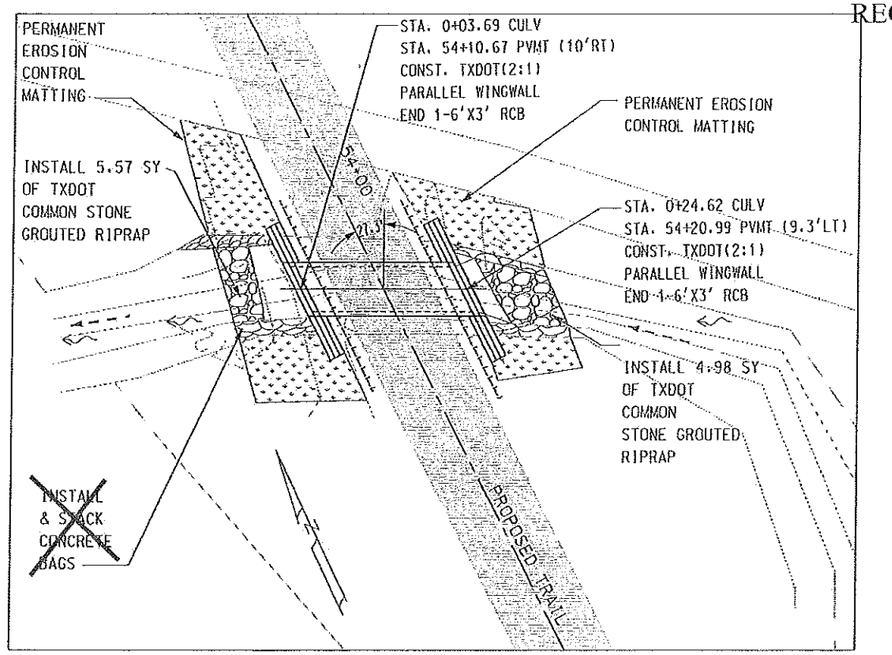
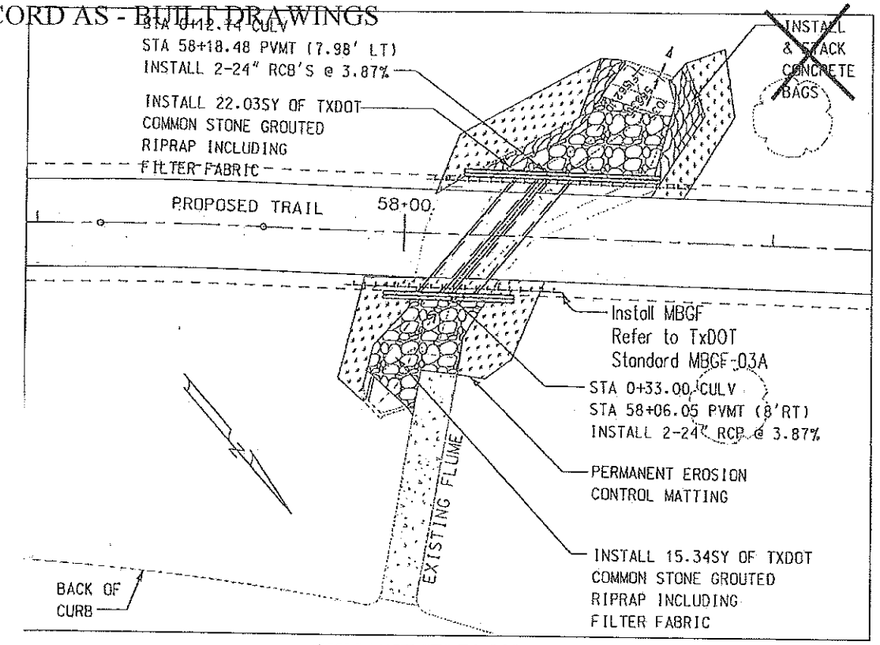
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
DRAINAGE AREA MAP
BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701

DESIGNED KN	DRAWN JR	DATE SEPT 2012	FILE DA.KDN SHEET 37
APPROVED TS	CHECKED KN	SCALE 1" = 100'	SHEET 37

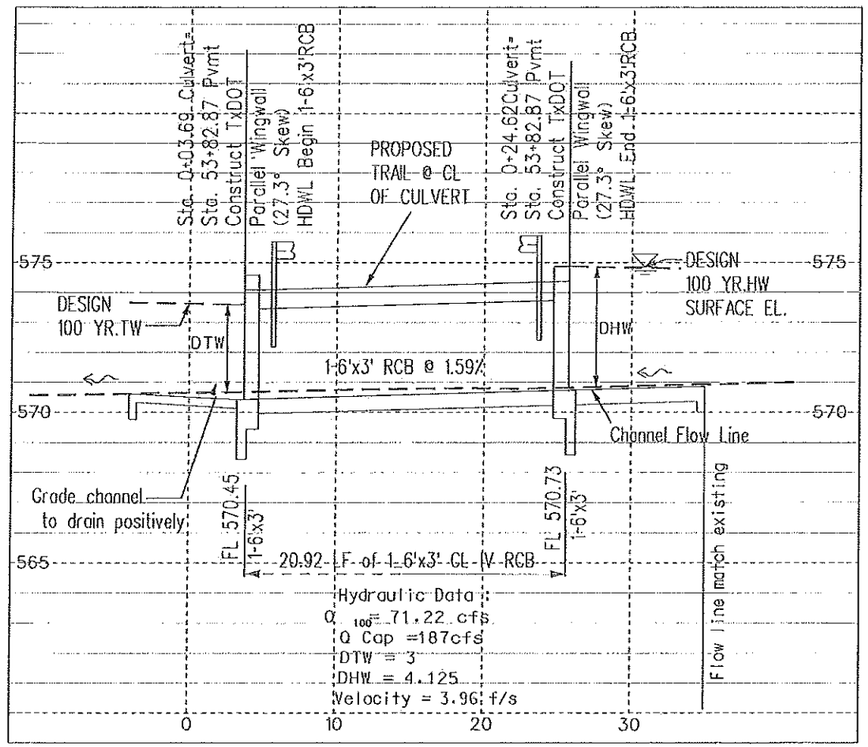
RECORD AS - BUILT DRAWINGS



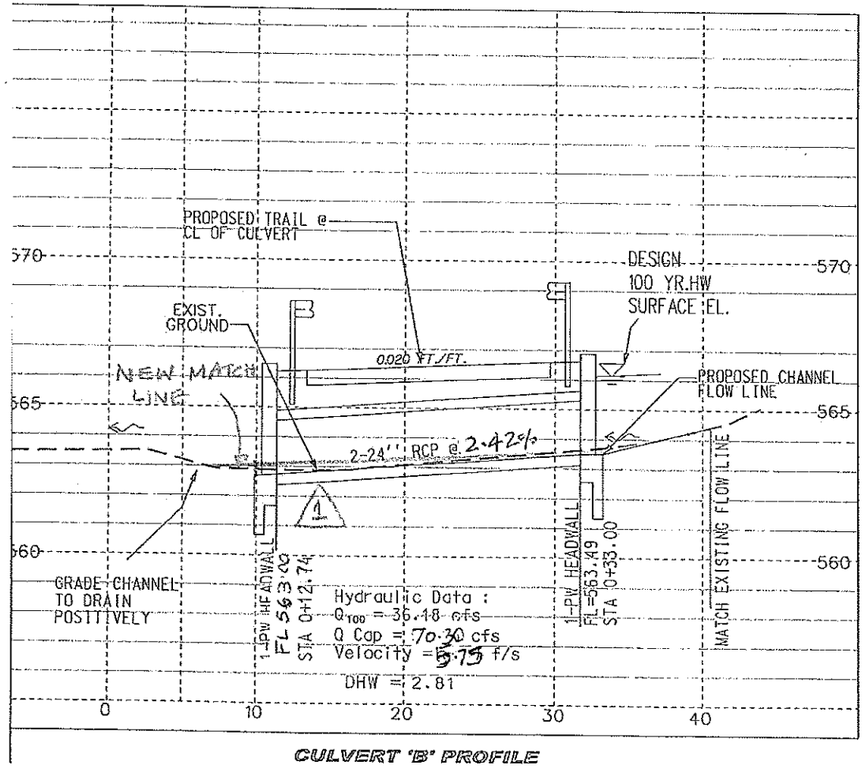
CULVERT 'A' PLAN
SCALE: 1"=20'



CULVERT 'B' PLAN
SCALE: 1"=20'



CULVERT 'A' PROFILE
SCALE: H 1"=10' V 1"=5'



CULVERT 'B' PROFILE
SCALE: H 1"=10' V 1"=5'

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111601
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Komala Narra

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1 REVISED 24" RCP GRADE TO REDUCE VELOCITY SO EROSION CAN BE MINIMIZED

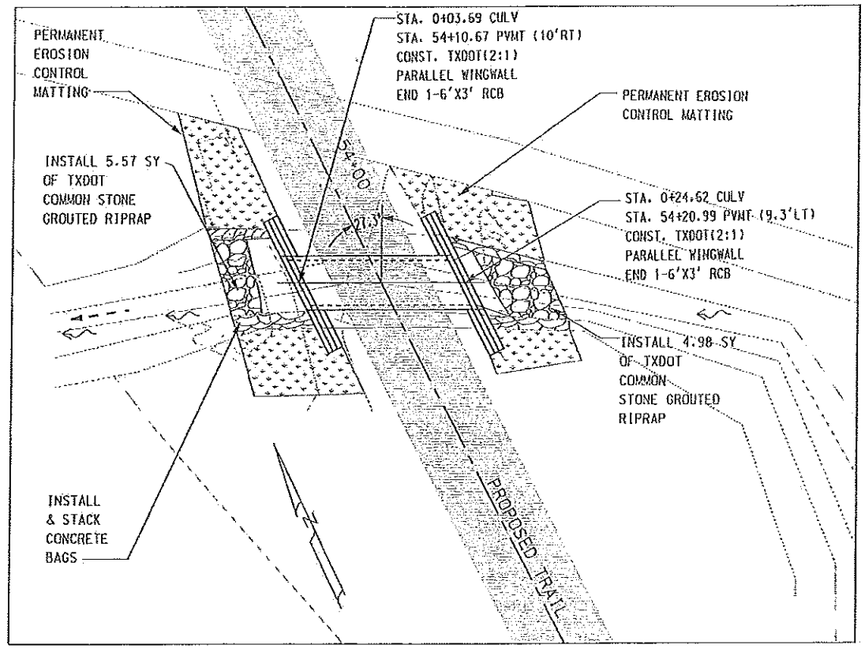
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
DRAINAGE

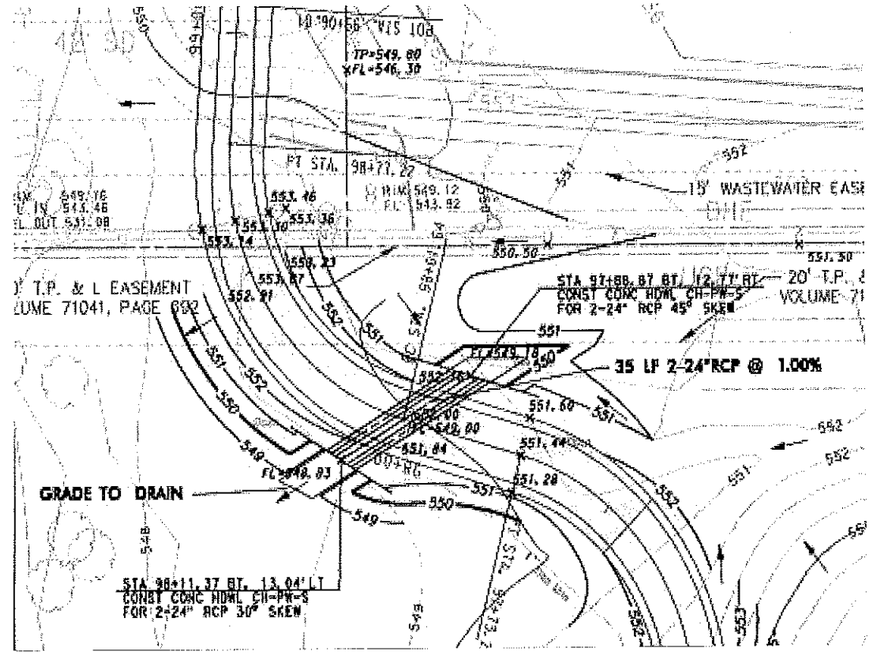
BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
CULVERTS 'A' AND 'B'

DESIGNED-KN	DRAWN-JR	DATE-5/29/2013	FILE- CULVERTS_COMBINED 38
APPROVED-TS	CHECKED-KN	SCALE-1"=10' / 1"=5'	SHEET 38

RECORD AS - BUILT DRAWINGS



CULVERT 'A' PLAN
SCALE: 1"=20'



CULVERT "C" PLAN

GENERAL NOTES:

1. Concrete bags shall be biodegradable, perforated, brown paper bags, reinforced with polyester scrim fiber.
2. Concrete mixture in the bags shall develop a strength of 3,000 psi compressive strength in 28 days, consisting of cement and a coarse, kiln dried sand.
3. Bags shall be approximately 21" long, 13" wide and 4 3/4" thick.
4. Bags shall be placed in level courses in a staggered or running bond pattern as indicated on the plans and typical sections. Each course shall be sufficiently tamped to compact each bag to finished thickness of 4".
5. After a maximum of six rows have been laid and at the end of each work day, the concrete bags shall be thoroughly wetted to insure total saturation for proper set up, curing and bonding.
6. Bags shall be secured with rebar, rebar hooks and washers as shown on the plans and typical sections.
7. All reinforcing steel shall be deformed type bars and conform to ASTM-A 615, Grade 60, placed as shown.
8. Filter fabric shall be a woven, high UV, non-biodegradable polypropylene geotextiles material, "GTF 300" as manufactured by Exxon Chemical Company, or approved equal. Filter fabric shall be laid continuous behind bags; fabric splices shall overlap a minimum of 12".
9. Make all excavations for base bags to undisturbed soil. All base soil shall be scarified of all vegetation, leveled and thoroughly compacted prior to placement of base bags.
10. Backfill as required behind bags shall be tamped and compacted in 6" lifts to 95% standard density; soil shall be wetted to obtain proper densities. Backfill may be excavated material from the site, free of lumps, rock 4" or larger, and other foreign matter.
11. The Contractor shall not dispose waste or any other materials into streams or waterways.
12. Existing piping, sprinkler or drainage systems exposed or disturbed during the work shall be repaired to their original condition. Any existing sub-surface drain pipe shall be extended through the new R-Rap system.
13. The Contractor shall maintain adequate drainage at all times.
14. The Contractor must have a set of plans "Approved" by the engineering department on this project at all time.

STATE OF TEXAS
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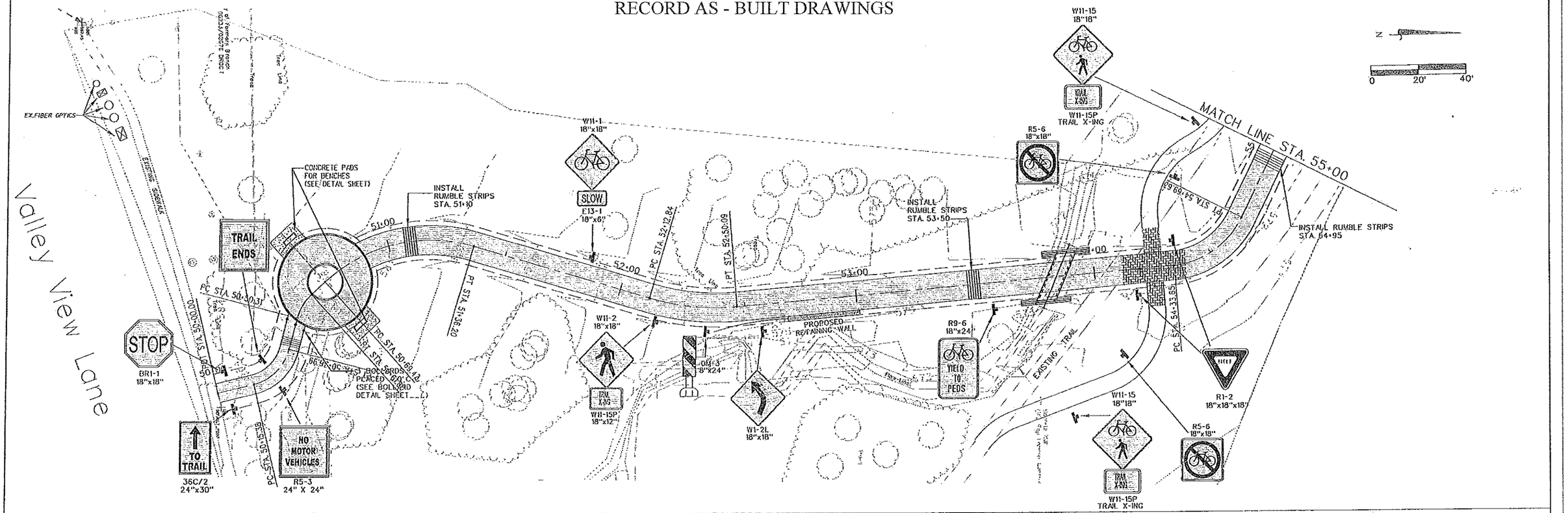
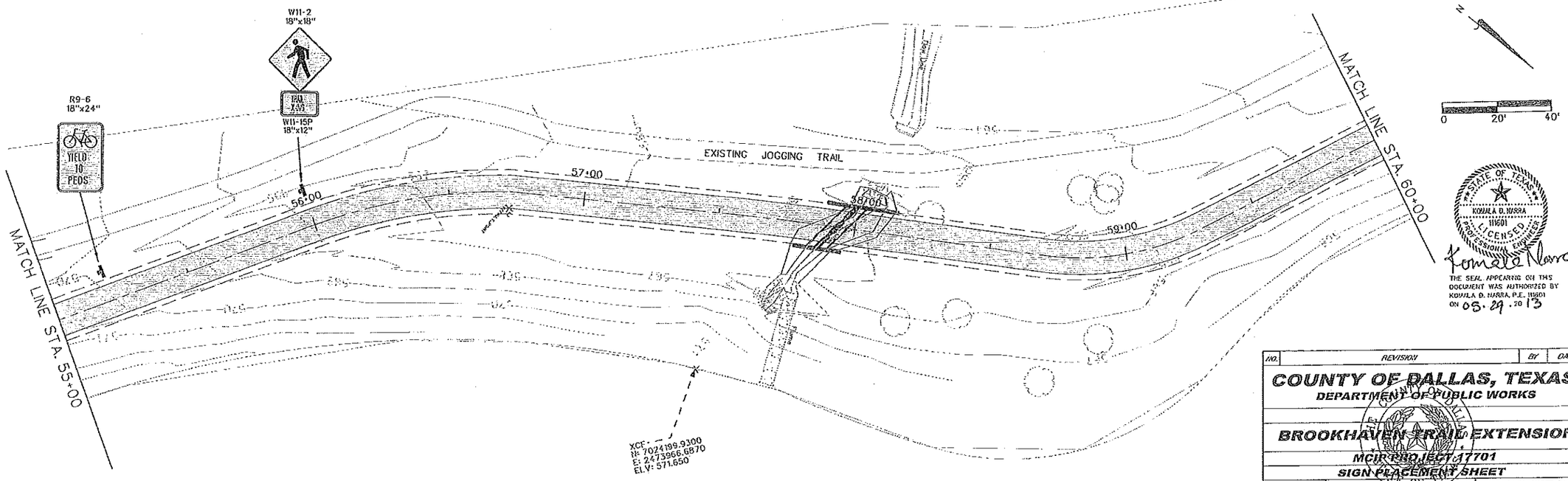
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
DRAINAGE

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
RIPRAP WALL DETAIL

DESIGNED-KN	DRAWN-JR	DATE- 5/23/2013	FILE- RIPRAP WALL DETAIL 38A
APPROVED-TS	CHECKED-KN	SCALE- 1"=20' & 1"=10'	SHEET 38 A

RECORD AS - BUILT DRAWINGS





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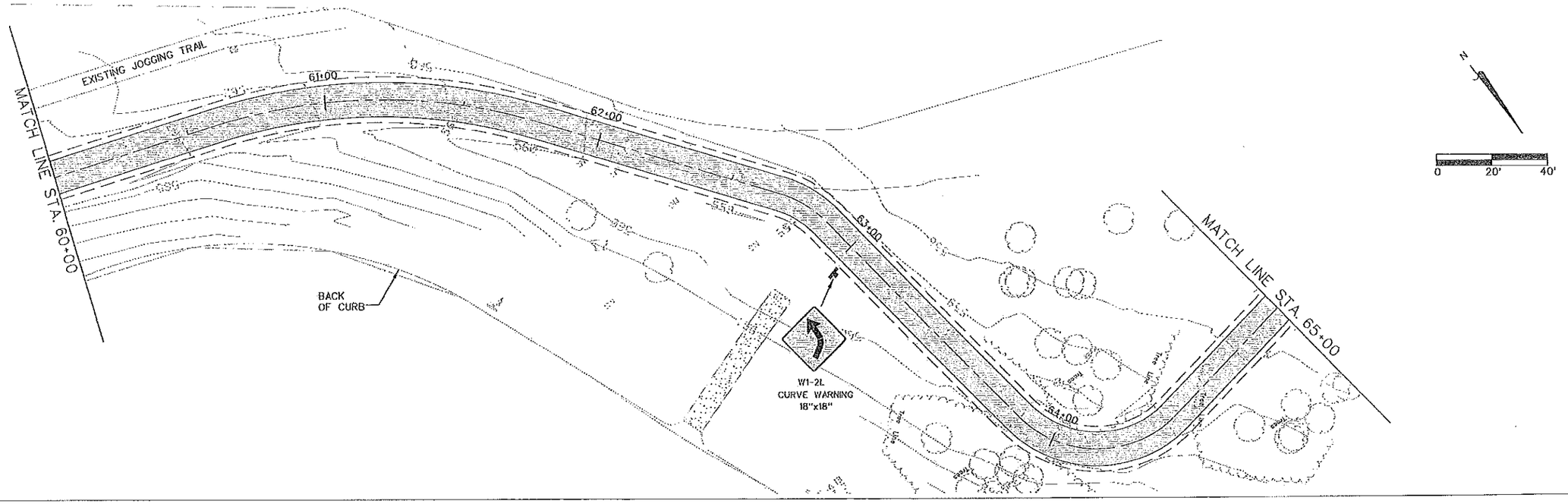
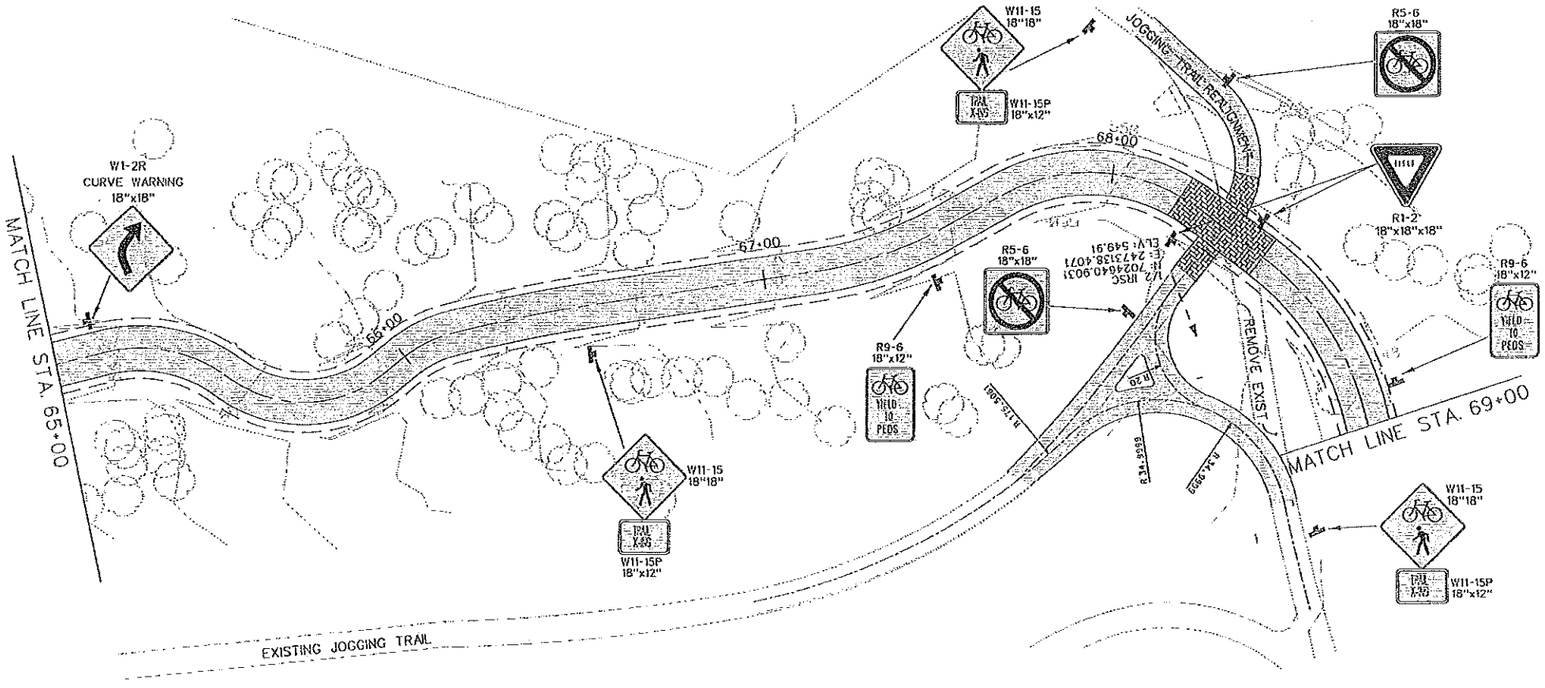
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
SIGN PLACEMENT SHEET

DESIGNED-KN	DRAWN-KN	DATE-5/23/2013	FILE- SIGNS SHEET 39
APPROVED'S	CHECKED-KN	SCALE- 1"=40' / 1"=20'	SHEET 39

RECORD AS - BUILT DRAWINGS





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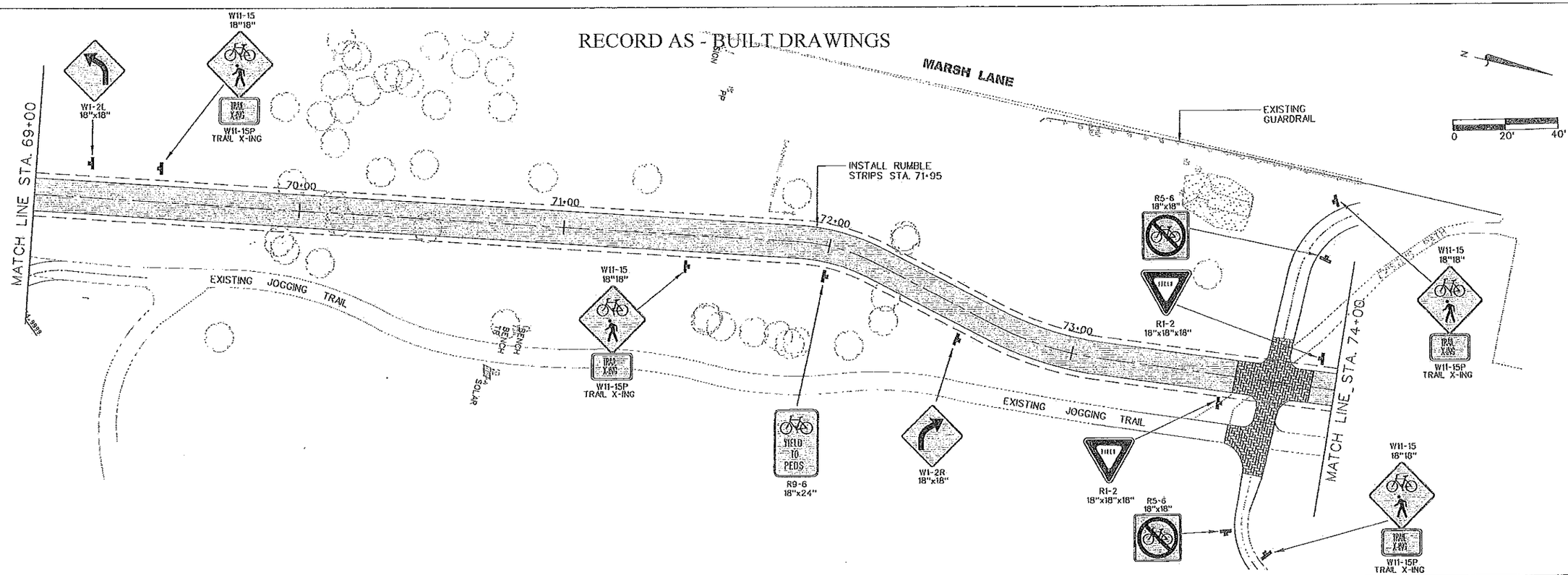
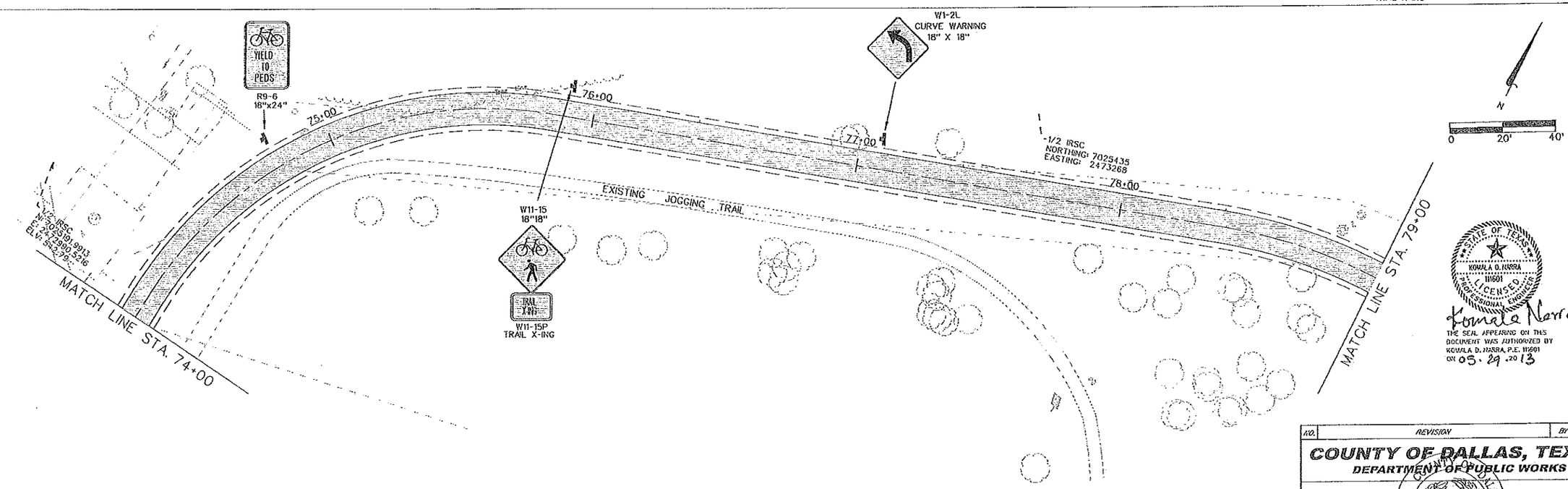
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 11701
SIGN PLACEMENT SHEET

DESIGNED-KN	DRAWN-JB	DATE- 5/23/2013	FILE- SIGNS SHEET 40
APPROVED-TS	CHECKED-KN	SCALE- 1"=40' / 1"=80'	SHEET 40

RECORD AS - BUILT DRAWINGS





STATE OF TEXAS
KOMALA D. NARRA
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LICENSED PROFESSIONAL ENGINEER

Komala Narra

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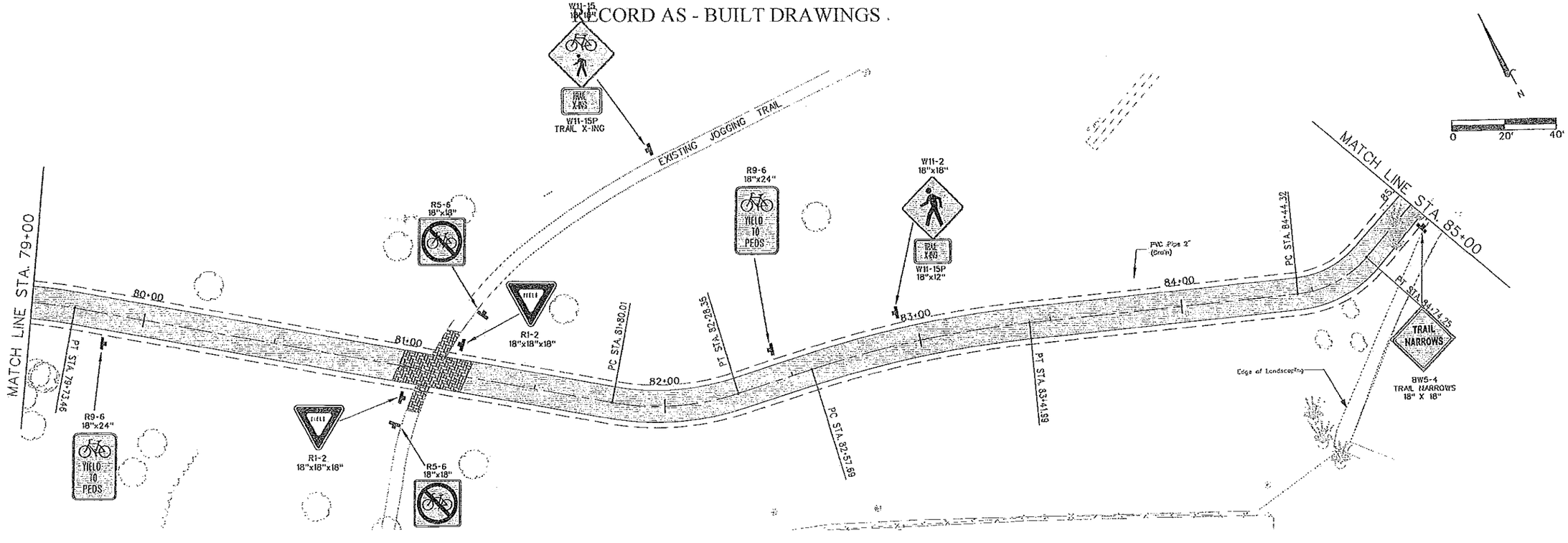
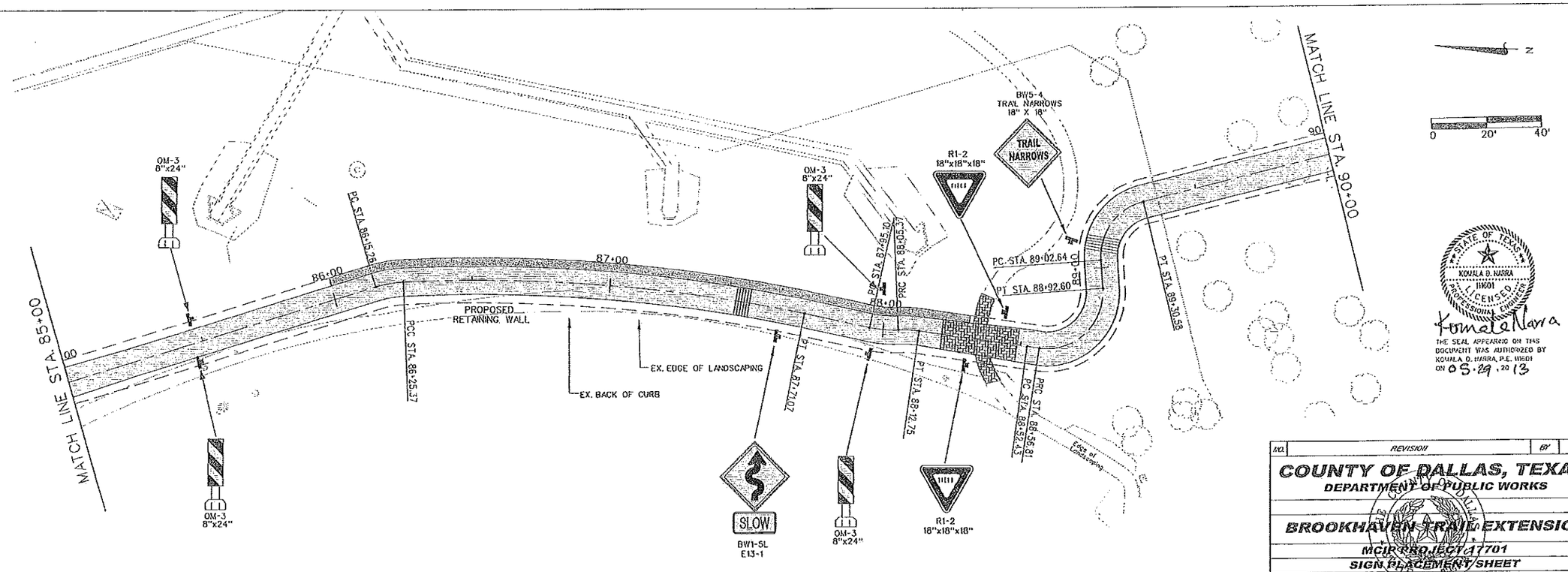
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 11701
SIGN PLACEMENT SHEET

DESIGNED-KN	DRAWN-JR	DATE- 5/23/2013	FILE- SIGNS SHEET - 4
APPROVED-TS	CHECKED-KN	SCALE- 1"=1' / 1"=80'	SHEET 4

RECORD AS - BUILT DRAWINGS





STATE OF TEXAS
KOUALA D. NARRA
111601
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PROFESSIONAL ENGINEER

Koualla Narra

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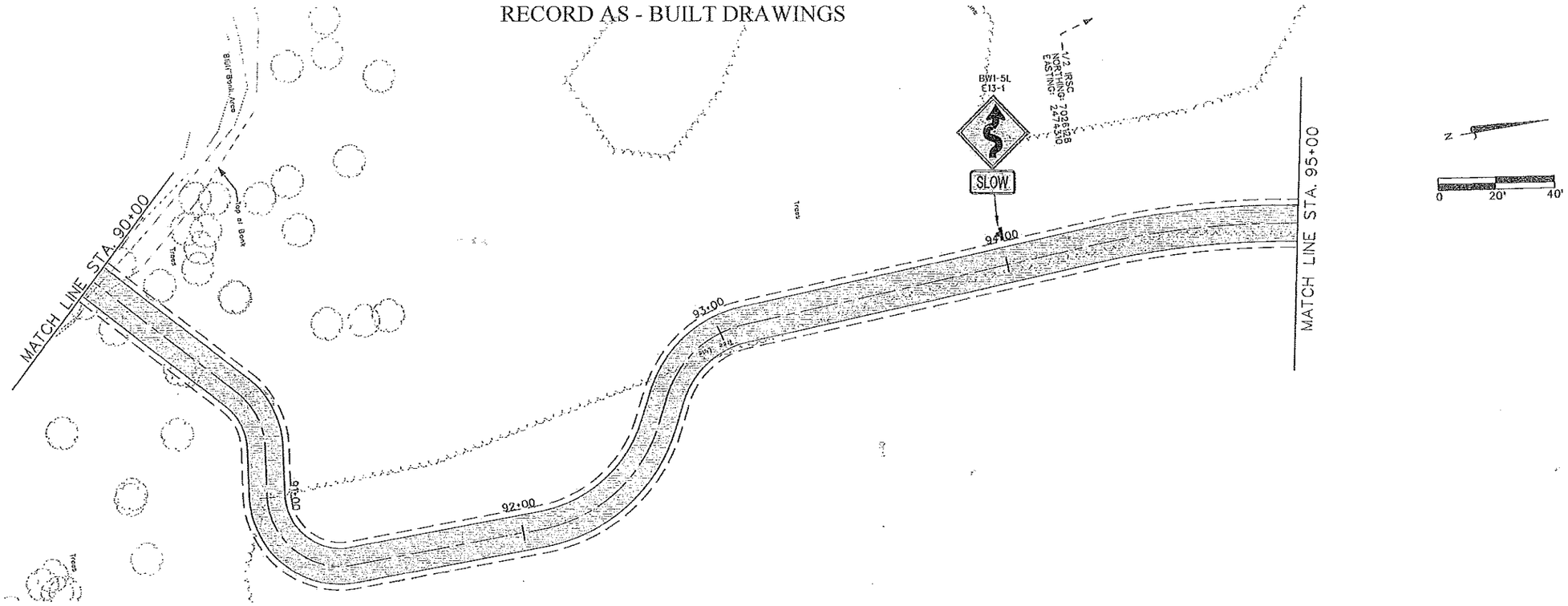
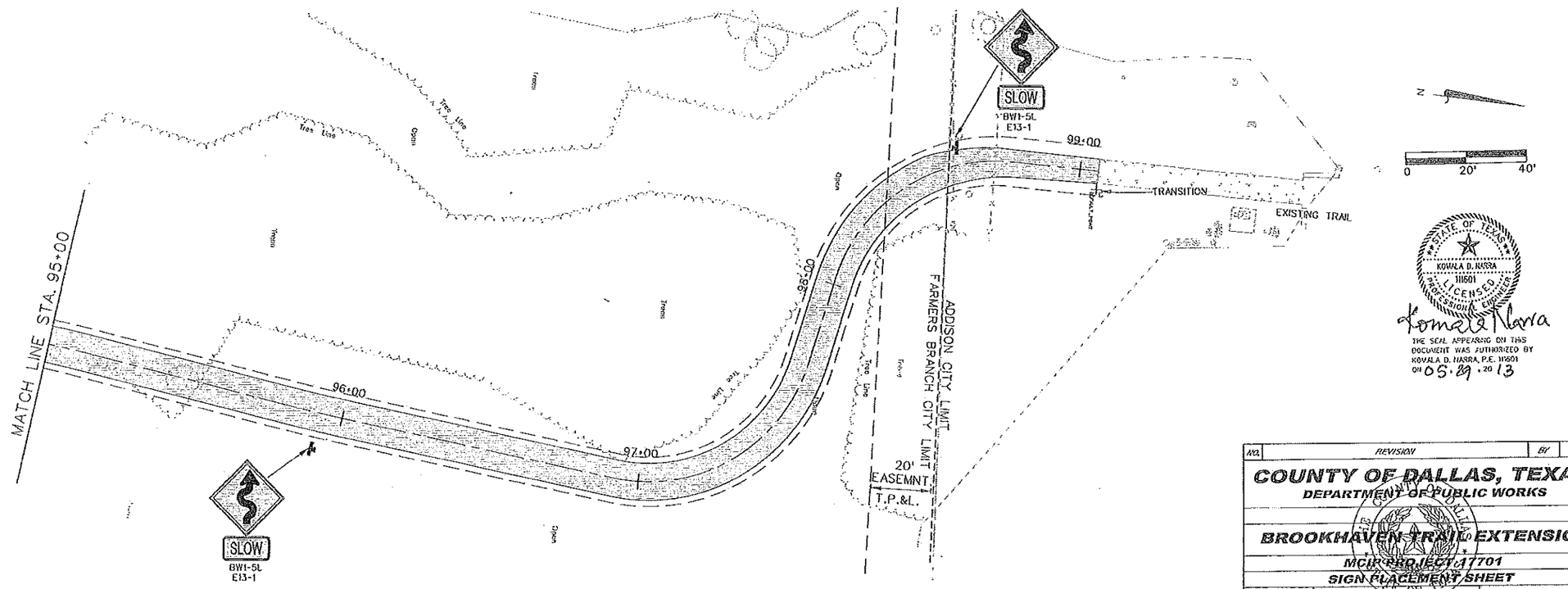
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT #11701
SIGN PLACEMENT SHEET

DESIGNED-KN	DRAWN-KN	DATE- 05/23/2013	FILE- SIGNS SHEET - 12
APPROVED-	CHECKED-KN	SCALE- 1"=20' / 1"=20'	SHEET 12

RECORD AS - BUILT DRAWINGS





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111601
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Komala Narra

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COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT 17701
SIGN PLACEMENT SHEET

DESIGNED-KN	DRAWN-JR	DATE-5/23/2013	FILE- SIGNS SHEET-4.3
APPROVED TS	CHECKED-KN	SCALE-1"=40' / 1"=20'	SHEET 4.3

RECORD AS - BUILT DRAWINGS

SIGN SUMMARY - BROOKHAVEN TRAIL CONNECTION

QTY.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS	MOUNT TYPE	SHT. NO. /QTY.	REGULATORY
1	R1-1	STOP	18" X 18"	A	40 - 01	
2	36C-2	TO TRAIL	24" X 30"	A	40 - 01	
1	R5-3	NO MOTOR VEHICLES	24" X 24"	A	40 - 01	
11	W11-15 W11-15P	BIKE CROSSING/ PED CROSSING/	24" X 24" 18" X 12"	A	40 - 02 41 - 03 42 - 05 43 - 01	
5	OM-3	CHEVRON (NO TEXT)	8"x24"	A	40 - 01 43 - 04	
4	W1-2L	L. CURVE WARNING (SYMBOL)	18" X 18"	A	40 - 01 41 - 01 42 - 02	
2	W1-2R	R. CURVE WARNING (SYMBOL)	18" X 18"	A	41 - 01 42 - 01	
4	W1-5	CURVE WARNING (SYMBOL)	18" X 18"	A	43 - 01 44 - 03	
2	W5-4	TRAIL NARROWS	18" X 18"	A	43 - 02	
1	SPECIAL	TRAIL ENDS	18"x18"	A	40 - 01	

QTY.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS	MOUNT TYPE	SHT. NO. /QTY.	REGULATORY
10	R1-2	YIELD	18"x18"x18"	A	40 - 02 41 - 02 42 - 02 43 - 04	
8	R5-6	NO BICYCLES (NO TEXT)	18"x18"	A	40 - 02 41 - 02 42 - 02 43 - 02	
8	R9-6	YIELD TO PEDS	18"x24"	A	40 - 02 41 - 02 42 - 02 43 - 02	
1	W11-1	BICYCLES (NO TEXT)	18"x18"	A	40 - 01	
1	W11-2	PEDESTRIANS (NO TEXT)	18"x18"	A	40 - 01	
14	W11-15P	TRAIL X-ING	18"x12"	A	40 - 04 41 - 03 42 - 05 43 - 02	
5	E13-1	SLOW	18"x6"	A	40 - 01 43 - 01 44 - 03	

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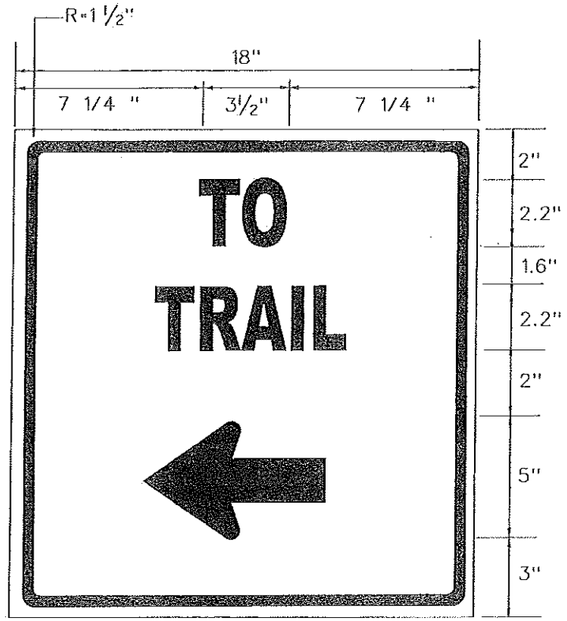
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
SIGN SUMMARY
BROOKHAVEN TRAIL EXTENSION
MCIR PROJECT 17701

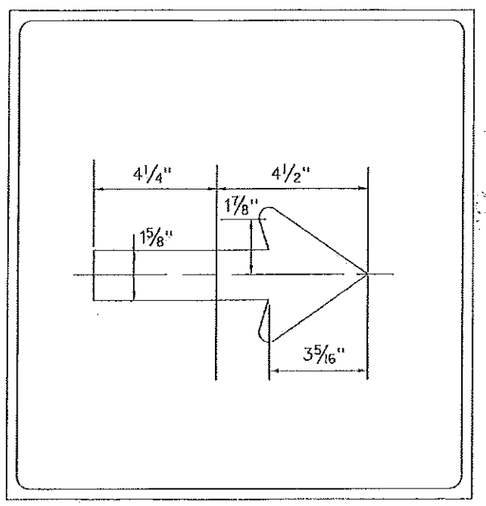
DESIGNED - TS	DRAWN - JR	DATE - AUGUST 2012	FILE: SIGN SUMMARY SHEET 44
APPROVED - TS	CHECKED - KA		SHEET - 44

N:\Brookhaven Trail Connection 17701\Roadway\Signs\SIGN SUMMARY UPDATE- Sheet 44.dgn
8:01:49 AM
5/23/2013

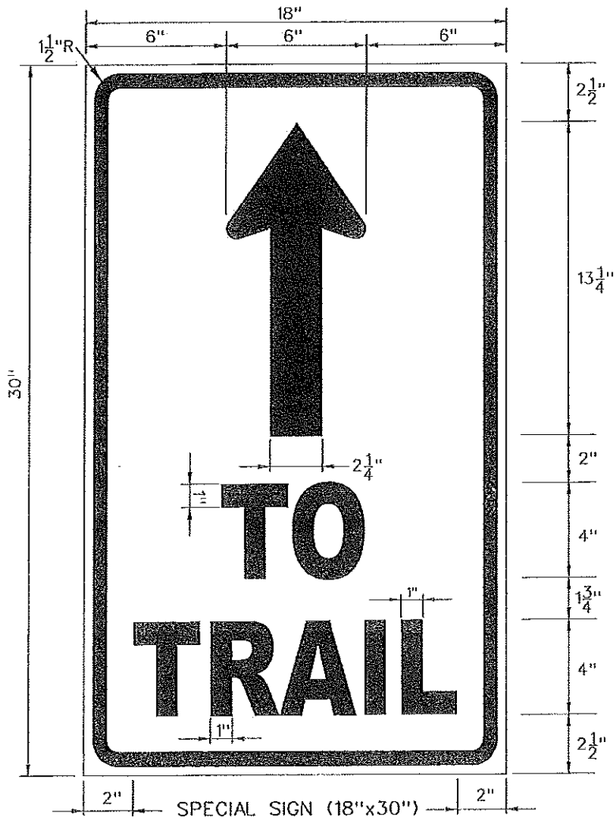


SPECIAL SIGN (18"x18")
LEGEND- BLACK
BACKGROUND- WHITE (REFL.)
ARROW FILL WITH BLACK
2.2" LETTERS FILL W/BLACK
(center of sign)

ARROW DETAILS

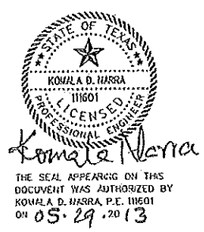


BACKGROUND- WHITE (REFL.)
ARROW FILL WITH BLACK



SPECIAL SIGN (18"x30")
LEGEND- BLACK
BACKGROUND- WHITE (REFL.)
ARROW FILL WITH BLACK

SPECIAL SIGN (18"x18")
LEGEND- BLACK
BACKGROUND- WHITE (REFL.)
ARROW FILL WITH BLACK
2.2" LETTERS FILL W/BLACK
(center of sign)



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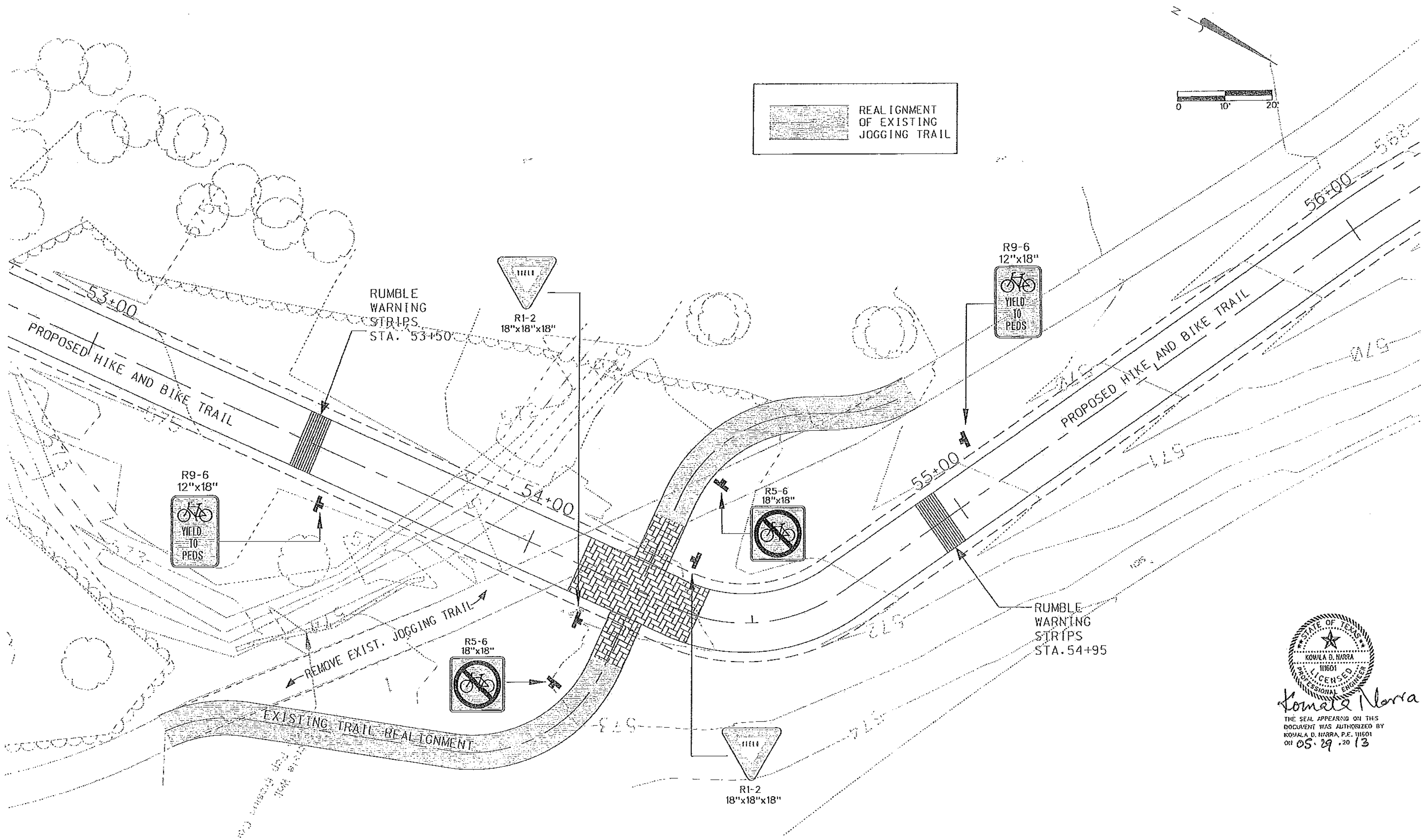
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
SPECIAL TRAIL SIGNS
BROOKHAVEN TRAIL
CONNECTION
MCIP 17701

DESIGNED - KN	DRAWN - AR	DATE: 5/23/2013	FILE: Special Trail Sign 2
APPROVED - TS	CHECKED - KN	SCALE: AS SHOWN	SHEET: 15

RECORD AS - BUILT DRAWINGS



STATE OF TEXAS
KOMALA D. NARRA
111601
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Komala Narra

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COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

INTERSECTION SIGNS DETAIL SHEET

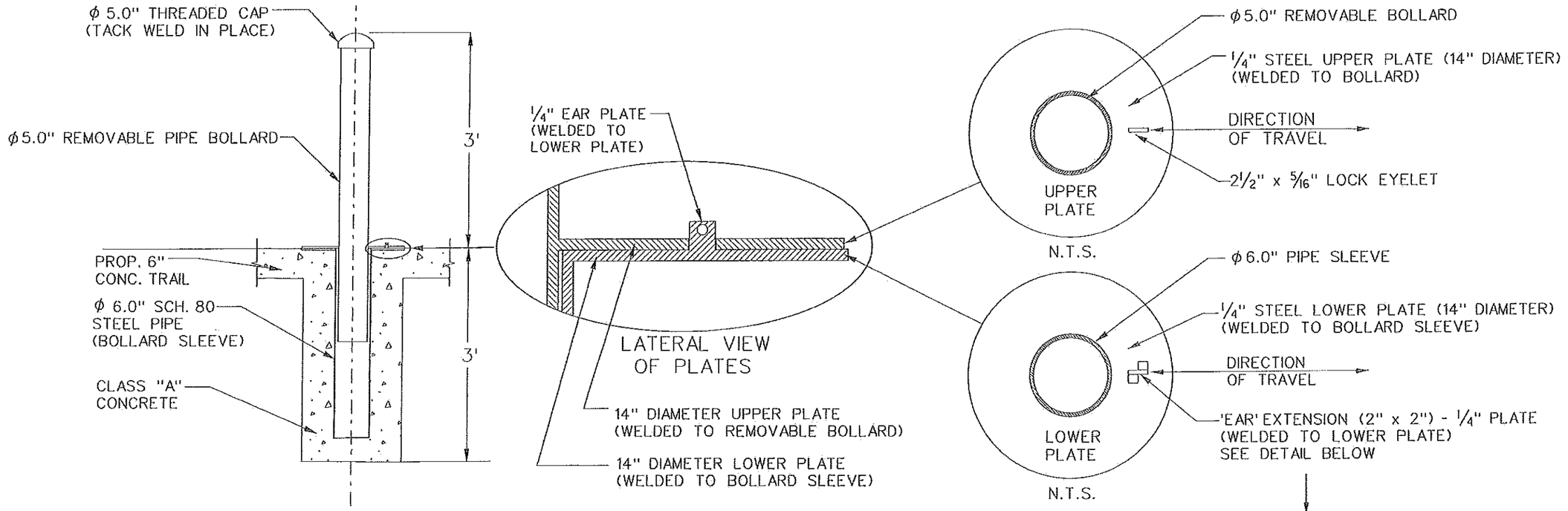
BROOKHAVEN TRAIL EXTENSION

MCIP PROJ. 17701

DESIGNED - JR	DRAWN - JR	DATE DEC/2012	FILE: Sign Detail Sheet_Sheet 45
APPROVED - KN	CHECKED - KN	SCALE: NA	SHEET: 46

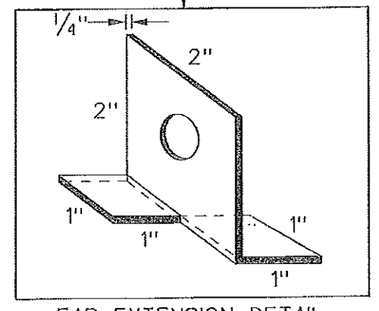
5/23/2013 8:02:29 AM

RECORD AS - BUILT DRAWINGS



REMOVABLE PIPE BOLLARD DETAIL

N.T.S.



EAR EXTENSION DETAIL

N.T.S.

NOTES:

1. PAINT EXPOSED SURFACES OF PIPE BOLLARD FLUORESCENT YELLOW

2. ORIENT LOCKING MECHANISM PARALLEL TO TRAIL TO MINIMIZE INTERFERENCE WITH TRAFFIC.

3. PROVIDE LOCKS-MASTERLOCK 3SF LAMINATED (OR EQUIVALENT) ALL KEYED ALIKE FOR EACH REMOVABLE BOLLARD. LOCKS (UPPER PLATES AND LOWER PLATES) NOT TO BE PAID FOR, BUT CONSIDERED SUBSIDIARY TO THIS BID ITEM.

4. PROP. 5" STEEL PIPE SLEEVE AND LOWER PLATE TO BE EMBEDDED INTO CONCRETE.

NOTE:
POLYESTER POWER COAT BOLLARD AND BASE PLATE. COLOR TO BE SELECTED BY OWNER CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR FINAL APPROVAL.

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

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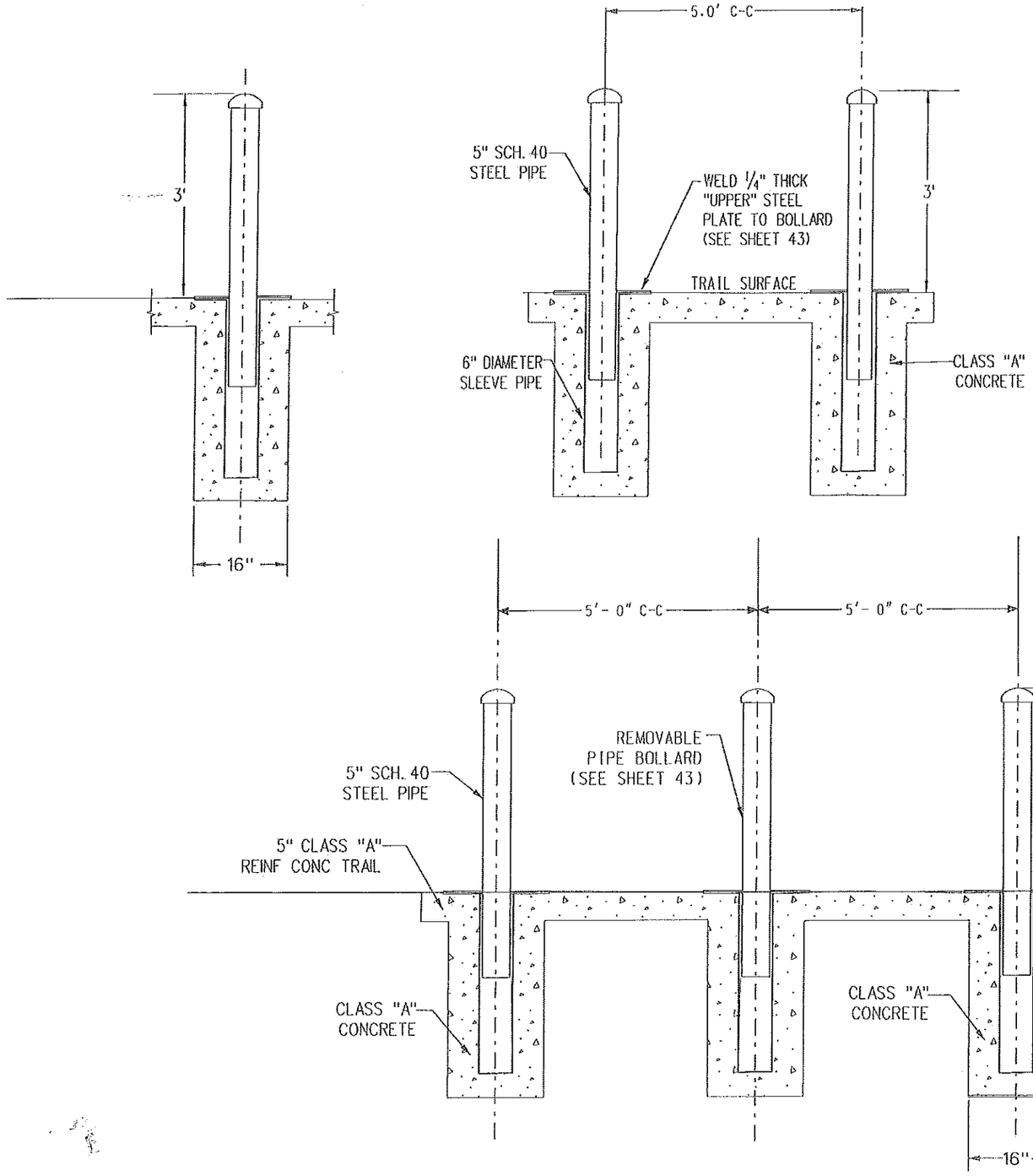
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
BOLLARD DETAIL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL
HCIP PROJ. NO. 11701

DESIGNED - J.R	DRAWN - J.R	DATE: MAY 2013	FILE: Bollard Det - A .dgn
APPROVED - K.N	CHECKED - K.N	SCALE: AS SHOWN	SHEET: 9

RECORD AS - BUILT DRAWINGS



TYPICAL BOLLARD DETAILS WITH SPACING

STATE OF TEXAS
KOVALA D. NARRA
111601
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Kovala Narra

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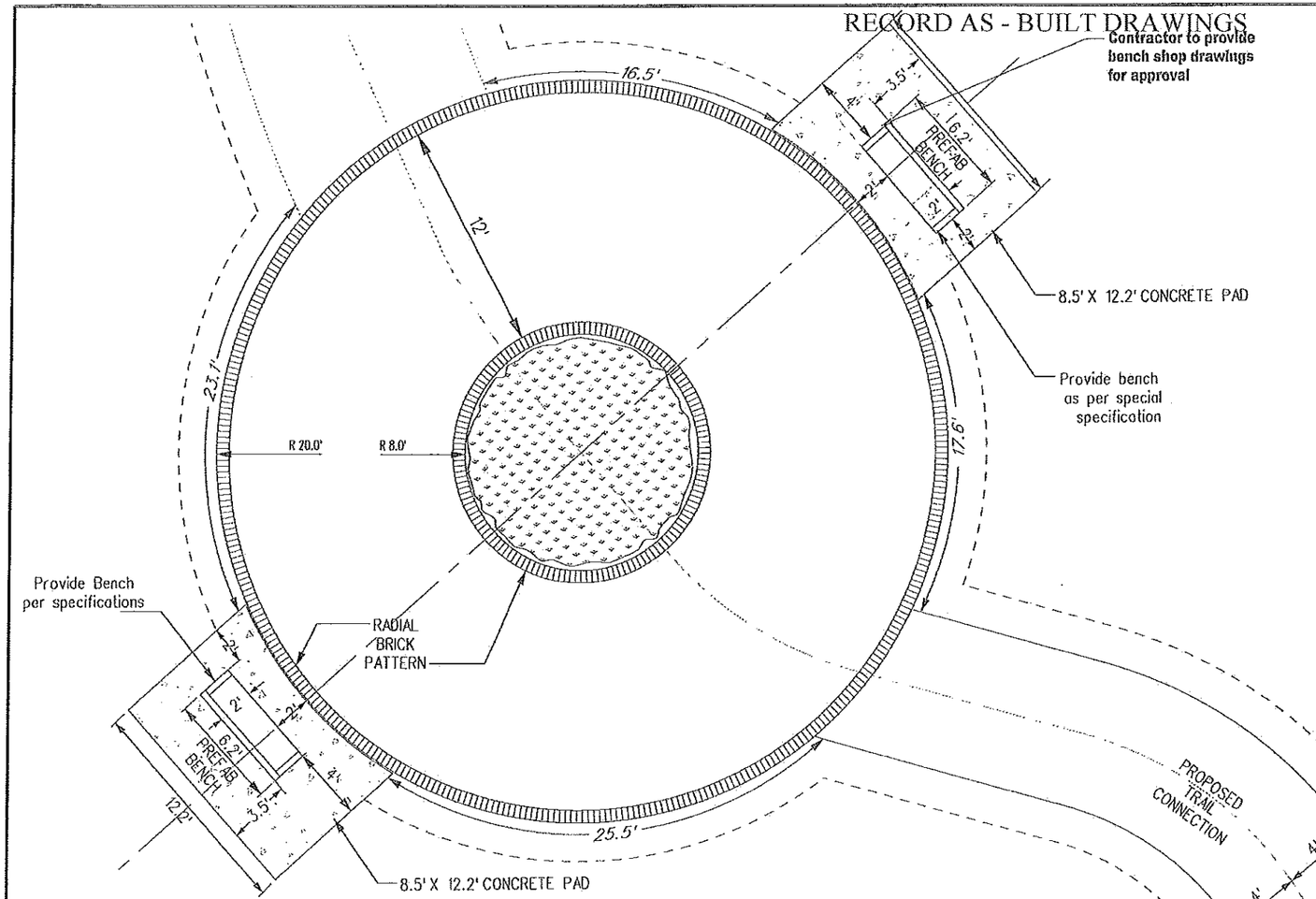
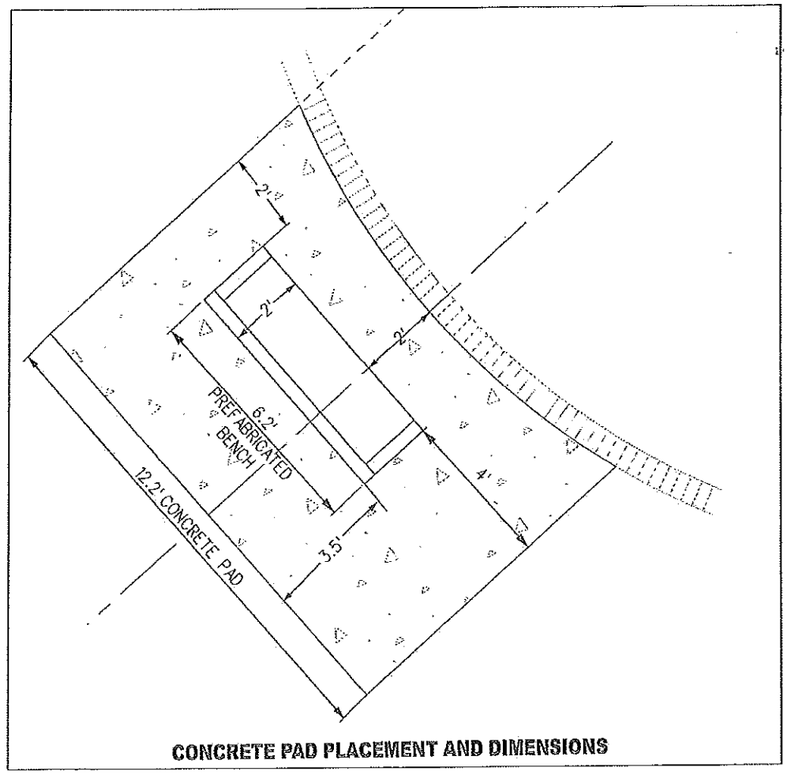
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW LANE TO VITRUVIAN TRAIL
MCIPI PROJ No. 17701

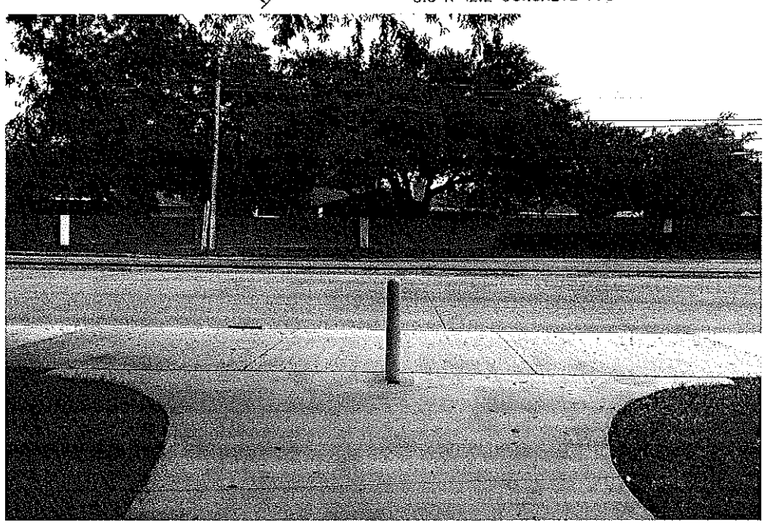
DESIGNED - KR	DRAWN - KR	DATE: MAY 2013	FILE: Bollard Det-B.dgn
APPROVED - KN	CHECKED - KR	SCALE: N.T.S.	SHEET: 42

RECORD AS - BUILT DRAWINGS

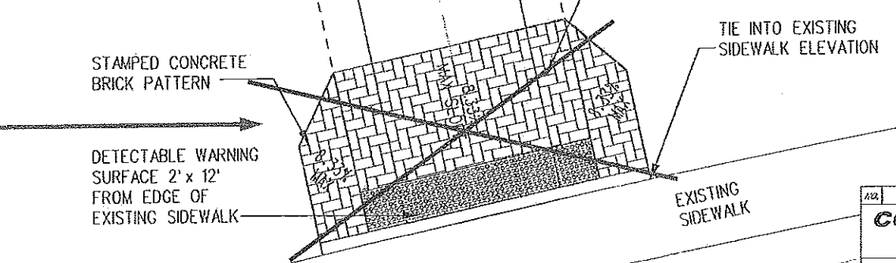




CONCRETE PAD PLACEMENT AND DIMENSIONS



Stamped Concrete HC Ramp not Required



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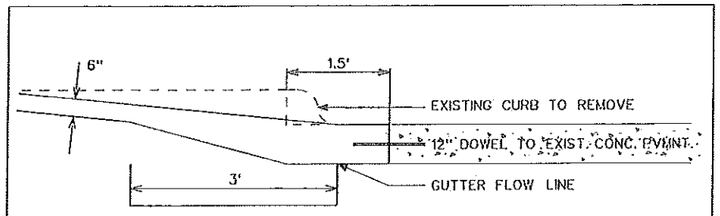
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
MCIP #17701
BROOKHAVEN TRAIL CONNECTION
BRICK PATTERNS, BENCHES, & BFR DETAILS
EXISTING SIDEWALK TO TRAIL CONNECTION

DESIGNED - KM	DRAWN - KM	DATE - AUGUST 2012	FILE - DETAIL SHEET 49
APPROVED - TS	CHECKED - KN	SCALE - N/A	SHEET - 49

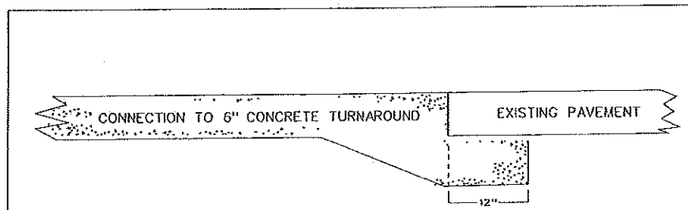
J:\M\Brookhaven Trail Connection 17701\Roadway\Details\Detail Sheet\Sanchez & BFR Sheet-49.dgn
8/14/2013 AM
5/23/2013

RECORD AS - BUILT DRAWINGS



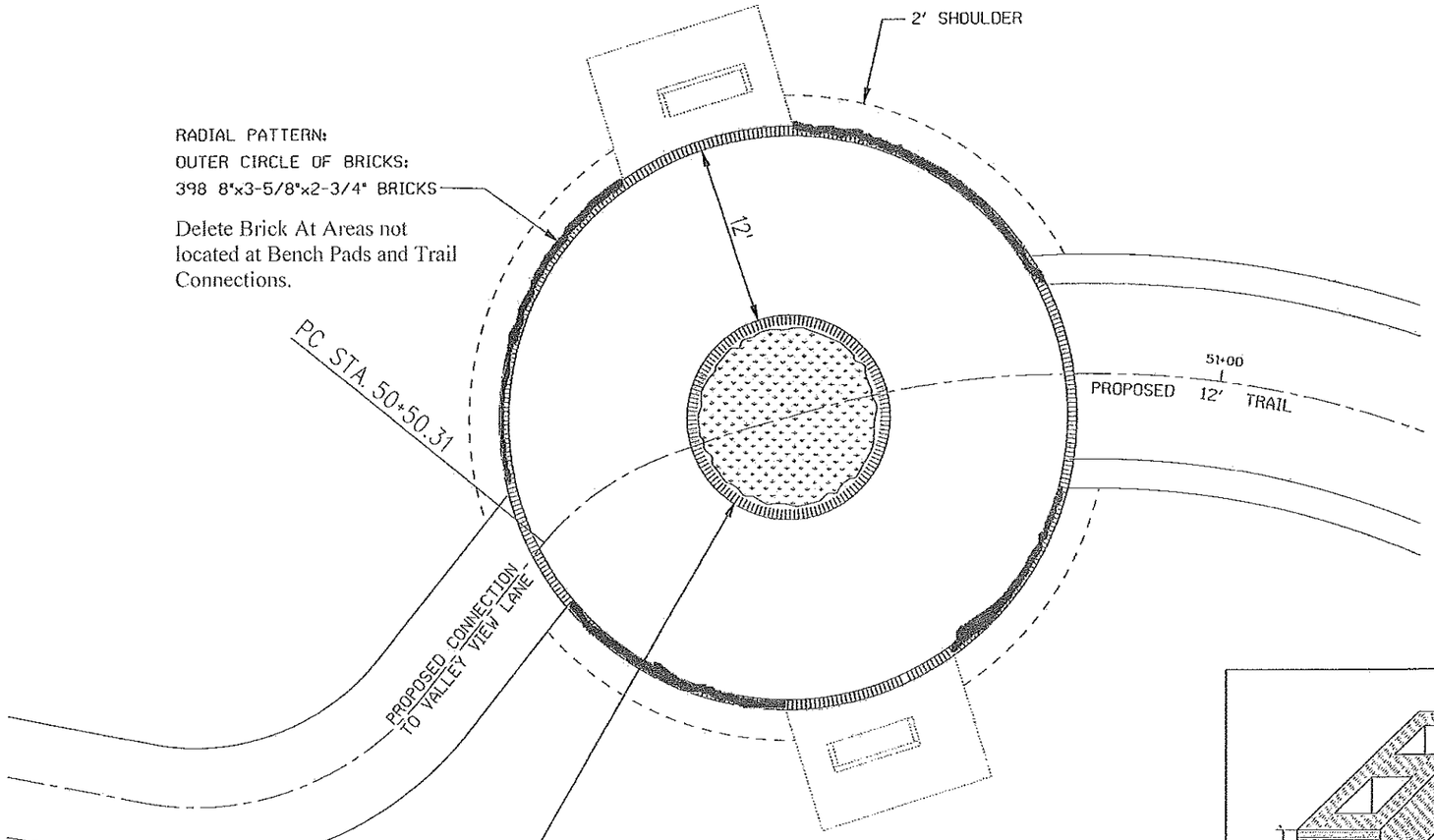
SIDEWALK TRANSITION

NTS



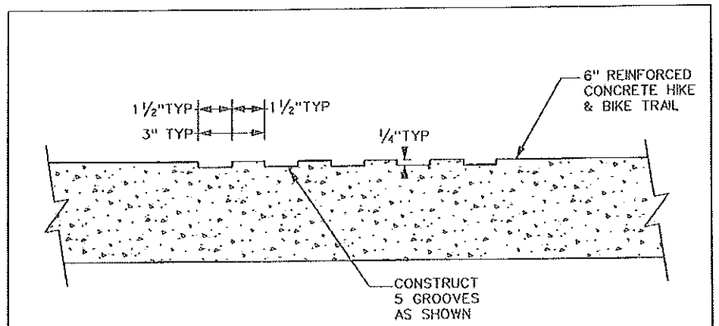
CONCRETE TO ASPHALT TRANSITION

NTS

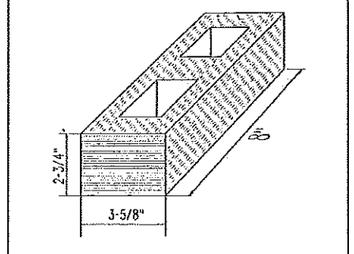


RADIAL BRICK PATTERN DETAIL

NTS



RUMBLE WARNING STRIP
SECTION PROFILE
NO SCALE



STANDARD BRICK DIMENSIONS
NO SCALE

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

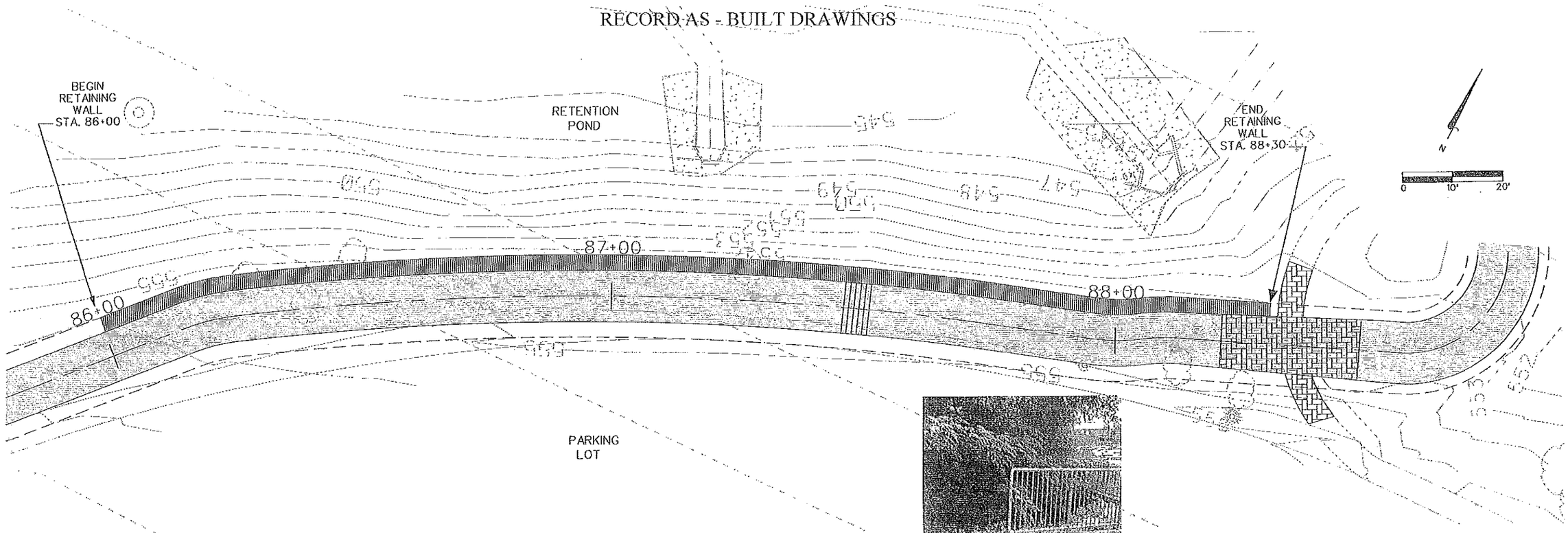
DETAILS SHEET

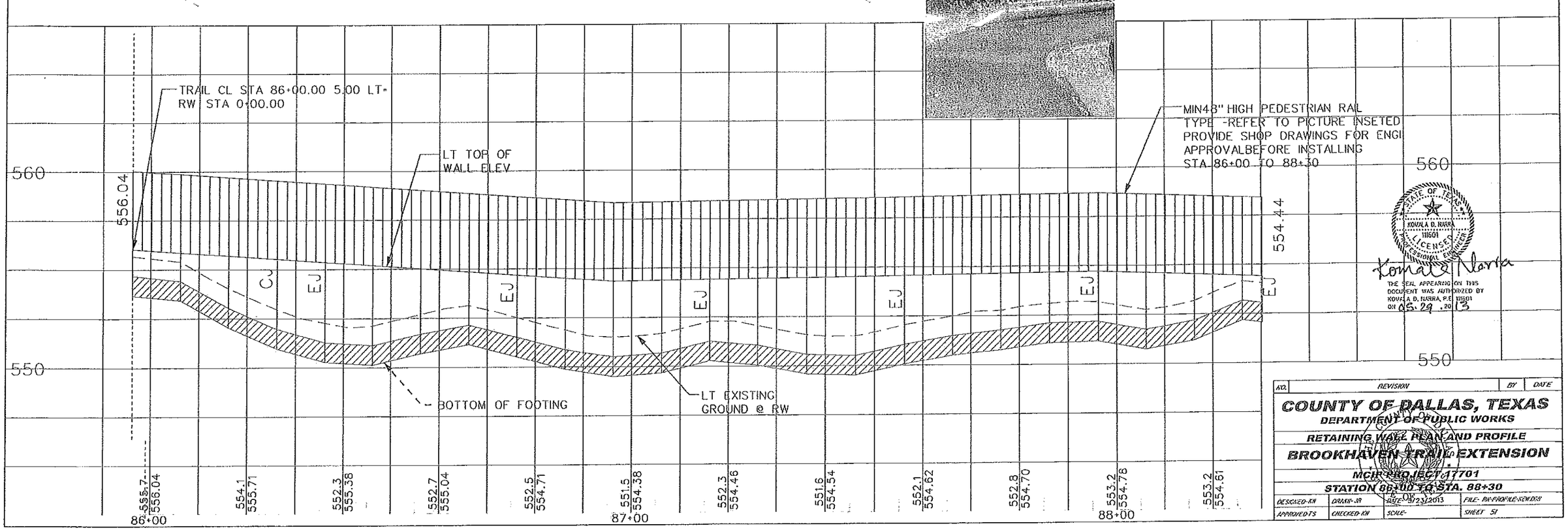
BROOKHAVEN TRAIL CONNECTION

MCIP #17701

DESIGNED - KN	DRAWN - JR	DATE - MAY 2012	FILE - DETAIL SHEET 50
APPROVED - TS	CHECKED - KN	SCALE - N/A	SHEET - 50

RECORD AS - BUILT DRAWINGS





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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS

DEPARTMENT OF PUBLIC WORKS

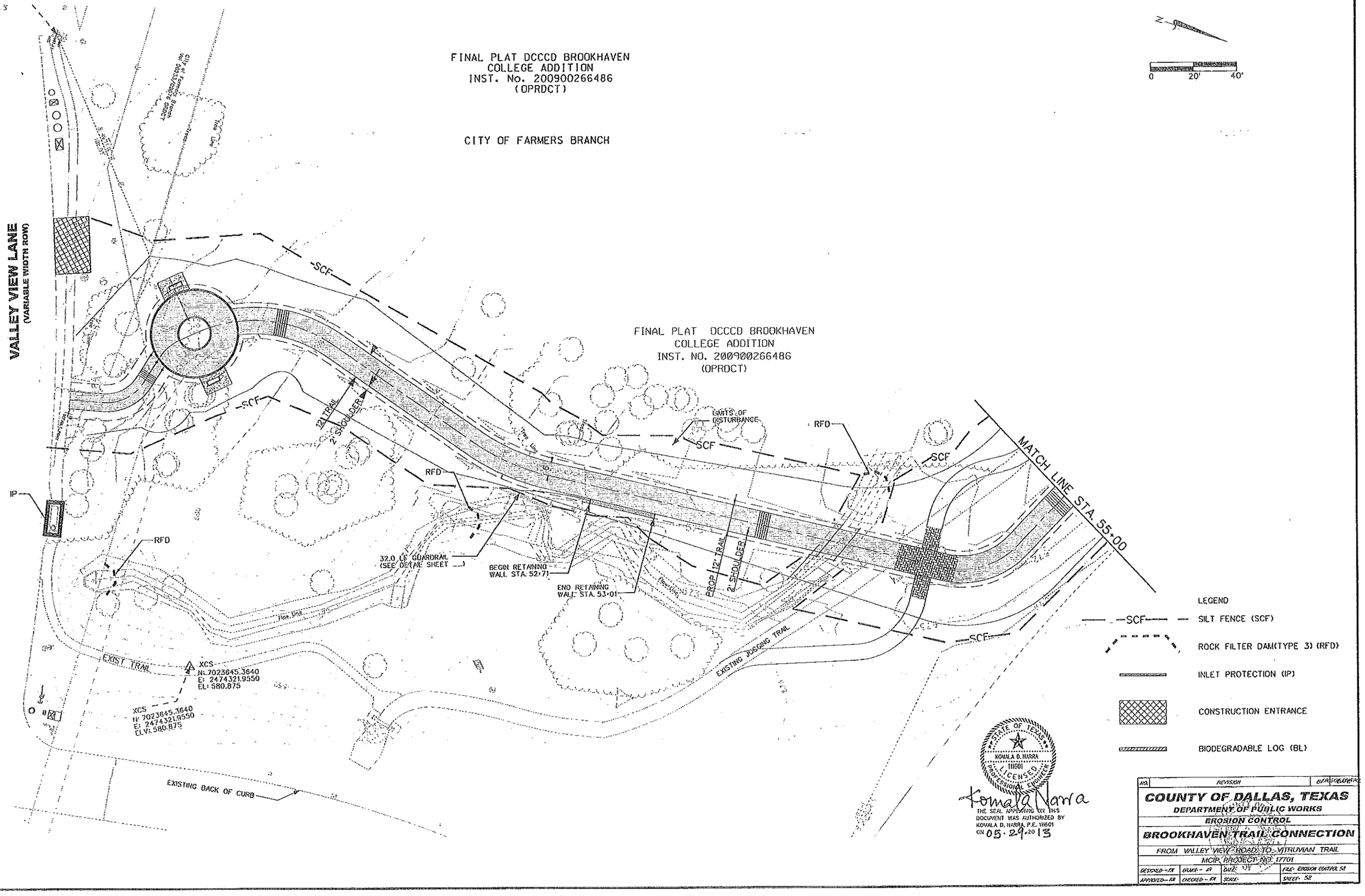
RETAINING WALL PLAN AND PROFILE

BROOKHAVEN TRAIL EXTENSION

MCIP PROJECT #11701

STATION 86+00 TO STA. 88+30

DESIGNED-KN	DRAWN-JR	DATE- 5/23/2013	FILE- PW-PROFILE-REVISED
APPROVED-TS	CHECKED-KN	SCALE-	SHEET 5I



STATE OF TEXAS
KOMALA D. NARRA
111501
LICENSED
PROFESSIONAL ENGINEER

Komala Narra

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ON 05.29.2013

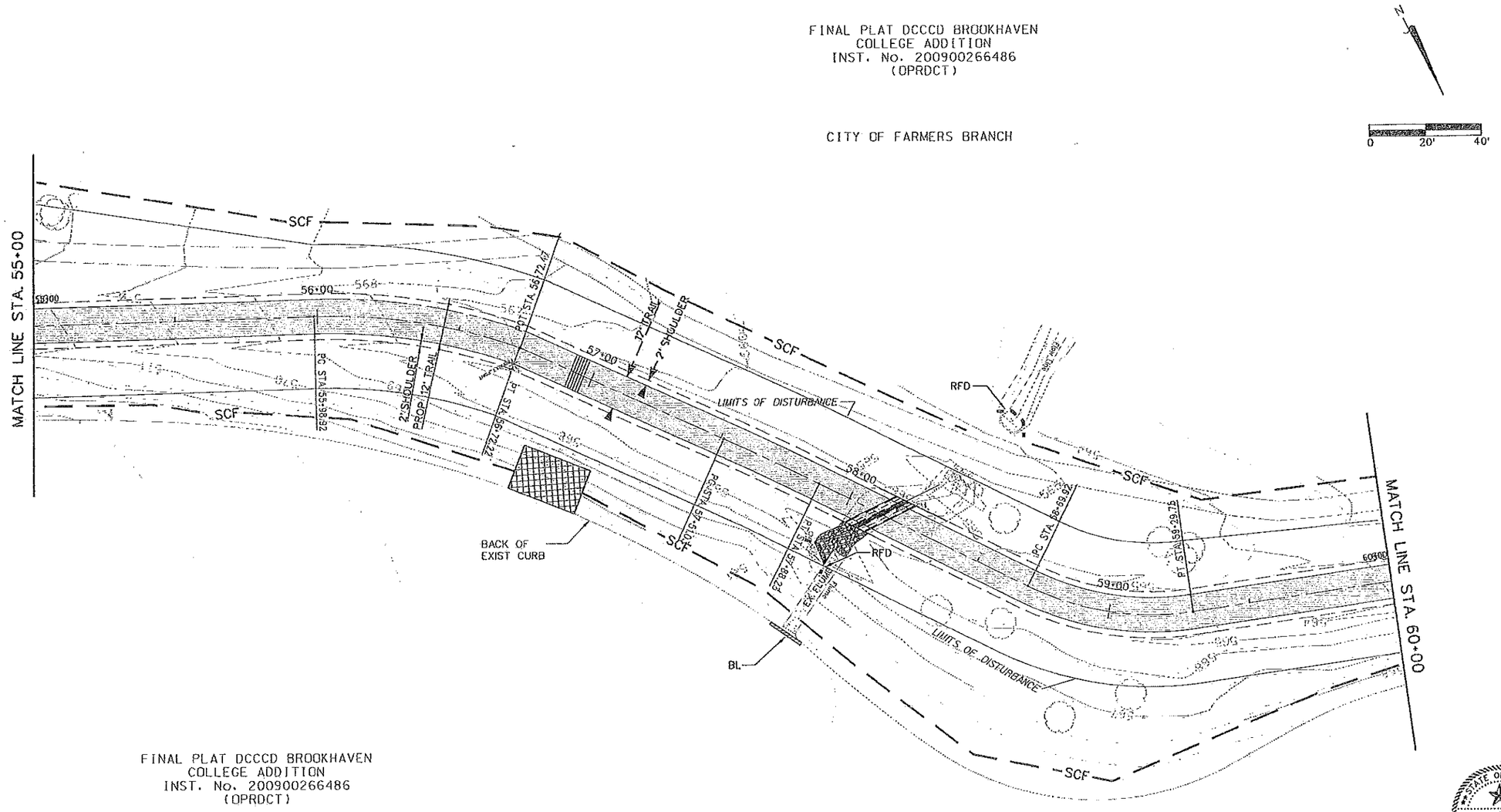
NO.	REVISION	BY	APP'D	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - AA	DATE: 05	FILE: EROSION CONTROL 52
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: 52

FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH



FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

LEGEND

—SCF—	SILT FENCE (SCF)
	ROCK FILTER DAM(TYPE 3) (RFD)
	INLET PROTECTION (IP)
	CONSTRUCTION ENTRANCE
	BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOMALA D. NARRA
111501
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PROFESSIONAL ENGINEER

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NO.	REVISION	BY	DATE

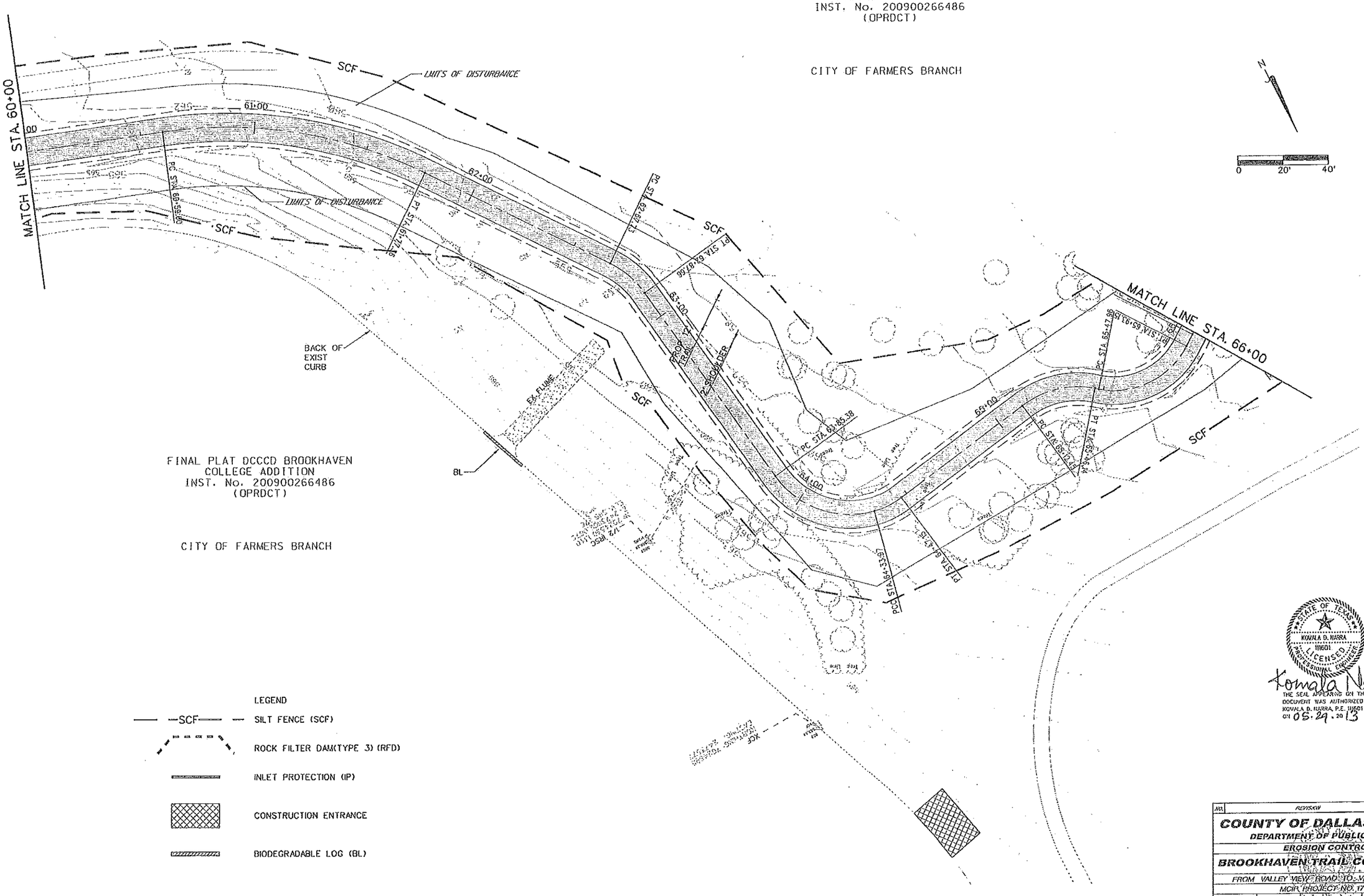
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - SR	DATE: NOVEMBER 2012	FILE: EROSION CONTROL S3
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: S3

RECORD AS - BUILT DRAWINGS

FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH



FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

LEGEND

- SCF — SILT FENCE (SCF)
- ROCK FILTER DAM(TYPE 3) (RFD)
- INLET PROTECTION (IP)
- CONSTRUCTION ENTRANCE
- BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOVALA D. NARRA
111601
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PROFESSIONAL ENGINEER

Kovala Narra

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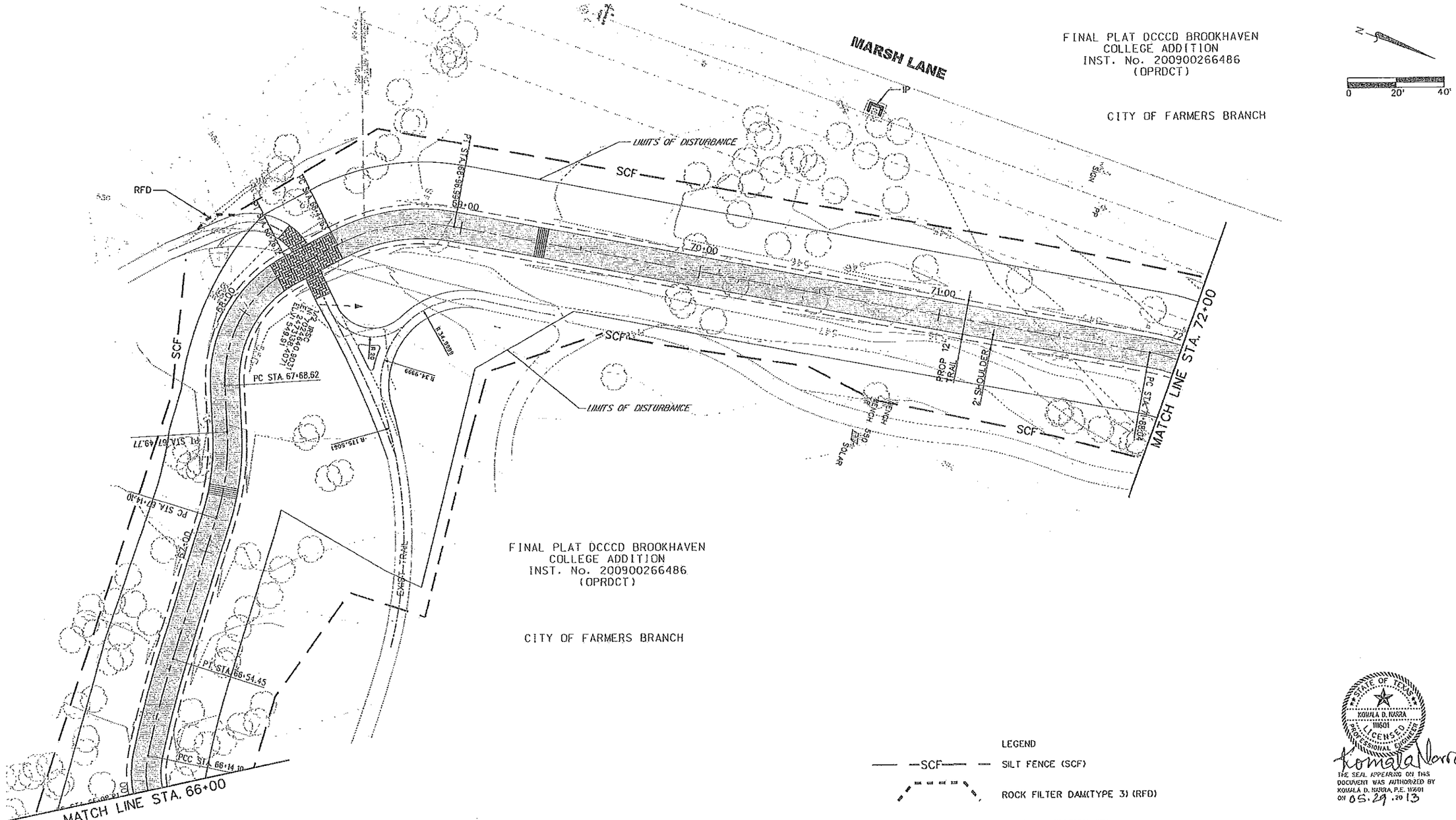
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JR	DATE: 12/13	FILE: EROSION CONTROL 54
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: 54

RECORD AS - BUILT DRAWINGS



FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

LEGEND

- SCF — SILT FENCE (SCF)
- ROCK FILTER DAM(TYPE 3) (RFD)
- INLET PROTECTION (IP)
- CONSTRUCTION ENTRANCE
- BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOMALA D. NARRA
111601
LICENSED PROFESSIONAL ENGINEER

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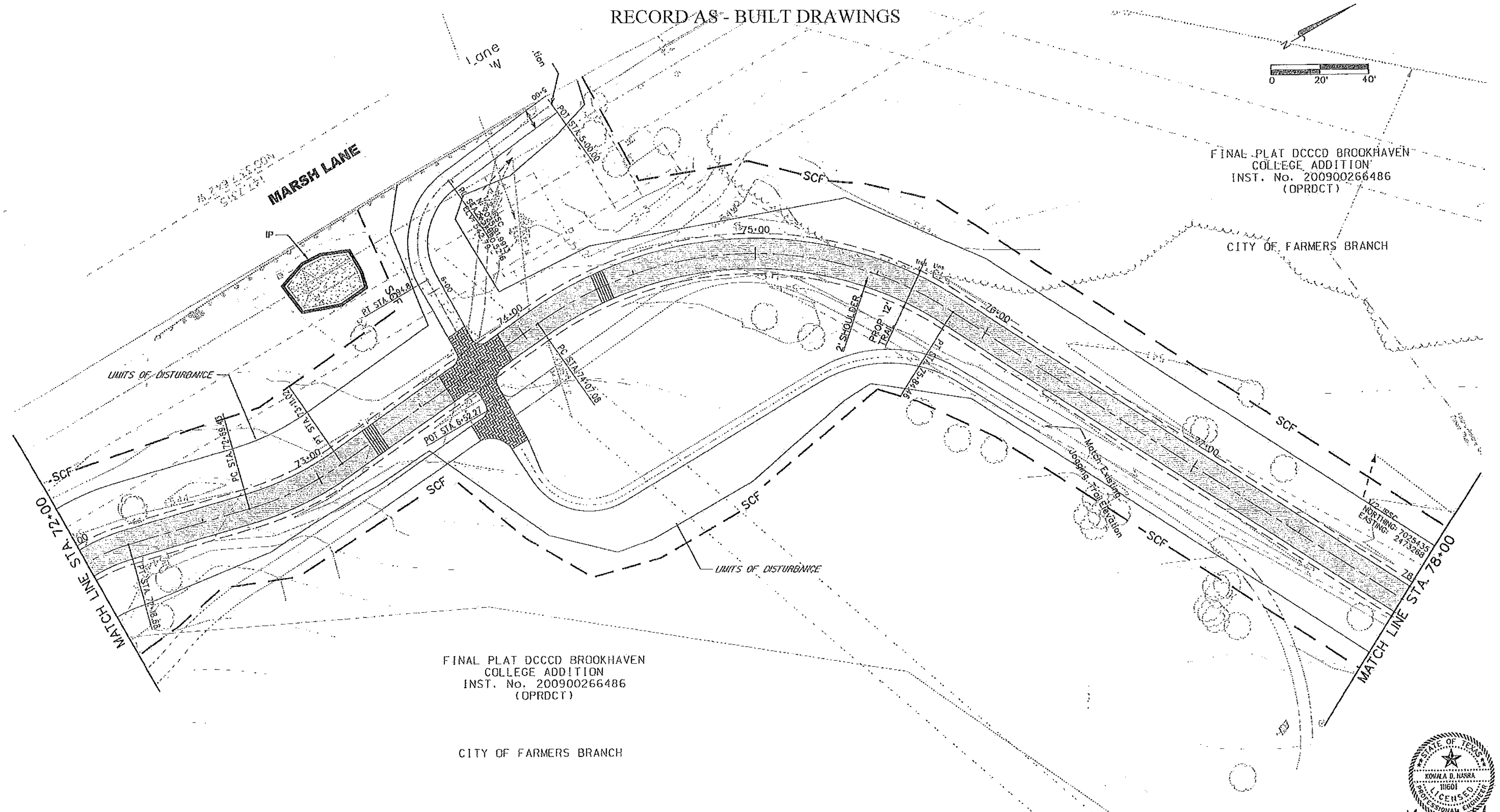
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIR PROJECT NO. 17701

DESIGNED - KK	DRAWN - SR	DATE: 05	REF: EROSION CONTROL 55
APPROVED - KK	CHECKED - KK	SCALE:	SHEET: 55

RECORD AS - BUILT DRAWINGS



LEGEND

—SCF—	SILT FENCE (SCF)
	ROCK FILTER DAM(TYPE 3) (RFD)
	INLET PROTECTION (IP)
	CONSTRUCTION ENTRANCE
	BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOMALA D. NASRA
111601
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PROFESSIONAL ENGINEER

Komala Nasra

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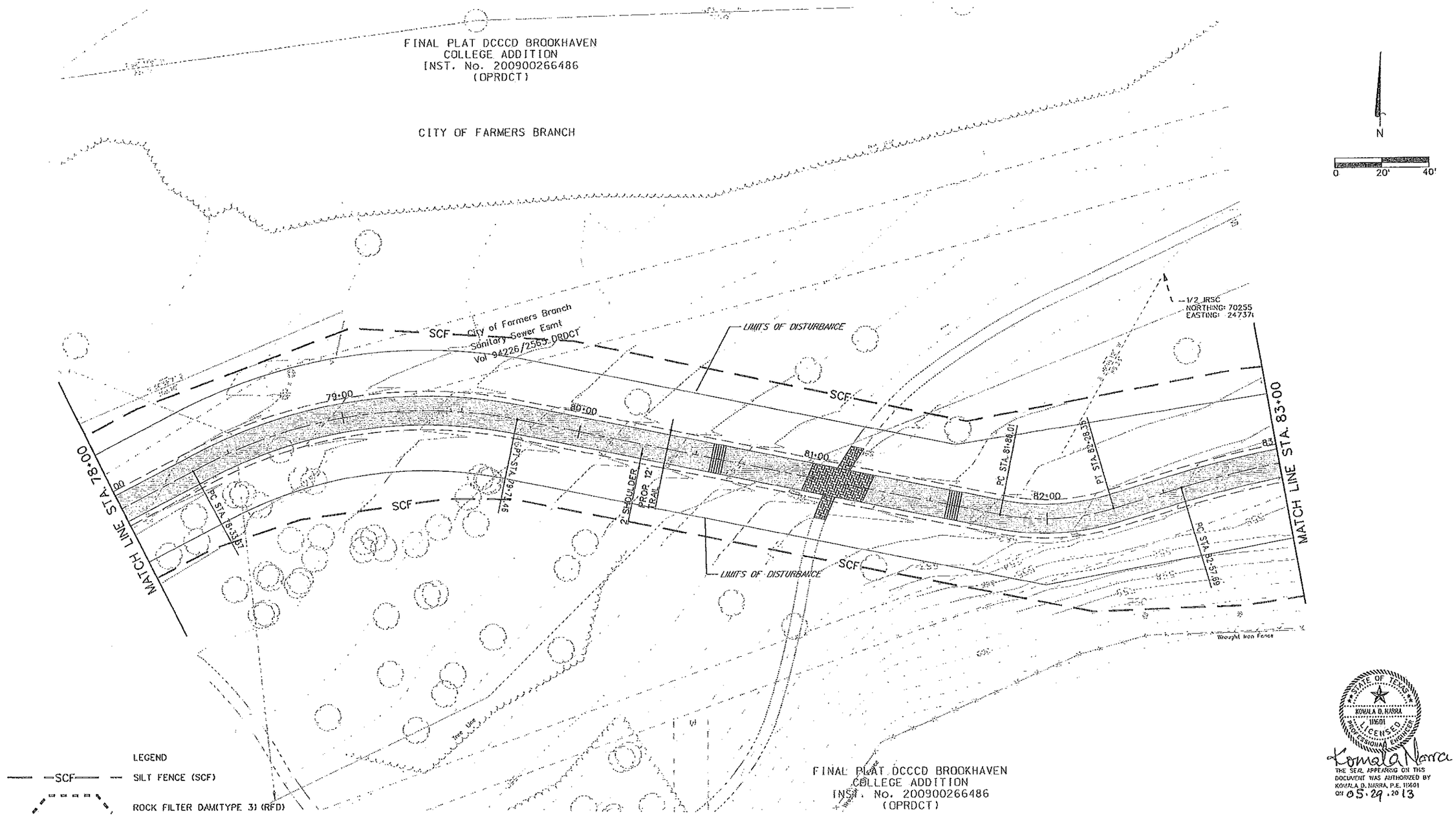
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JR	DATE-	FILE- EROSION CONTROL 56
APPROVED - KN	CHECKED - KN	SCALE-	SHEET- 56

RECORD AS - BUILT DRAWINGS



LEGEND

—SCF— SILT FENCE (SCF)

ROCK FILTER DAM(TYPE 3) (RFD)

INLET PROTECTION (IP)

CONSTRUCTION ENTRANCE

BIODEGRADABLE LOG (BL)

FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

STATE OF TEXAS
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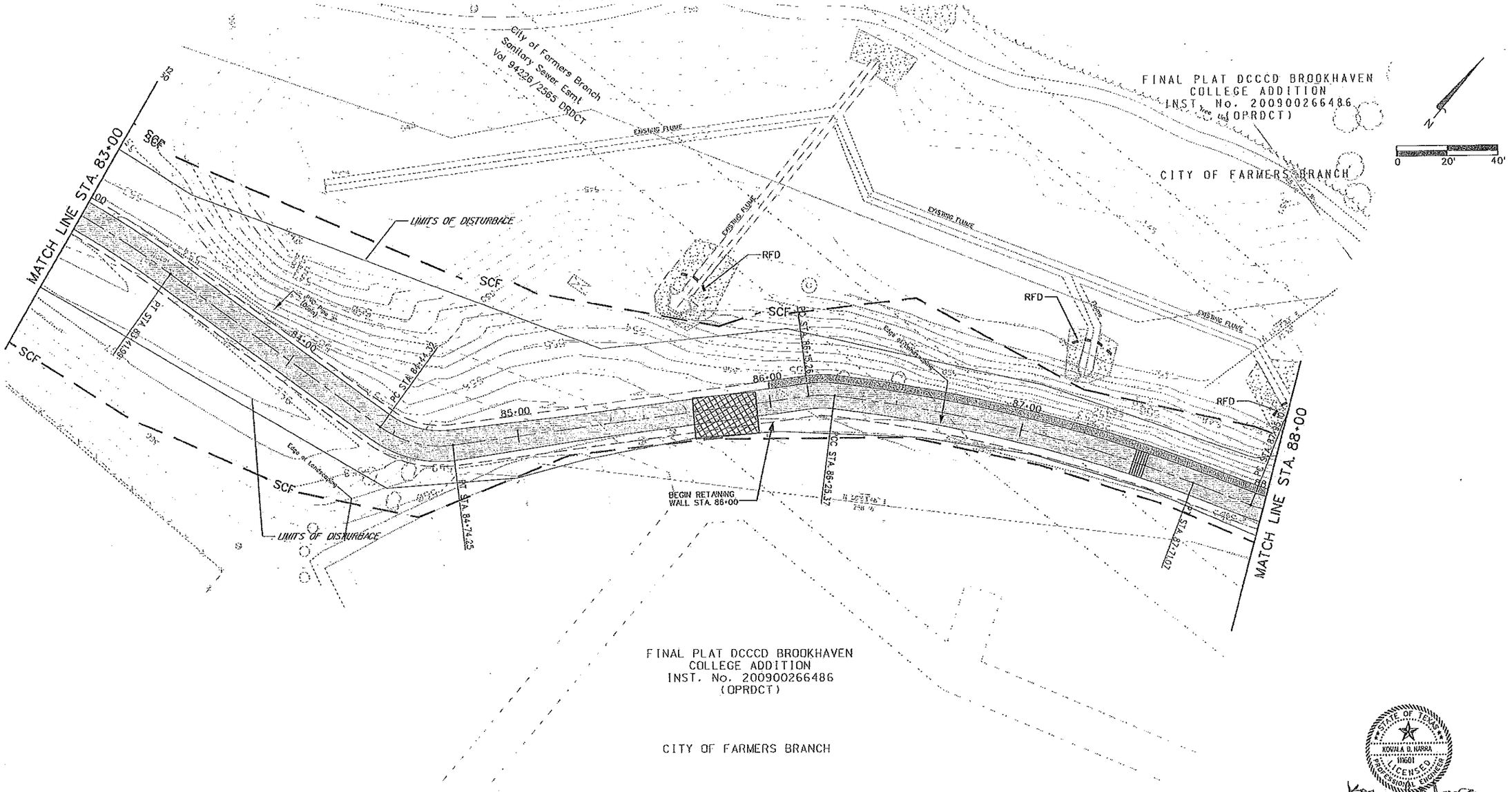
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JR	DATE: 05	FILE: EROSION CONTROL SH
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: SH

RECORD AS - BUILT DRAWINGS



FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

LEGEND

—SCF—	SILT FENCE (SCF)
	ROCK FILTER DAM(TYPE 3) (RFD)
	INLET PROTECTION (IP)
	CONSTRUCTION ENTRANCE
	BIODEGRADABLE LOG (BL)

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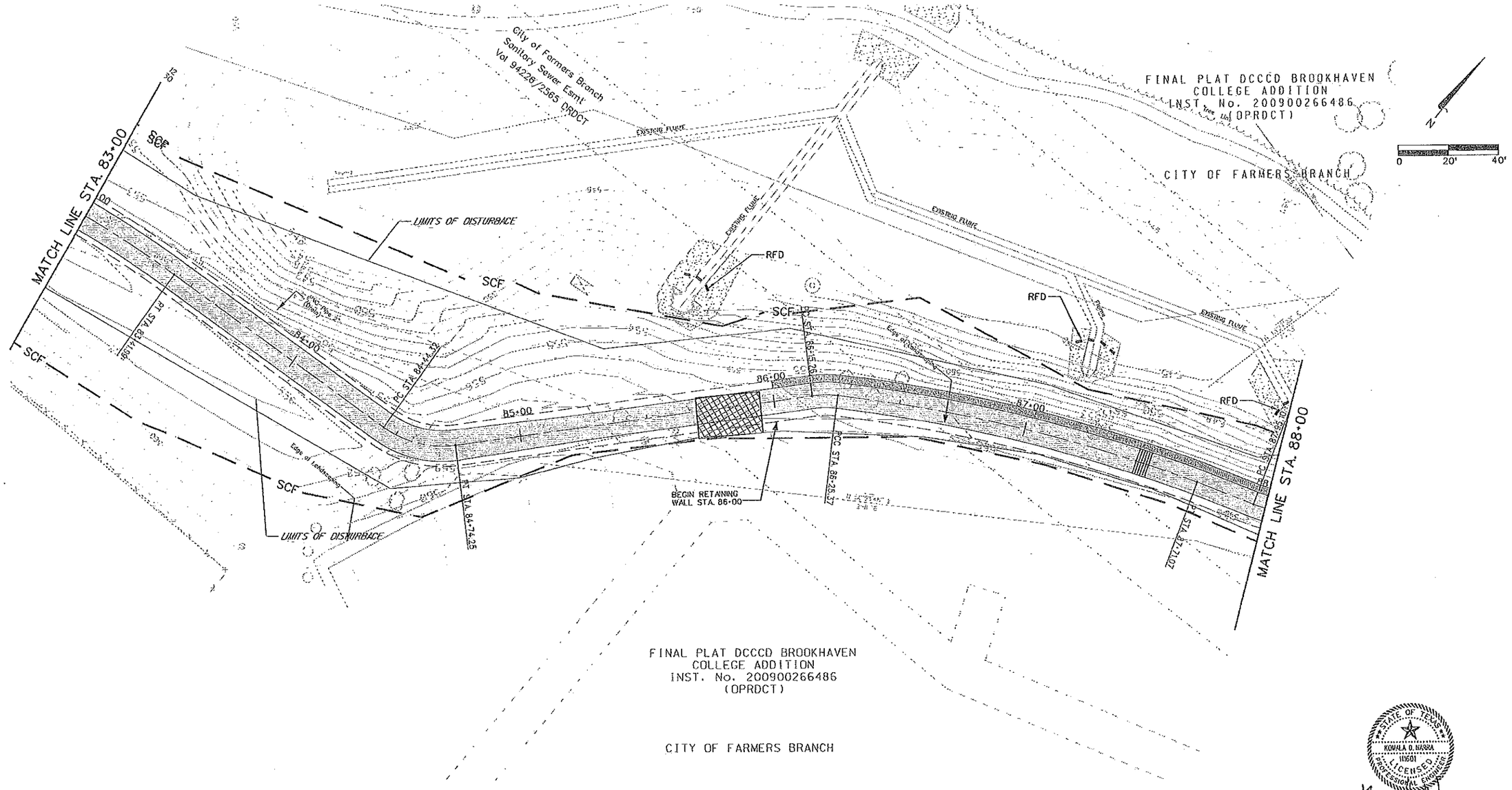
COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - JR	DATE: 05/24/13	FILE: EROSION CONTROL 58
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: 58

RECORD AS - BUILT DRAWINGS



FINAL PLAT DCCCD BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

LEGEND

—SCF—	SILT FENCE (SCF)
	ROCK FILTER DAM(TYPE 3) (RFD)
	INLET PROTECTION (IP)
	CONSTRUCTION ENTRANCE
	BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOMALA D. NARRA
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Komala Narra

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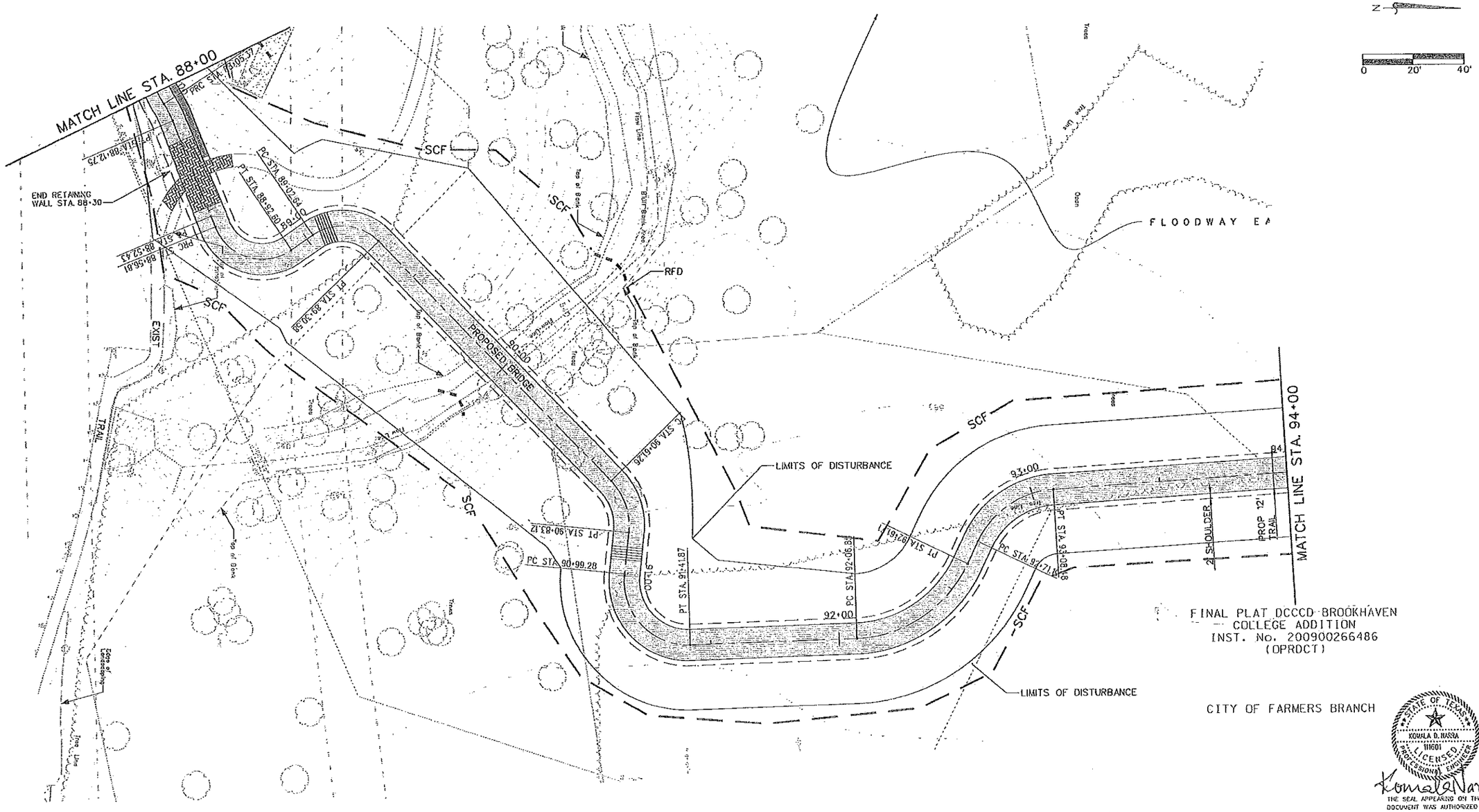
NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - KN	DATE: 05/29/13	FILE: EROSION CONTROL SS
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: SS

RECORD AS - BUILT DRAWINGS



FINAL PLAT DCCCD-BROOKHAVEN
COLLEGE ADDITION
INST. No. 200900266486
(OPRDCT)

CITY OF FARMERS BRANCH

STATE OF TEXAS
KOMALA D. NARRA
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ON 05.29.2013

LEGEND

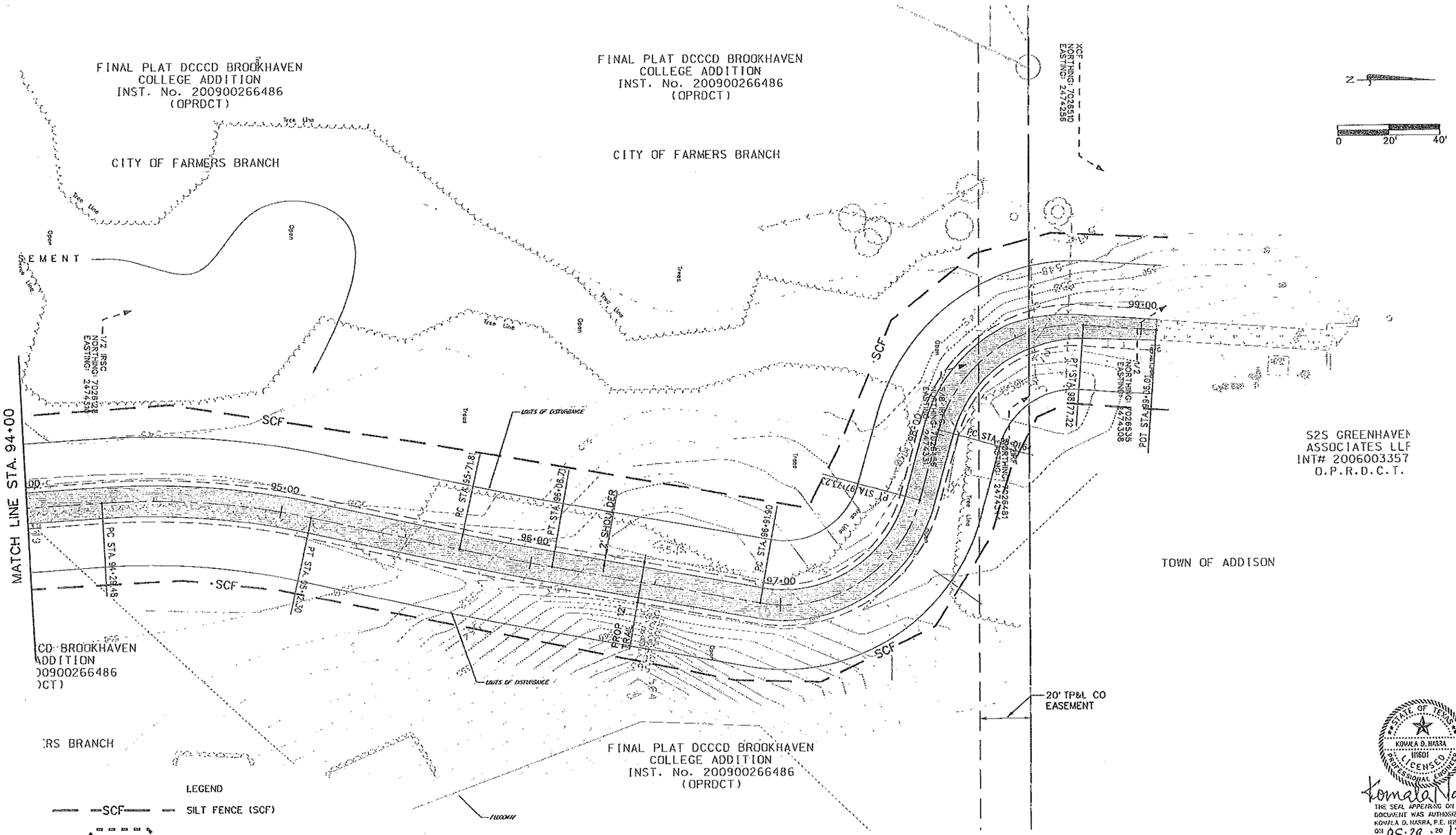
- SCF — SILT FENCE (SCF)
- ROCK FILTER DAM(TYPE 3) (RFD)
- INLET PROTECTION (IP)
- CONSTRUCTION ENTRANCE
- BIODEGRADABLE LOG (BL)

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KK	CHKD. - KK	DWG. 01	FILE: EROSION CONTROL 59
APPROVED - KK	CHECKED - KK	SCALE:	SHEET: 59

RECORD AS - BUILT DRAWINGS



LEGEND

—SCF—	SILT FENCE (SCF)
	ROCK FILTER DAM(TYPE 3) (RFD)
	INLET PROTECTION (IP)
	CONSTRUCTION ENTRANCE
	BIODEGRADABLE LOG (BL)

STATE OF TEXAS
KOMALA D. NASRA
111601
LICENSED
PROFESSIONAL ENGINEER

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NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
BROOKHAVEN TRAIL CONNECTION
FROM VALLEY VIEW ROAD TO VITRUVIAN TRAIL
MCIP PROJECT NO. 17701

DESIGNED - KN	DRAWN - SB	DATE:	FILE: EROSION CONTROL 60
APPROVED - KN	CHECKED - KN	SCALE:	SHEET: 60

RECORD AS - BUILT DRAWINGS

A. GENERAL SITE DATA

1. PROJECT LIMITS: *From Valley View Lane to Vitruvian Trail*

Project Coordiates: N; 2,474,224.2853 E; 7,023,557.3398

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: Drainage Area Maps N/A*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections (Sheet 5A & 5B)*
- *Location of Erosion and Sediment Controls: SW3P Site Maps (Sheets 57-61)*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layouts N/A*
- *Project Specific Locations: To be specified by the Project Field Office during construction and located in the Project SW3P File. Reference Item #10 below.*

3. PROJECT DESCRIPTION:

For the construction of 12' bike and bike trail, on the campus of Brookhaven College

4. MAJOR SOIL DISTURBING ACTIVITIES:

Excavation for the pavement slabs and grading of ditches to facilitate drainage along portions of the trail.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

This is a moderately deep, well drained, gently sloping soil. Typically, the surface layer is moderately alkaline, very dark grayish brown silty clay. Runoff is medium, and hazard of errosion is moderate. Vegetative cover consists of native grasses with weeds in good condition and approximately 95% coverage.

6. TOTAL PROJECT AREA: 6.76 Acres

7. TOTAL AREA TO BE DISTURBED: 6.76 Acres (100 %)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION:	0.7
AFTER CONSTRUCTION:	0.7

9. NAME OF RECEIVING WATERS:

Drainage outfalls into Farmers Branch Creek which outfalls into the Upper Trinity River.

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:

None

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: ___ (Select T = Temporary or P = Permanent, as applicable)

___	TEMPORARY SEEDING	P	PRESERVATION OF NATURAL RESOURCES
___	MULCHING (Hay or Straw)	___	FLEXIBLE CHANNEL LINER
___	BUFFER ZONES	P	RIGID CHANNEL LINER
___	PLANTING	___	SOIL RETENTION BLANKET
P	SEEDING	P	COMPOST MANUFACTURED TOPSOIL
P	SODDING	___	OTHER: *(Specify Practice)*

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- ___ EROSION CONTROL COMPOST LOGS
- ___ EROSION CONTROL COMPOST BERMS (Low Velocity)
- T ROCK FILTER DAMS
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ___ DIVERSION DIKE AND SWALE COMBINATIONS
- T PIPE SLOPE DRAINS
- ___ PAVED FLUMES
- T ROCK BEDDING AT CONSTRUCTION EXIT
- ___ TIMBER MATTING AT CONSTRUCTION EXIT
- ___ CHANNEL LINERS
- T SEDIMENT TRAPS
- ___ SEDIMENT BASINS
- T STORM INLET SEDIMENT TRAP
- ___ STONE OUTLET STRUCTURES
- ___ CURBS AND GUTTERS
- ___ STORM SEWERS
- ___ VELOCITY CONTROL DEVICES
- OTHER: *(Specify Practice)*

3. STORM WATER MANAGEMENT:

1. Storm water drainage will be provided by ditches, inlets, and storm water systems which carry drainage within the R.O.W. to the laws within the roadway and project site which drains to natural facilities.

2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4 :1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

The Contractor will install SW3P control measures prior to beginning any earthwork or excavation operations, and shall maintain the system until the disturbed area is stabilized and construction is completed.

5. NON-STORM WATER DISCHARGES:

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water; and water used for dust control, pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

Maintain all erosion and sediment controls in good working order. Perform any necessary repairs at the earliest date possible but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. Stabilize disturbed areas on which construction activities have ceased, temporarily or permanently, within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways have priority followed by devices protecting storm sewer inlets.

2. WASTE MATERIALS:

On a regular basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

3. HAZARDOUS WASTE & SPILL REPORTING:

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

4. SANITARY WASTE:

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

5. OFFSITE VEHICLE TRACKING:

On a regular basis, or as may be directed, dampen haul roads for dust control and stabilize construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a weekly basis, or as may be directed, to remove sediment from paved roadways abutting or transversing the project site.

6. MANAGEMENT PRACTICES:

1. Construct disposal areas, stockpiles and haul roads in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
2. Locate construction staging areas and vehicle maintenance areas in a manner to minimize the runoff of pollutants.
3. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
4. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

STATE OF TEXAS
KOVILA D. NARRA
91601
LICENSED
PROFESSIONAL ENGINEER

Kovila Narra

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY KOVILA D. NARRA, P.E. 91601 ON 05.29.2013

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS

BROOKHAVEN TRAIL EXTENSION
MCIP PROJECT # 11701

DESIGNED-KN	DRAWN- SR	DATE- 5/29/2013	FILE- SW3P_Sheet 61
APPROVED-TS	CHECKED-KN	SCALE- 1-40 / 1-20	SHEET 61

GENERAL NOTES FOR STRUCTURES:

1. REFERENCES TO TXDOT SHALL BE THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES, 2004 EDITION.

2. CONCRETE MIX DESIGN SHALL BE IN ACCORDANCE WITH TXDOT ITEM 421, HYDRAULIC CEMENT CONCRETE. ALL CONCRETE SHALL BE CLASS C AND HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,600 PSI. ALL MIX DESIGNS SHALL BE SUBMITTED FOR APPROVAL.

3. CONCRETE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE LATEST EDITION OF ACI 318 AND TXDOT ITEM 420, CONCRETE STRUCTURES.

4. CHAMFER ALL EXPOSED EDGES OF CONCRETE STRUCTURES ½" UNLESS NOTED OTHERWISE ON DETAILS.

5. ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 IN ACCORDANCE WITH TXDOT ITEM 440, REINFORCING STEEL. SUBMIT CERTIFICATION FOR ALL REINFORCING STEEL.

6. ALL BAR DIMENSIONS ARE TO OUTSIDE OF BAR UNLESS OTHERWISE SHOWN.

7. DOWEL BARS SHALL BE PRE-SET OR DRILLED AND EPOXIED INTO FULLY HARDENED CONCRETE. PUSHING DOWEL BARS INTO GREEN CONCRETE IS NOT PERMITTED.

8. REINFORCED CONCRETE PIERS SHALL CONFORM TO THE GEOTECHNICAL REPORT AND TXDOT ITEM 416, DRILLED SHAFT FOUNDATIONS.

9. JOINT SEALERS AND FILLERS SHALL BE IN ACCORDANCE WITH TXDOT ITEM 438, CLEANING AND SEALING JOINTS AND BRIDGE CRACKS. SUBMIT PRODUCT DATA FOR ALL JOINTS AND SEALANTS. SEALANT SHALL BE POLYURETHANE.

10. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND BRACING ALL WORK INCLUDING THE PROTECTING OF ALL EXISTING STRUCTURES AND UTILITIES DURING CONSTRUCTION. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING STRUCTURES AND UTILITIES PRIOR TO THE START OF CONSTRUCTION.

11. ALL BACKFILL MATERIAL SHALL BE SELECT FILL IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT FOR THE PROJECT AND TXDOT SPECIFICATIONS.

12. PREMANUFACTURED BRIDGE STRUCTURE SHALL BE AS MANUFACTURED BY 'CONTECH BRIDGE SOLUTIONS' OR EQUAL, AND SHALL HAVE THE APPEARANCE OF A 'CONTINENTAL KEYSTONE' STYLE BRIDGE. BRIDGE TO MATCH THE EXISTING PEDESTRIAN BRIDGE AT THE ADJACENT VITRUVIAN PARK.

13. BRIDGE STRUCTURE SHALL BE DESIGNED FOR THE FOLLOWING CRITERIA:
    1) VEHICLE LOAD = 10,000 LB.
    2) DEAD LOAD = 115,100 LB
    3) LIVE LOAD = 85PSF
    4) DECKING = CONCRETE
    5) RAIL HEIGHT = 54 INCHES
    6) TRUSS = A588 WEATHERING STEEL
    7) DESIGN FLOOD ELEVATION = 548.95 FT.
    8) CLEAR TRAVEL WIDTH = 14 FT.

14. RAILING IS TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS AND SUBMITTED FOR APPROVAL. ALL PIPE USED FOR RAILINGS SHALL BE STANDARD WEIGHT.

15. RUB RAIL SHALL BE PROVIDED IN ACCORDANCE WITH MANUFACTURER INSTALLATION.

16. CONTRACTOR SHALL SUBMIT BRIDGE SHOP DRAWINGS THAT CONFORM TO THE GEOMETRY AND ABUTMENT CONFIGURATION AS SHOWN ON THE PLANS. IF CONTRACTOR SUBMITS A DIFFERENT CONFIGURATION FOR APPROVAL, IT SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COSTS INCURRED FOR THE ALTERNATE DESIGN INCLUDING SHOP DRAWING REVIEW AND APPROVAL BY THE COUNTY AND THE COUNTY'S ENGINEER.

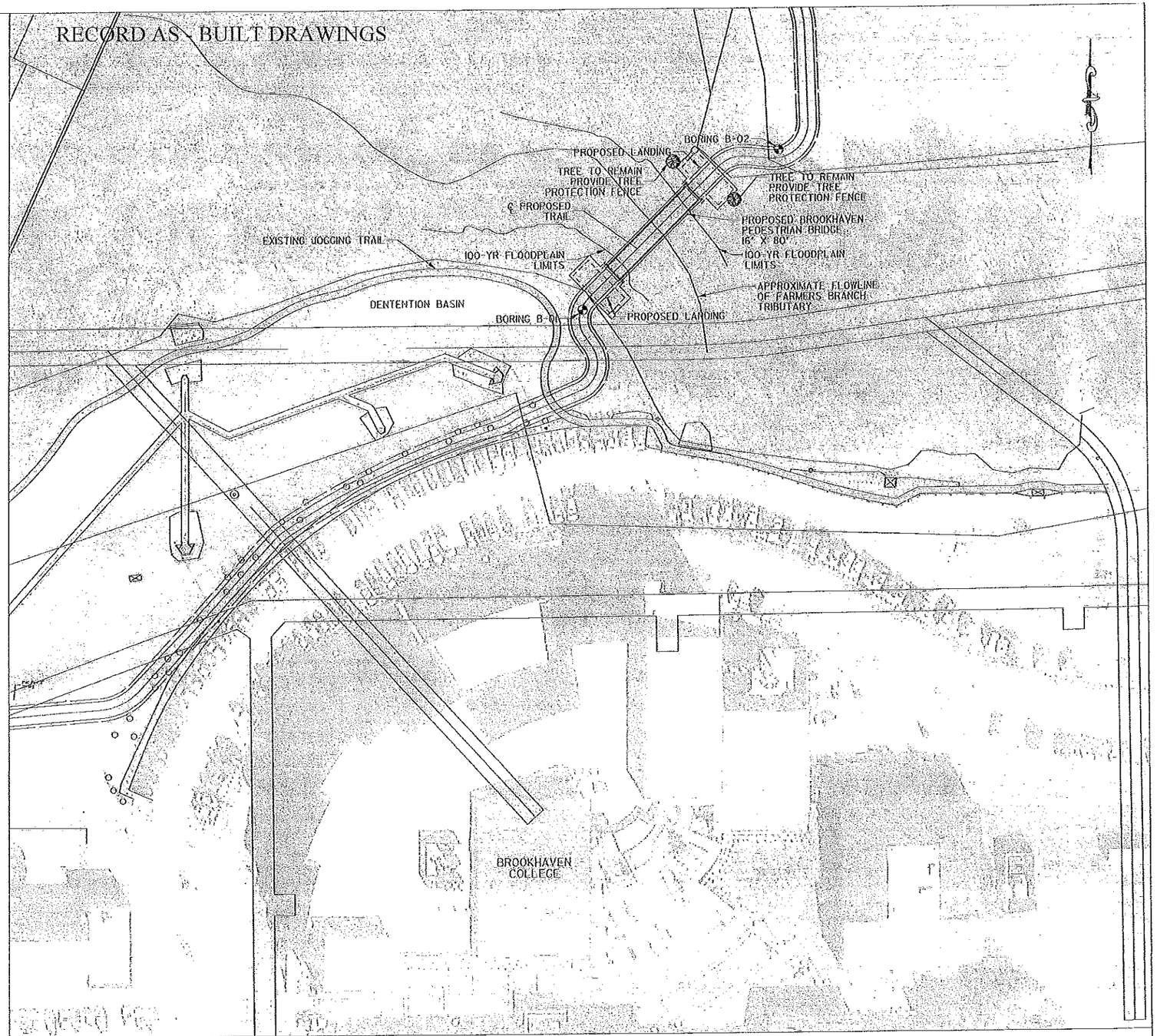
17. SHOP DRAWINGS FOR BRIDGE SHALL BE SUBMITTED NO LATER THAN THE PRE - CONSTRUCTION MEETING.

18. CONTRACTOR SHALL COORDINATE WITH DALLAS COUNTY FOR ANY TREES REQUIRING TRIMMING OR REMOVAL FOR BRIDGE CONSTRUCTION.

19. A LOAD LIMIT SIGN (5 TONS MAX) SHALL BE INSTALLED AT EACH END OF THE BRIDGE BY THE MANUFACTURER. SIGN SHALL BE INCLUDED IN BRIDGE SHOP DRAWINGS FOR COUNTY APPROVAL. NO SEPARATE PAY ITEM.

20. REFER TO TRAIL SHEETS FOR CLEARING AND GRUBBING, TRAFFIC CONTROL, EROSION CONTROL, AND STABILIZATION FOR THIS PROJECT.

RECORD AS - BUILT DRAWINGS



ACOSTA D. SALDANA
106282
LICENSED PROFESSIONAL ENGINEER
4/22/13

revisions	date

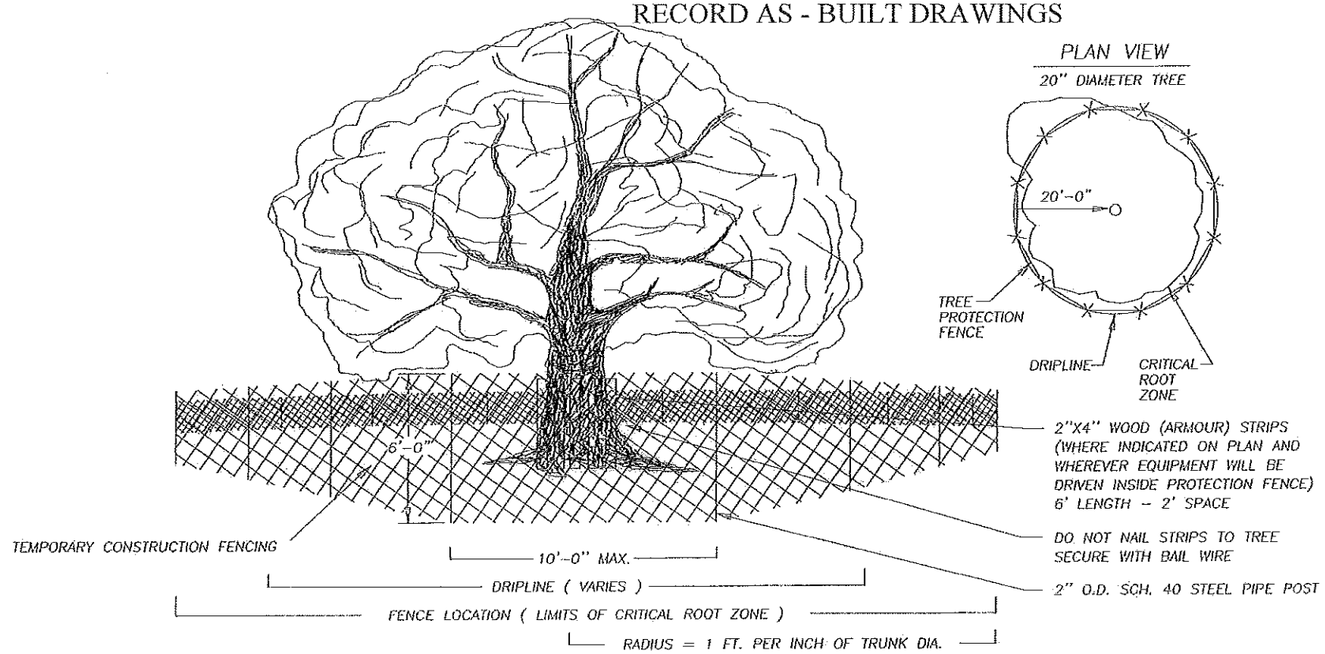
NDM NATHAN D. MAIER
CONSULTING ENGINEERS, INC.
FIRM REGISTRATION NO.: F-356
Two Park Lane Place / 8080 Park Lane / Suite 600
Dallas, Texas 75231 / (214) 739-4741

DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
SITE PLAN

sheet no.	
2	9

design	drawn	scale	date	file name	job number
ADS	ADS	1"=80'	4/22/2013	12015SM01	12-015

RECORD AS - BUILT DRAWINGS



TREE PROTECTION NOTES:

1. TREE PROTECTION SHALL BE PROVIDED AS SHOWN IN THE DRAWINGS OR AS DIRECTED BY THE OWNER.
2. TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING, OR GRADING).
3. FENCES SHALL COMPLETELY SURROUND THE TREE OR CLUSTERS OF TREES; WILL BE LOCATED AT THE OUTERMOST LIMITS OF THE TREE BRANCHES (DRIPLINE); AND WILL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:
   - A. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC OR STORAGE OF EQUIPMENT OR MATERIALS.
   - B. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN 6 INCHES CUT OR FILL).
   - C. WOUNDS TO EXPOSED ROOTS, TRUNK OR LIMBS BY MECHANICAL EQUIPMENT.
   - D. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CHEMICAL STORAGE, CEMENT TRUCK CLEANING, AND FIRES.
4. WHERE ANY OF THE ABOVE EXCEPTION RESULT IN A FENCE BEING CLOSER THAN 4 FEET TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF 8 FEET (OR TO THE LIMITS OF LOWER BRANCHES) IN ADDITION TO THE REDUCED FENCING PROVIDED.
5. ALL GRADING WITHIN PROTECTED ROOT ZONE AREA SHALL BE DONE BY HAND OR WITH SMALL EQUIPMENT TO MINIMIZE ROOT DAMAGE. PRIOR TO GRADING, RELOCATE PROTECTIVE FENCING TO 2 FEET BEHIND THE GRADE CHANGE AREA.
6. PRIOR TO EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLINES, MAKE A CLEAN CUT BETWEEN THE DISTURBED AND UNDISTURBED ROOT ZONES WITH A ROCK SAW OR SIMILAR EQUIPMENT TO MINIMIZE DAMAGE TO REMAINING ROOTS.
7. TREES MOST HEAVILY IMPACTED BY CONSTRUCTION ACTIVITIES SHOULD BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS SHOULD BE SPRAYED WITH WATER PERIODICALLY TO REDUCE DUST ACCUMULATION ON THE LEAVES.
8. ANY TRENCHING REQUIRED FOR THE INSTALLATION OF LANDSCAPE IRRIGATION SHALL BE PLACED AS FAR FROM EXISTING TREE TRUNKS AS POSSIBLE.
9. NO LANDSCAPE TOPSOIL DRESSING GREATER THAN 4 INCHES SHALL BE PERMITTED WITHIN THE DRIPLINE OF TREES. NO SOIL IS PERMITTED ON THE ROOT FLARE OF ANY TREE.
10. PRUNING TO PROVIDE CLEARANCE OF STRUCTURES, VEHICULAR TRAFFIC AND EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS.
11. ALL FINISHED PRUNING MUST BE PERFORMED BY A CERTIFIED ARBORIST.
12. OWNER SHALL BE CONTACTED PRIOR TO REMOVAL OR TRIMMING OF ANY TREES.

TREE PROTECTION

N.T.S.

STATE OF TEXAS
AUDREY D. SALDANA
106202
LICENSED PROFESSIONAL ENGINEER
4/22/13

revisions	date

NDM NATHAN D. MAIER CONSULTING ENGINEERS, INC.
FIRM REGISTRATION NO.: F-356
Two Park Lane Place / 8080 Park Lane / Suite 600
Dallas, Texas 75231 / (214) 739-4741

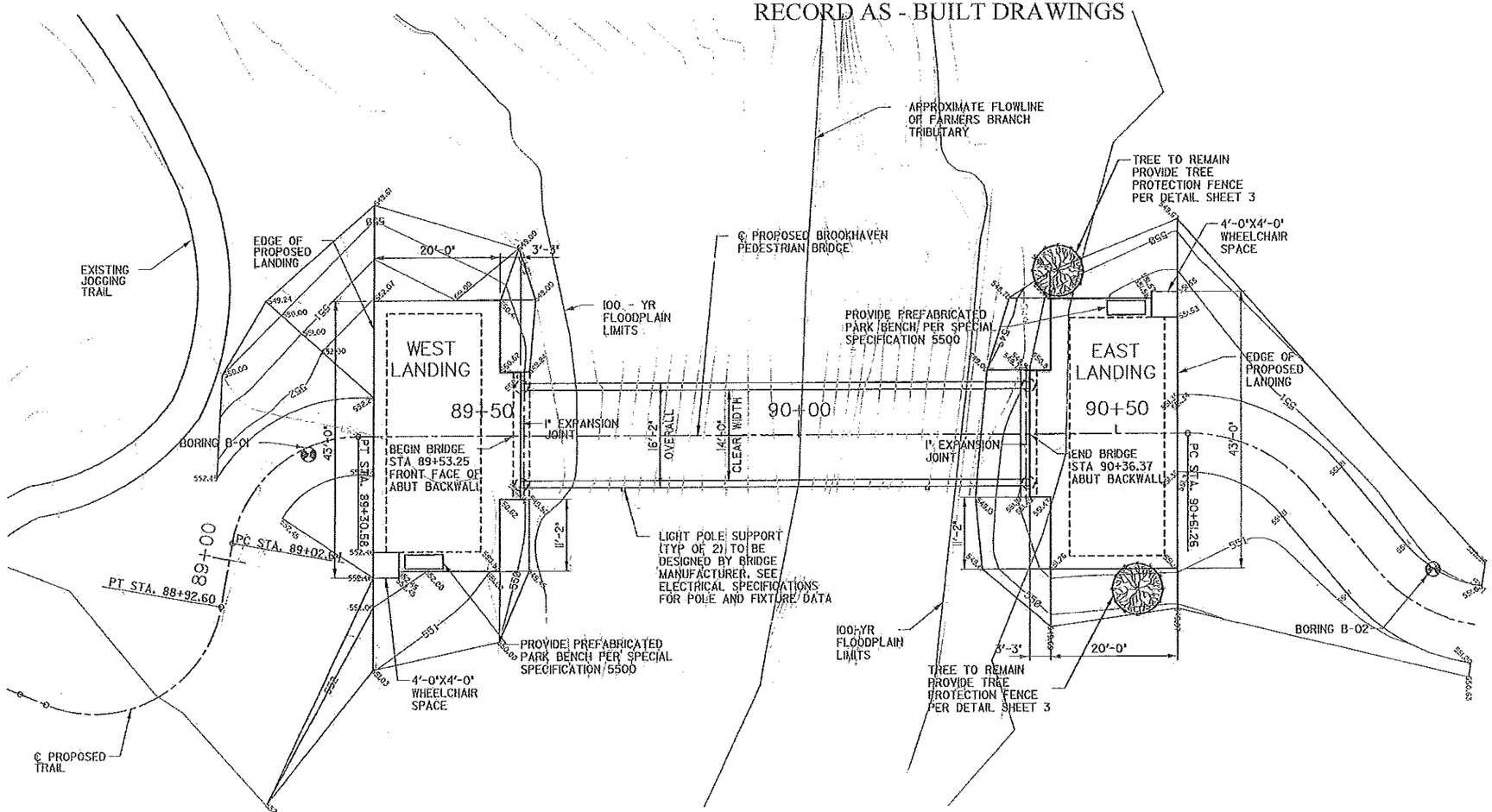
DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
TREE PROTECTION DETAIL

design	drawn	scale	date	file name
AOS	AOS	N.T.S	4/22/2013	12015TP01

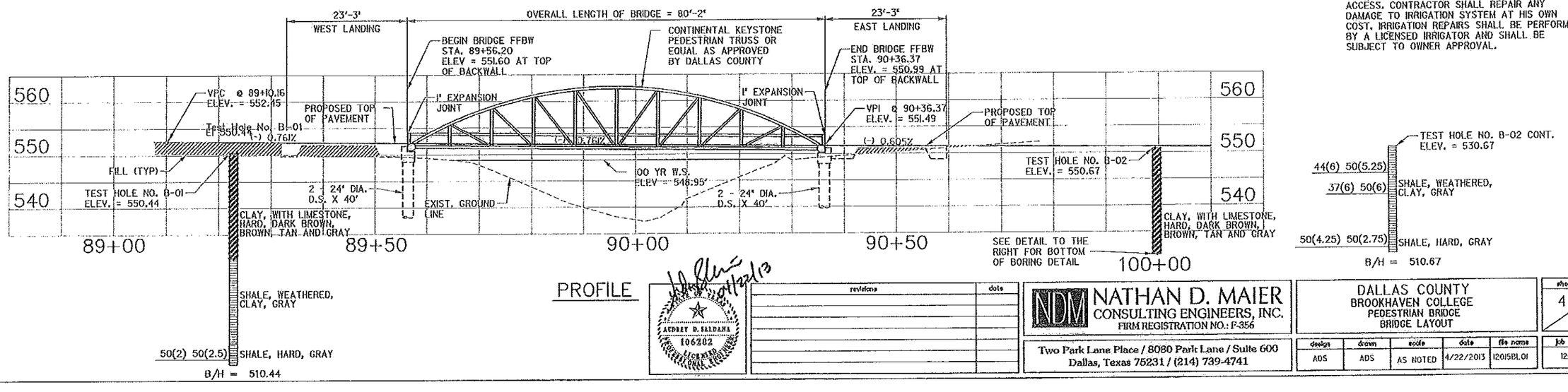
sheet no. 3 / 9

job number 12-015

RECORD AS - BUILT DRAWINGS



PLAN



PROFILE

NOTES:

1. SEE GENERAL NOTES FOR STRUCTURES ON SHEET 2.
2. SEE THE GEOTECHNICAL ENGINEERING REPORT FOR THE PROJECT FOR BORING DATA.
3. BRIDGE BEGIN AND END ELEVATIONS AT CENTERLINE OF BRIDGE SET AT THE TOP OF ABUTMENT BACKWALL AT FFBW (FRONT FACE OF BACKWALL).
4. CONTRACTOR SHALL LOCATE AND PROTECT ANY IRRIGATION IN THE AREA OF WORK, STAGING AND ACCESS. CONTRACTOR SHALL REPAIR ANY DAMAGE TO IRRIGATION SYSTEM AT HIS OWN COST. IRRIGATION REPAIRS SHALL BE PERFORMED BY A LICENSED IRRIGATOR AND SHALL BE SUBJECT TO OWNER APPROVAL.

STATE OF TEXAS AUDREY B. BALDAMA 106282 LICENSED PROFESSIONAL ENGINEER 04/22/13

revisions	date

NATHAN D. MAIER CONSULTING ENGINEERS, INC.
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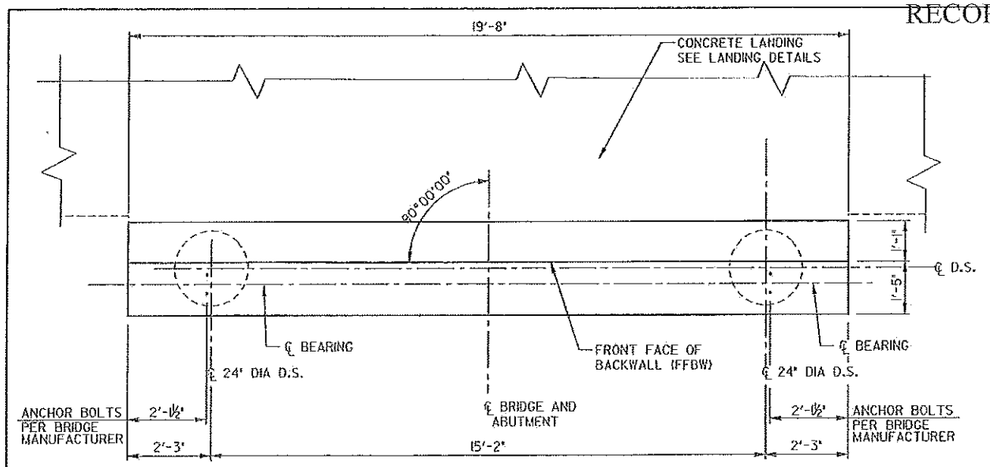
Two Park Lane Place / 8080 Park Lane / Suite 600
Dallas, Texas 75231 / (214) 739-4741

DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
BRIDGE LAYOUT

sheet no. 4 / 9

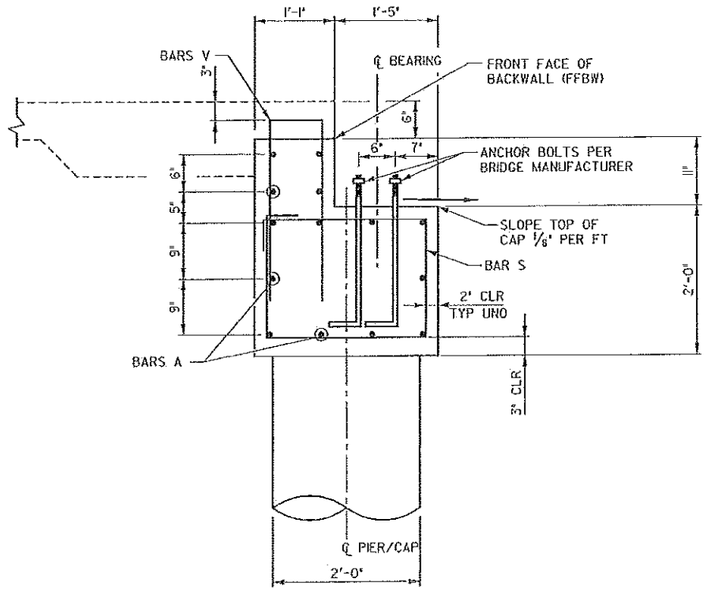
design	drawn	scale	date	file name	job number
ADS	ADS	AS NOTED	4/22/2013	12015BL01	12-015

RECORD AS - BUILT DRAWINGS



ABUTMENT PLAN

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



SECTION A-A

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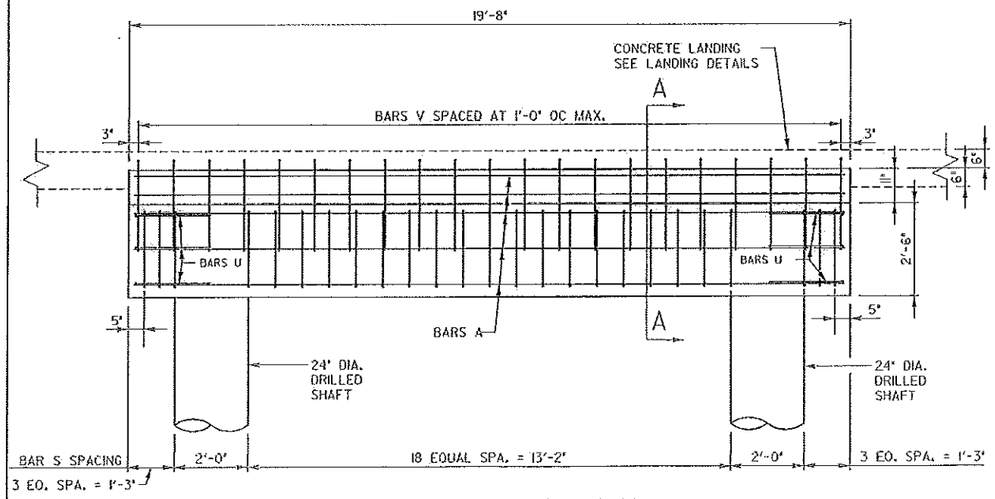
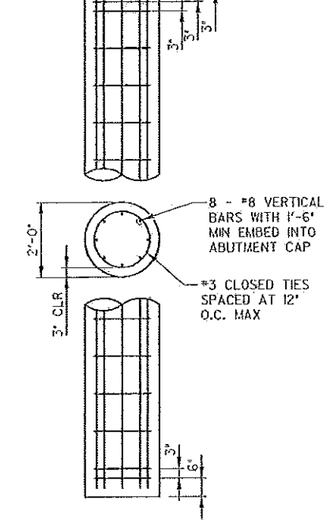


ABUTMENT ELEVATION

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



DRILLED SHAFT DETAIL

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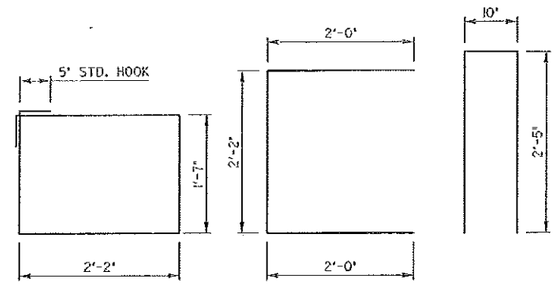

BARS S BARS U BARS V

NOTES:

1. TEST HOLE DATA PROVIDED BY GORRONDONA & ASSOCATES, INC. REPORT No. 12-0173, DATED JULY 2012. TEST HOLE LOCATIONS ARE APPROXIMATE.
2. CONTRACTOR SHALL LOCATE ALL UTILITIES AND INFORM THE ENGINEER IN WRITING OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
3. LIGHT POLE SUPPORTS SHALL BE LOCATED ON VERTICAL TRUSS MEMBERS AT APPROXIMATE LOCATIONS SHOWN ON PLANS. TOP OF SUPPORT SHALL BE AT THE SAME ELEVATION AS THE TOP OF DECKING. EXACT LOCATION TO BE CONFIRMED IN SHOP DRAWING.
4. CONTRACTOR TO VERIFY ABUTMENT BACKWALL TO ABUTMENT BACKWALL LENGTH WITH BRIDGE MANUFACTURER.
5. ABUTMENT DIMENSIONS AND ANCHOR ROD LOCATIONS ARE TO BE COORDINATED WITH BRIDGE MANUFACTURER PRIOR TO CONSTRUCTION.
6. SHOP DRAWINGS FOR THE BRIDGE SHALL BE PROVIDED TO THE COUNTY AND THE ENGINEER FOR APPROVAL.
8. FOUND DRILLED SHAFTS AT DEPTHS AS SHOWN ON THE BRIDGE LAYOUT OR DEEPER AS NECESSARY TO PENETRATE THE SHALE A MINIMUM OF 6 FEET.

AUDREY D. GALDAVA
106282
LICENSED PROFESSIONAL ENGINEER
04/22/13

revisions	date

NDM NATHAN D. MAIER CONSULTING ENGINEERS, INC.
FIRM REGISTRATION NO.: F-356

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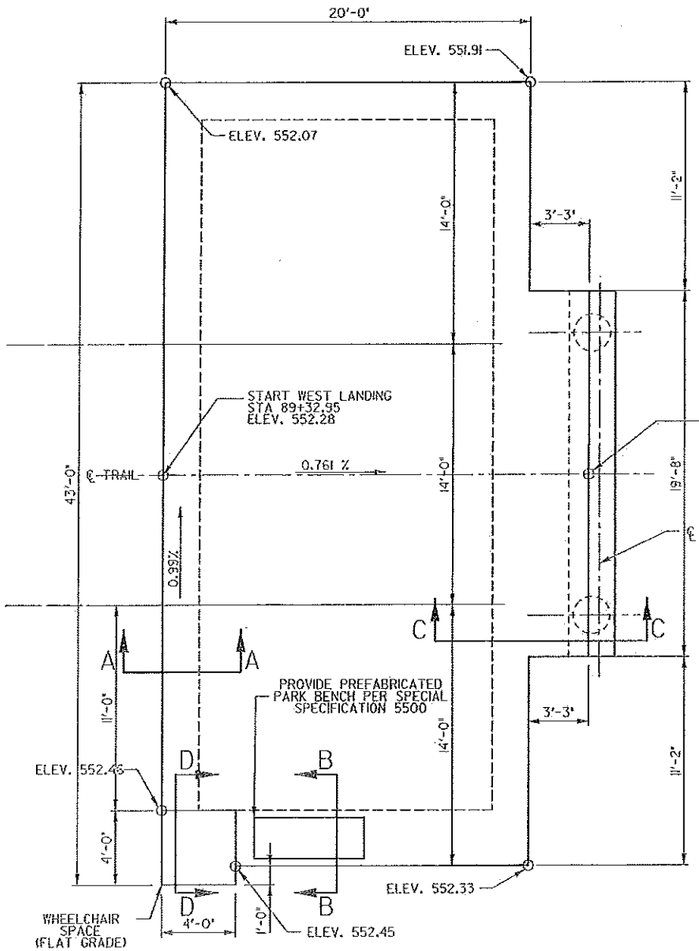
DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
TYPICAL ABUTMENT DETAILS

sheet no. 5/9

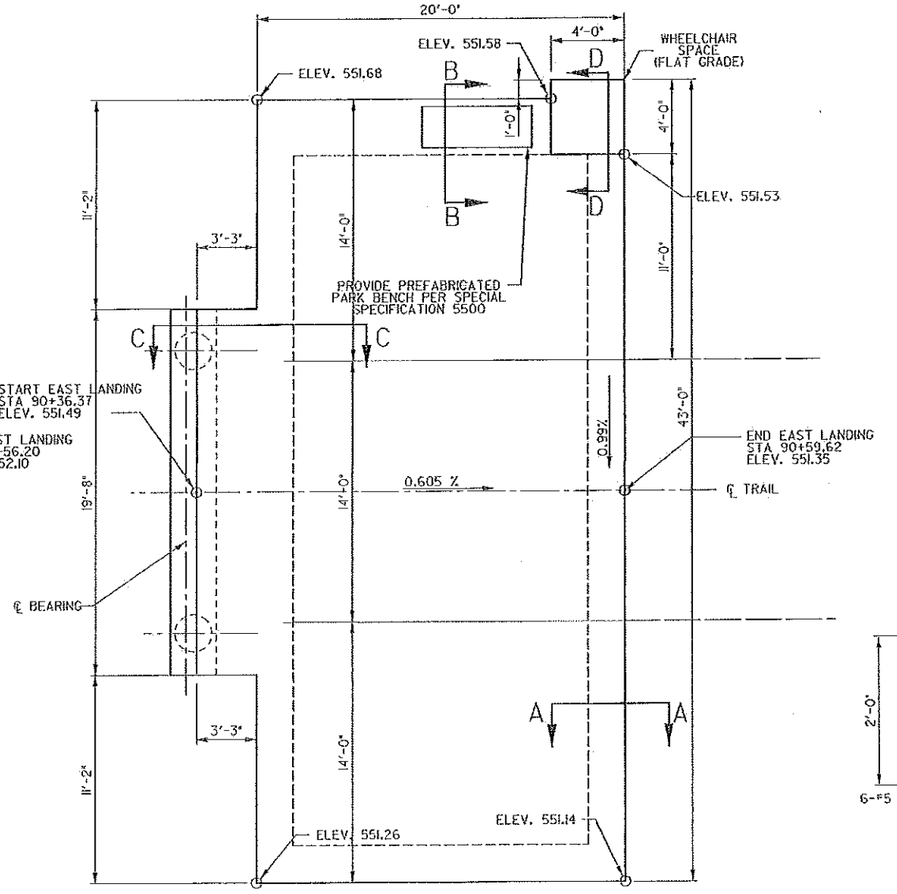
design	drawn	scale	date	file name	job number
ADS	ADS	AS NOTED	4/22/2013	12015AB01	12-015

RECORD AS - BUILT DRAWINGS

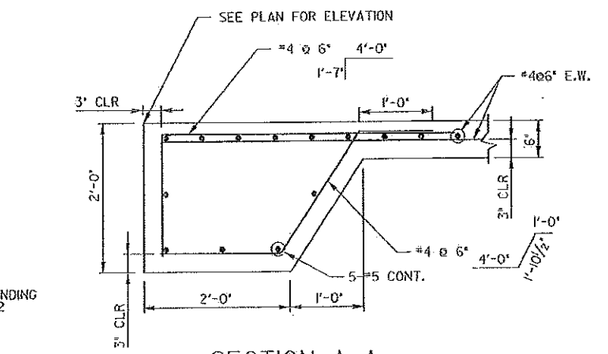
NOTES:
1. SEE GENERAL NOTES FOR STRUCTURES ON SHEET 2.
2. CROSS SLOPES ON LANDINGS NOT TO EXCEED 1.90%, SEE DETAILS FOR SPECIFIC GRADES.



WEST LANDING PLAN
SCALE: 1/8" = 1'-0"



EAST LANDING PLAN
SCALE: 1/8" = 1'-0"



SECTION A-A
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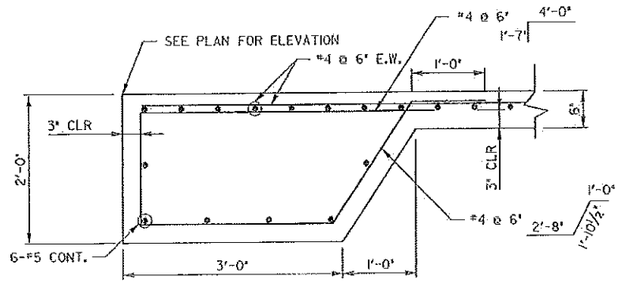

SECTION B-B
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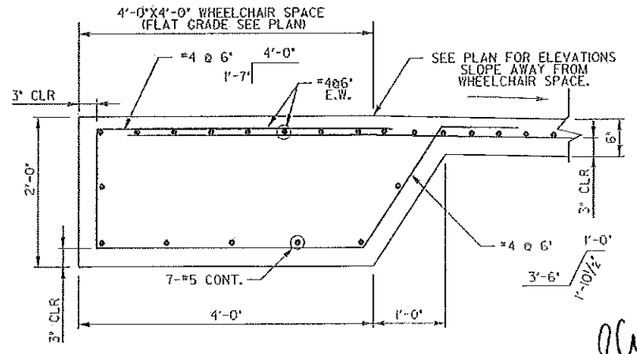

SECTION D-D
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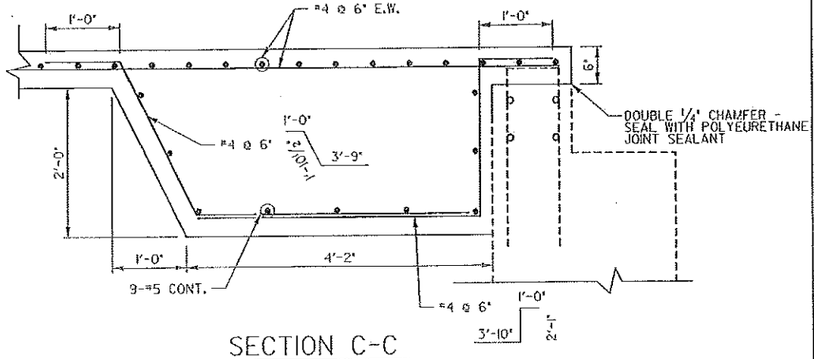

SECTION C-C
SCALE: 1/2" = 1'-0"

STATE OF TEXAS
AUDREY D SALDANA
106282
LICENSED PROFESSIONAL ENGINEER
04/22/13

revisions	date

NDM NATHAN D. MAIER CONSULTING ENGINEERS, INC.
FIRM REGISTRATION NO.: F-356
Two Park Lane Place / 8080 Park Lane / Suite 600
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DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
LANDING PLANS AND DETAILS

sheet no. 6 / 9

design	drawn	scale	date	file name	job number
ADS	ADS	AS NOTED	4/22/2013	1201SLA01	12-015

RECORD AS - BUILT DRAWINGS

ELECTRICAL GENERAL NOTES

1. THE NOTES CONTAINED ON THIS SHEET ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR WHEN WORKING IN THE FIELD, AND CONTAIN EXCERPTS FROM THE SPECIFICATION SECTIONS. HOWEVER THE CONTRACTOR IS HEREBY ADVISED THAT THE CONTRACT DOCUMENTS CONSIST OF BOTH THE DRAWINGS AND THE SPECIFICATIONS, AND THAT THE CONTRACTOR MUST COMPLY FULLY WITH BOTH THE BOUND DRAWINGS AND THE BOUND SPECIFICATIONS.
2. ALL EQUIPMENT WIRING, RACEWAYS, ETC. SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, LOCAL CODES, AND INDUSTRY STANDARDS (IE. UL, NEMA, IEEE, ANSI, ETC.) THE DRAWING NOTES AND DETAILS SHALL BE COMPLIED WITH IN ADDITION TO THE REQUIREMENTS IN THE SPECIFICATIONS. REFER TO EACH SPECIFICATION SECTION FOR SPECIFIC REQUIREMENTS.
3. ALL RACEWAY INSTALLATIONS SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. SEE SPECIAL SPECIFICATION SS6618 FOR ADDITIONAL REQUIREMENTS.
4. CONDUITS SHALL BE TERMINATED IN A NEAT MANNER AND STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWING DETAILS. SEE SPECIAL SPECIFICATION SS6618 FOR ADDITIONAL REQUIREMENTS.
5. CONDUITS TERMINATED INTO ENCLOSURES SHALL BE PERPENDICULAR TO THE WALLS OF THE ENCLOSURE. THE USE OF SHORT SEALTIGHT ELBOW FITTINGS FOR SUCH TERMINATIONS WILL NOT BE PERMITTED.
6. ALL RACEWAY INSTALLATIONS, CROSSING EXPANSION JOINTS OR TRANSITIONS FROM BELOW GRADE TO EXPOSED ABOVE GRADE, SHALL HAVE EXPANSION OR EXPANSION/DEFLECTION TYPE FITTINGS AS SPECIFIED FOR THE APPLICATION. SEE THE DRAWINGS AND SPECIAL SPECIFICATION SS6618 FOR THE EXACT TYPE OF FITTING TO BE USED.
7. NO CONDUIT SMALLER THAN 3/4", NOR WIRE SMALLER THAN NO. 12 AWG, SHALL BE USED UNLESS SPECIFICALLY NOTED.
8. ALL UNDERGROUND SINGLE CONDUITS, AND DUCTBANKS OF MULTIPLE CONDUITS, SHALL BE PVC CONDUIT. MINIMUM SIZE SHALL BE 1 INCH. THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF ALL EXISTING UNDERGROUND CONDUIT AND DUCTBANKS AND SHALL COORDINATE THE ROUTING OF NEW CONDUIT AND DUCTBANKS TO AVOID INTERFERENCE WITH EXISTING CONDUIT AND DUCTBANKS AND OTHER UNDERGROUND UTILITIES.
9. ALL CHANGES OF DIRECTION GREATER THAN 20 DEGREES IN UNDERGROUND SINGLE, OR DUCTBANKS OF MULTIPLE CONDUITS, SHALL BE ACCOMPLISHED USING LONG RADIUS BENDS OF PVC COATED RIGID ALUMINUM CONDUIT. THE USE OF FLEXIBLE CONDUIT OF ANY TYPE, WILL NOT BE PERMITTED UNLESS INDICATED OTHERWISE. SEE SECTION 16110 FOR MORE REQUIREMENTS.
10. THE WIRING DIAGRAMS, BLOCK DIAGRAMS, QUANTITY, SIZE OF WIRES, AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY APPROVED. ALL MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFIED.
11. FOR ALL JUNCTION BOXES, PULL BOXES AND TERMINATION BOXES IN THE RACEWAY SYSTEM IN OUTDOOR AREAS SHALL BE CONSTRUCTED OF ALUMINUM. FOR ALL OTHER AREAS SEE SPECIAL SPECIFICATION SS6618 FOR BOX DETAILS AND SPECIFICATIONS.
12. WHERE RACEWAYS ENTER JUNCTION BOXES OR CONTROL PANELS CONTAINING ELECTRICAL OR INSTRUMENTATION EQUIPMENT, ALL ENTRANCES SHALL BE SEALED WITH WATERTIGHT SEALANT. REFER TO SPECIAL SPECIFICATION SS6618 FOR DETAILS.
13. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURE LOCATIONS, OR TERMINAL BOX LOCATIONS, ARE APPROXIMATE. THE EXACT LOCATIONS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER, DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.
14. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES DIMENSIONS ARE APPROXIMATE. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES OR TERMINAL BOX DIMENSIONS SHALL BE VERIFIED WITH THE EQUIPMENT SUPPLIER. ALLOW FOR LOCATION CHANGES AND INCLUDE IN THE CONTRACT PRICE. THE EXACT LOCATIONS OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF ALL CABLES AND CONDUITS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER ENGINEER DURING CONSTRUCTION.
15. THE LOCATION OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF CABLES AND CONDUITS SHALL BE COORDINATED AND APPROVED BY THE OWNER.
16. THE DUCTBANK ROUTING AS SHOWN ON THE DRAWING IS APPROXIMATE. THE EXACT DUCTBANK ROUTING, CABLE LENGTH AND CONDUIT LENGTH SHALL BE VERIFIED IN THE FIELD.
17. THIS IS AN OPERATING FACILITY. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER.
18. THE CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE ALL UNDERGROUND UTILITIES BEFORE DIGGING. CONTRACTOR SHALL COORDINATE THE EFFORT WITH THE OWNER.
19. ALL SLOTTED CHANNEL, SLOTTED CHANNEL SUPPORT MATERIAL, WASHERS, SCREWS, NUTS, CONDUIT CLAMPS, ALL THREAD SPRING NUTS AND MISC. MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL.
20. LIGHTING FIXTURES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS. THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE BOTTOM OF THE LIGHTING FIXTURE TO THE FINISHED LEVEL OF LIGHTED SURFACE.
21. ALL CONDUITS AND WIRES SHOWN ON THE INTERFACE DIAGRAM SHALL BE INSTALLED BY THE CONTRACTOR. GROUPING OF CONDUIT AND WIRE MAY BE CHANGED, IF APPROVED BY THE ENGINEER AND OWNER.
22. ALL CONDULETS SHALL BE FORM 7 AND SHALL BE CONSTRUCTED OF ALUMINUM. SCREW DOWN COVERS ARE UNACCEPTABLE.
23. ALL GROUNDING CONDUCTORS SHALL BE BARE COPPER, ALL GROUND RODS SHALL BE COPPER PLATTED STEEL, 3/4" BY 10' LONG. ALL EXPOSED COPPER GROUND CABLES SHALL BE GREEN INSULATED CONDUCTORS. PROVIDE XHHW INSULATION.
24. WHERE NOTES ON THE DRAWING INDICATE THAT THE CONTRACTOR SHALL FIELD-VERIFY, THE INTENT IS FOR THE CONTRACTOR TO INVESTIGATE TO THE EXTENT NECESSARY TO PROVIDE THE WORK AND MATERIALS PRIOR TO BIDDING AND INCLUDE ALL COSTS IN THE BID PRICE. THE CONTRACT PRICE SHALL NOT BE INCREASED WHEN THE CONTRACTOR HAS NOT INVESTIGATED PER THE NOTES DIRECTING THAT BE DONE.

CONDUIT TYPE	LOCATION
1. RIGID ALUMINUM CONDUIT	ALL ABOVE GRADE AREAS
2. RIGID GALVANIZED STEEL CONDUIT	NOT ACCEPTABLE FOR USE ON THIS PROJECT..
3. PVC COATED RIGID ALUMINUM CONDUIT	ALL BELOW GRADE BENDS AND TRANSITIONS FROM BELOW GRADE UP TO 6" MINIMUM ABOVE GRADE.
4. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT	FIXTURE WHIP CONNECTION TO LIGHTING FIXTURES (MAXIMUM 3-FT). TYPE BX OR AC PREFABRICATED CABLES ARE NOT PERMITTED.
5. RIGID NON-METALLIC, SCHEDULE 40 PVC CONDUIT	ALL BELOW GRADE AREAS.
6. RIGID NON-METALLIC, SCHEDULE 80 PVC CONDUIT	NOT ACCEPTABLE FOR USE ON THIS PROJECT.
7. FLEXIBLE METAL CONDUIT	NOT ACCEPTABLE FOR USE ON THIS PROJECT.

ONE LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
FRAME TRIP	CB	LOW VOLTAGE CIRCUIT BREAKER, 3 POLE UNLESS OTHERWISE NOTED.
	F	FUSIBLE DISCONNECT SWITCH, 600 VOLT, POLE, AMPERE RATING AND FUSE SIZE AS NOTED
LC		LIGHTING CONTACTOR RELAY COIL
		CONTACT, NORMALLY OPEN (NO)
		GROUND ROD GROUND ROD WELL
		POLE MOUNTED LIGHTING FIXTURE WITH ROUND HOUSING
		POLE MOUNTED LIGHTING FIXTURE WITH SQUARE HOUSING

ABBREVIATIONS			
AC	ALTERNATING CURRENT	MFR	MANUFACTURER
ADD	ADJUSTABLE FREQUENCY DRIVE	MH	MANHOLE
AFF	ABOVE FINISHED FLOOR	MLO	MAIN LUGS ONLY
AG	ABOVE GRADE	MTG	MOUNTING
ALUM	ALUMINUM	MTD	MOUNTED
AMP/A	AMPERE	MTS	MANUAL TRANSFER SWITCH
ATC	AIR TERMINAL CHAMBER	NC	NORMALLY CLOSED
ATS	AUTOMATIC TRANSFER SWITCH	NGR	NEUTRAL GROUNDING RESISTOR
AUTO	AUTOMATIC	NO	NORMALLY OPEN OR NUMBER
AUX	AUXILIARY	NTS	NOT TO SCALE
AWG	AMERICAN WIRE GAUGE	OL	OVERLOAD
BAS	BUILDING AUTOMATION SYSTEM	OLR	OVERLOAD CONTROL RELAY
C	CONDUIT	PB	PUSH BUTTON
CB	CIRCUIT BREAKER	PCC	PUMP CONTROL CONSOLE
CKT	CIRCUIT	PFCC	POWER FAC FOR CORRECTION CAPACITOR
CLF	CURRENT LIMITING FUSE	PFR	PHASE FAILURE RELAY
CP	CONTROL PANEL	PH	PHASE
CPT	CONTROL POWER TRANSFORMER	PLC	PROGRAMMABLE LOGIC CONTROLLER
CR	CONTROL RELAY	PPR	PHASE PROTECTIVE RELAY
CS	CONTROL SWITCH	PR	PAIR
CT	CURRENT TRANSFORMER	PT	POTENTIAL TRANSFORMER
CU	COPPER	PTT	PUSH TO TEST TYPE
DC	DIRECT CURRENT	PVC	POLYVINYL CHLORIDE
DI	DOOR INTERLOCK	QTY	QUANTITY
DN	DOWN	RCP	RELAY CONTROL PANEL
DWG	DRAWING	RECP	RECEPTACLES
EC	EMPTY CONDUIT	RVSS	REDUCED VOLTAGE SOLID STATE STARTER
EHH	ELECTRICAL HAND HOLE	SB	SWITCHBOARD
ELEC	ELECTRICAL	SC	SURGE CAPACITOR
ELEV	ELEVATION	SCH	SCHEMATIC
EM	EMERGENCY	SCTB	SHORT CIRCUITING TERMINAL BLOCK
EMH	ELECTRICAL MAN HOLE	SEC	SECONDS OR SECONDARY
EO	ELECTRICALLY OPERATED	SH	SHIELDED
FBO	FURNISHED BY OTHERS	SHT	SHEET
FO	FIBER OPTIC	SN	SOLID NEUTRAL
FRP	FIBERGLASS REINFORCED POLYESTER	SPD	SURGE PROTECTIVE DEVICE
FU	FUSE	SS	STAINLESS STEEL
GRD/G	GROUND	ST	STARTER
GCP	GENERATOR CONTROL PANEL	SV	SOLENOID VALVE
GEN	GENERATOR	SW	SWITCH
GFI	GROUND FAULT INTERRUPTER	SWGR	SWITCHGEAR
GO	GATE OPERATOR	TC	TERMINATION CABINET
GRS	GALVANIZED RIGID STEEL	TEL	TELEPHONE
HH	HANDHOLE	TD	TIME DELAY ON OPENING
HT	HEIGHT	TS	TEMPERATURE SWITCH
HTP	HEAT TRACE PANEL	TVSS	TRANSIENT VOLT. SURGE SUPP.
HZ	HERTZ	TW	TWISTED
IMH	INSTRUMENT MAN HOLE	TYP	TYPICAL
INST	INSTRUMENT	UG	UNDERGROUND
LA	LIGHTING ARRESTER	V	VOLTS
LC	LIGHTING CONTRACTOR	VFD	VARIABLE FREQUENCY DRIVE
LGTS	LIGHTS	VO	VALVE OPERATOR
LP	LIGHTING PANEL	W	WIRE
LPU	LOCAL PROCESSING UNIT	WP	WEATHERPROOF
LV	LOW VOLTAGE	XFMR	TRANSFORMER
MCC	MOTOR CONTROL CENTER	XP	EXPLOSION PROOF
MCP	MOTOR CIRCUIT PROTECTOR		

STATE OF TEXAS
MATTHEW D. KOLLER
102174
LICENSED
PROFESSIONAL ENGINEER
4-22-13

revisions	date

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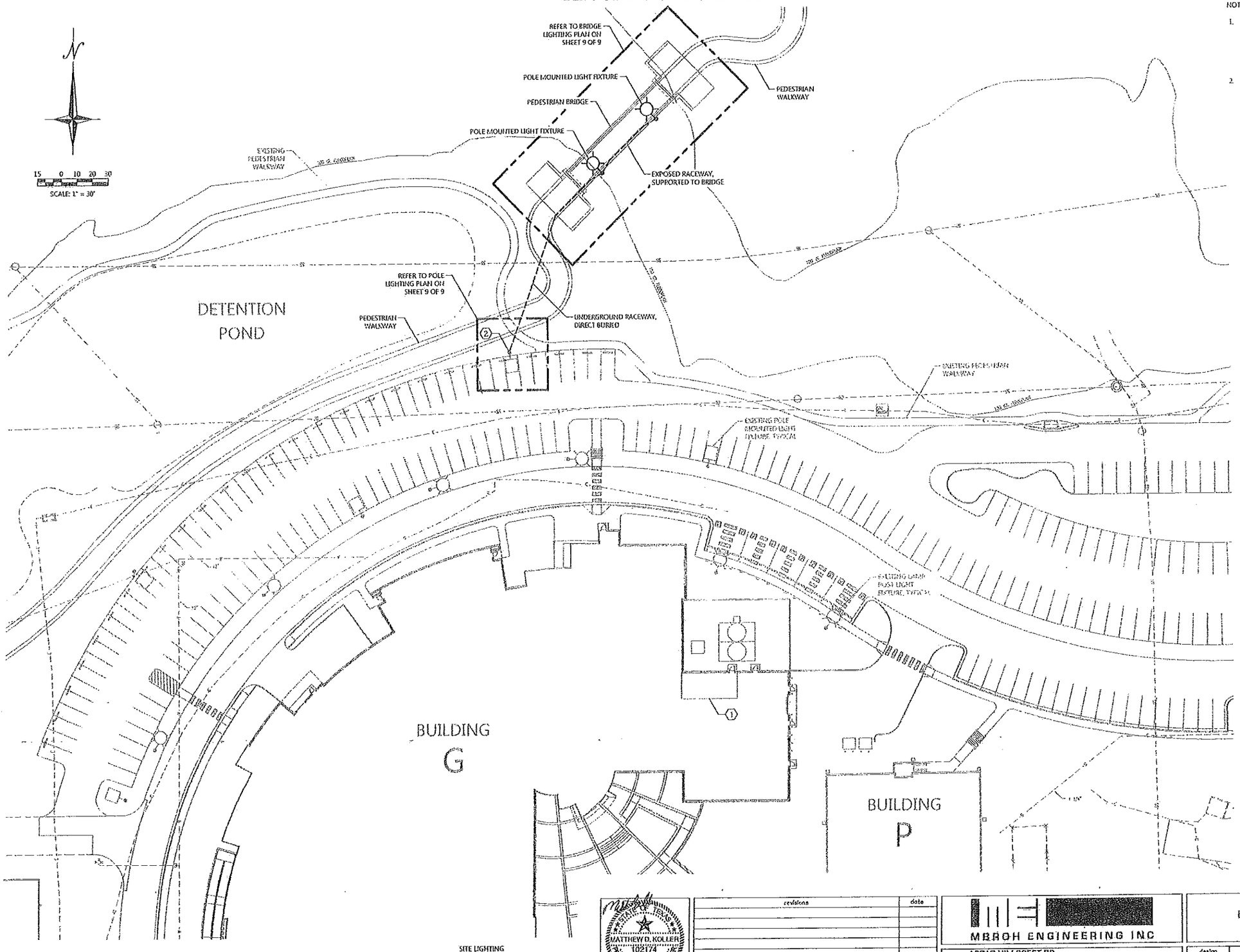
DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
ELECTRICAL NOTES, SYMBOLS & ABBREVIATIONS

sheet no.
7 / 9

design	drawn	scale	date	file name	job number
MDK	MDK	N.T.S.	04/18/2013	E-01.dwg	12 - 015

RECORD AS - BUILT DRAWINGS



NOTES BY SYMBOL "⬡":

1. ELECTRICAL ROOM WITH EXISTING PANELBOARD 'CPHL'. CONTRACTOR SHALL UTILIZE BRANCH CIRCUIT BREAKER IN PANELBOARD 'CPHL' TO DISCONNECT POWER TO OUTDOOR LIGHTING CIRCUIT. POWER SHALL BE DISCONNECTED PRIOR TO PERFORMING ANY MODIFICATIONS TO EXISTING CIRCUIT AS SPECIFIED PER THIS CONTRACT.
2. POINT OF TERMINATION OF BRIDGE LIGHTING CIRCUIT TO EXISTING SITE LIGHTING CIRCUIT. REFER TO SHEET 9 OF 9 FOR ADDITIONAL INSTALLATION REQUIREMENTS.

SITE LIGHTING
PLAN
1" = 30'

STATE OF TEXAS
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revisions	date

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DALLAS COUNTY
BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
SITE LIGHTING PLAN

sheet no.	design	drawn	scale	date	file name	job number
8 / 9	MDK	MDK	AS NOTED	04/18/2013	E-02.dwg	12 – 015

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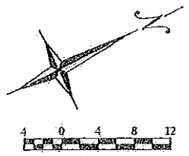
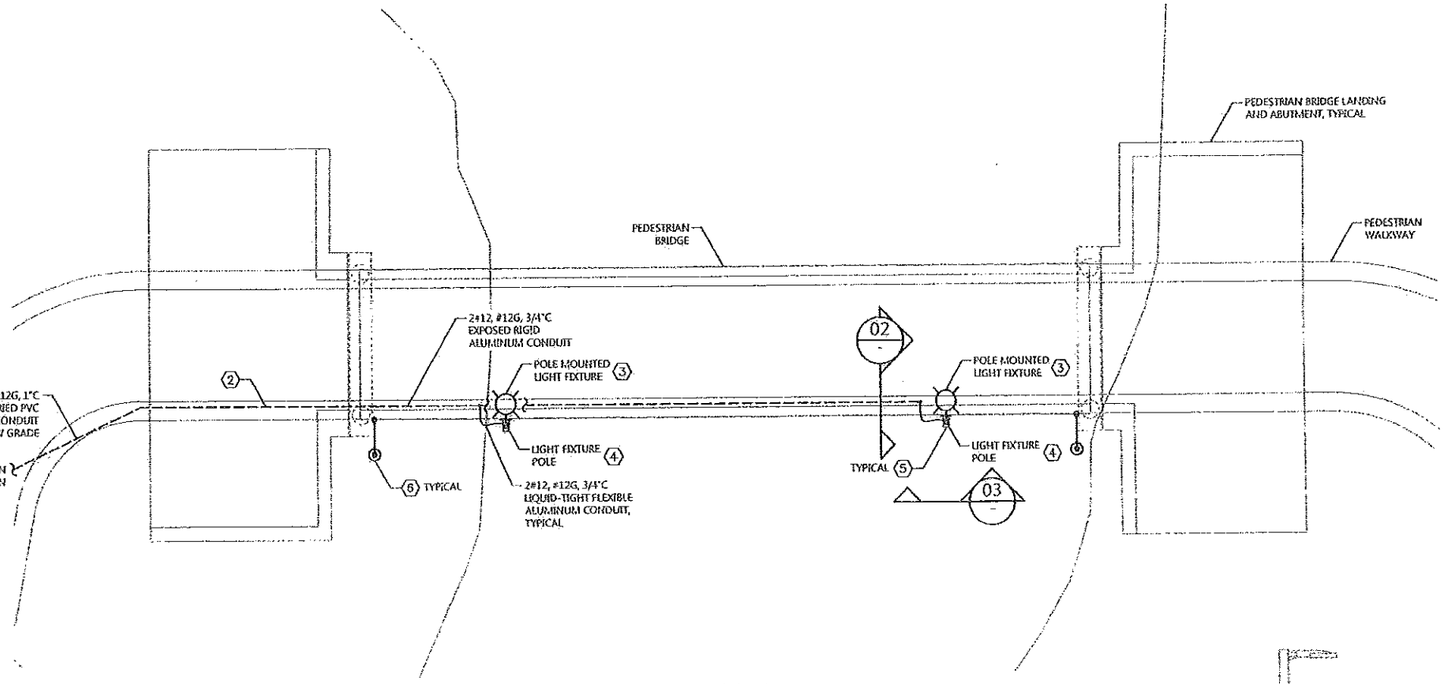
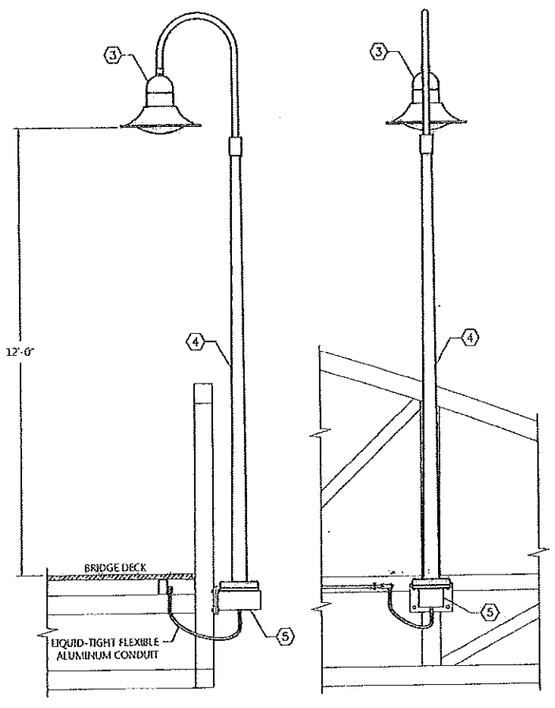




BRIDGE LIGHTING
PLAN
1/8" = 1' - 0"

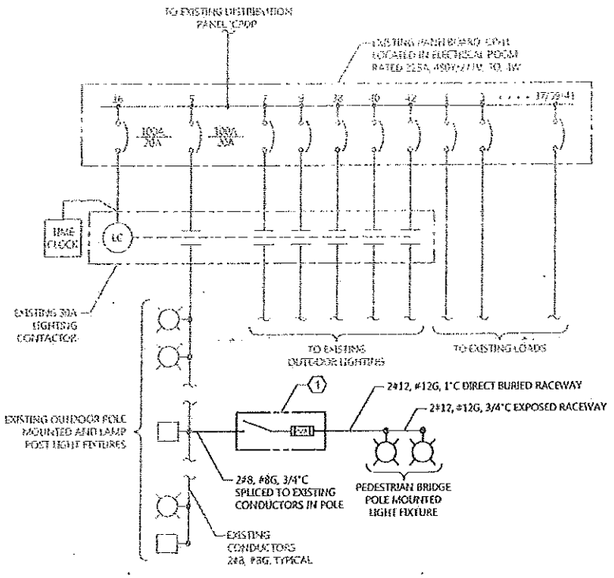
NOTES BY SYMBOL "⬡":

1. ALUMINUM NEMA 3R ENCLOSURE EQUIVALENT TO 'COMPACT' SERIES AS MANUFACTURED BY HOFFMAN. ENCLOSURE SHALL BE SIZED PER NEC 2011 REQUIREMENTS. MOUNT INSIDE OF ENCLOSURE A 2-POLE DISCONNECT FUSE HOLDER. DISCONNECT FUSE HOLDER SHALL BE RATED 600 VOLT, 30 AMP AND U.L. LISTED, EQUIVALENT TO THE 'C383' SERIES AS MANUFACTURED BY EATON. PROVIDE (2) 1/2 AMP CLASS CC FUSES, TYPE FNQ-R AS MANUFACTURED BY BUSSMANN. PROVIDE TYPE 316 STAINLESS STEEL MOUNTING CHANNEL AND HARDWARE REQUIRED TO SUPPORT ENCLOSURE TO CONCRETE BASE. CONCRETE BASE SHALL BE SIZED AS REQUIRED WITH A MINIMUM DEPTH OF 24 INCHES. PROVIDE ENCLOSURE WITH A NAMEPLATE LABELED "BRIDGE LIGHTING FUSED DISCONNECT", REFER TO SPECIAL SPECIFICATION SS6600-3.12 FOR REQUIREMENTS.
2. TRANSITION THE 1" DIRECT BURIED PVC SCHEDULE 40 CONDUIT TO A 1" PVC COATED ALUMINUM CONDUIT FOR THE PORTION INSTALLED UNDER THE PEDESTRIAN BRIDGE LANDING. PVC COATED ALUMINUM CONDUIT SHALL EXTEND EXPOSED A MINIMUM OF 6" BEYOND PEDESTRIAN BRIDGE ABUTMENT AND GROUND COVER PRIOR TO TRANSITIONING AND REDUCING TO A 3/4" RIGID ALUMINUM CONDUIT UNDERNEATH PEDESTRIAN BRIDGE.
3. POLE MOUNTED LIGHT FIXTURE SHALL BE LED TYPE WITH A DIE-CAST ALUMINUM HOUSING AND HEAVY GAUGE ALUMINUM SHADE, AN ANODIZED ALUMINUM ASYMMETRICAL REFLECTOR AND CLEAR IMPACT RESISTANT ACRYLIC LENS. LED LIGHT FIXTURE HOUSING SHALL BE ATTACHED TO A MOUNTING ARM THAT IS FABRICATED FROM AN 1/8" WALL ALUMINUM CONDUIT FORMED INTO A CONTINUOUS SMOOTH RADIUS WITH AN END FITTING TO SECURELY FIT ATOP A 3" O.D. POLE. LED LIGHT FIXTURE SHALL CONTAIN A 42.5W LED LUMINAIRE WITH AN INTEGRAL 277V ELECTRONIC LED DRIVER AND A COLOR TEMPERATURE OF 5000K. LED LIGHT FIXTURE'S FINISH COLOR SHALL BE BRONZE AND ASSEMBLY SHALL BE U.L. LISTED, SUITABLE FOR WET LOCATIONS. LED LIGHT FIXTURE SHALL BE TYPE 7911LED AS MANUFACTURED BY BEGA-US OR APPROVED EQUAL. LED LIGHT FIXTURE AND LIGHT FIXTURE POLE SHALL BE SUBMITTED FOR APPROVAL.
4. ROUND HINGED LIGHT FIXTURE POLE SHALL BE 11'-8' FROM ANCHOR BASE AND TAPER FROM 5" O.D. TO 3" O.D. POLE SHAFT SHALL BE EXTRUDED FROM SEAMLESS 6063 ALUMINUM ALLOY TUBING AND HEAT TREATED TO A T-6 CONDITION. POLE ANCHOR BASE SHALL BE ROUND MADE OF TWO HINGED ALUMINUM CASTINGS HEAT TREATED TO A T-6 CONDITION. UPPER BASE CASTING SHALL BE WELDED TO THE POLE SHAFT AND SECURELY FASTENED TO LOWER BASE CASTING WITH A MINIMUM OF THREE STAINLESS STEEL BOLTS. POLE'S FINISH COLOR SHALL BE BRONZE AND POLE SHALL BE TYPE 1103HR AS MANUFACTURED BY BEGA-US OR APPROVED EQUAL.
5. SUPPORT BRACKET FOR POLE MOUNTED LIGHT FIXTURE SHALL BE PROVIDED BY MANUFACTURER. CONTRACTOR SHALL COORDINATE LOCATION OF SUPPORT BRACKET WITH BRIDGE MANUFACTURER.
6. COPPER CLAD STEEL GROUND ROD BONDED TO PEDESTRIAN BRIDGE'S STRUCTURAL STEEL. EXOTHERMICALLY WELD ONE END OF A #4/0 AWG BARE COPPER GROUND WIRE TO GROUND ROD AND OTHER END TO PEDESTRIAN BRIDGE STEEL UTILIZING APPROPRIATE FITTINGS AS SPECIFIED. ROUTE GROUND WIRE IN A 3/4" RIGID ALUMINUM CONDUIT AND SUPPORT CONDUIT TO BRIDGE ABUTMENT.

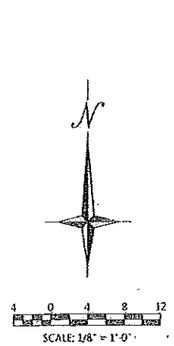


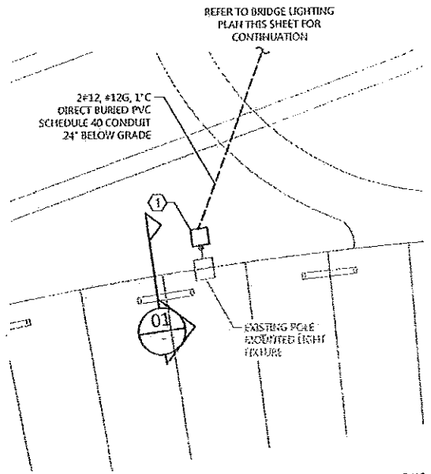
BRIDGE LIGHTING
SECTION 02
NTS

BRIDGE LIGHTING
SECTION 03
NTS

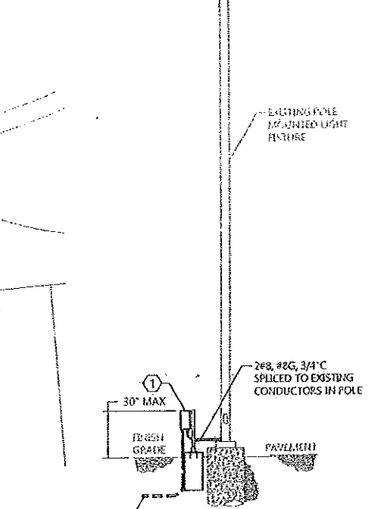


LIGHTING BLOCK
DIAGRAM
NTS





POLE LIGHTING
PLAN
1/8" = 1' - 0"



POLE LIGHTING
SECTION 01
NTS

revisions	date

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BROOKHAVEN COLLEGE
PEDESTRIAN BRIDGE
LIGHTING PLANS, SECTIONS & DIAGRAM

sheet no.	job number
9 / 9	12 - 015

design	drawn	scale	date	file name
MDK	MDK	AS NOTED	04/18/2013	E-03.dwg

RECORD AS - BUILT DRAWINGS

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. 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 prequalified 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) 416-3134

WEB ADDRESSES FOR REFERENCED DOCUMENTS

Compliant Work Zone Traffic Control Devices List (CWZTCD)
http://www.txdot.gov/publications/traffic.htm

Texas Manual on Uniform Traffic Control Devices (TMUTCD)
http://www.txdot.gov/publications/traffic.htm

Standard Highway Sign Designs for Texas (SHSD)
http://www.txdot.gov/publications/traffic.htm

Traffic Engineering Standard Sheets
http://www.txdot.gov/business/disclaim.htm

Material Producer List
http://www.txdot.gov/business/producer*list.htm

Departmental Material Specifications (DMS)
http://www.txdot.gov/services/construction/material*specifications/

Roadway Design Manual
http://www.txdot.gov/services/general*services/manuals.htm

Texas Department of Transportation
Traffic Operations Division

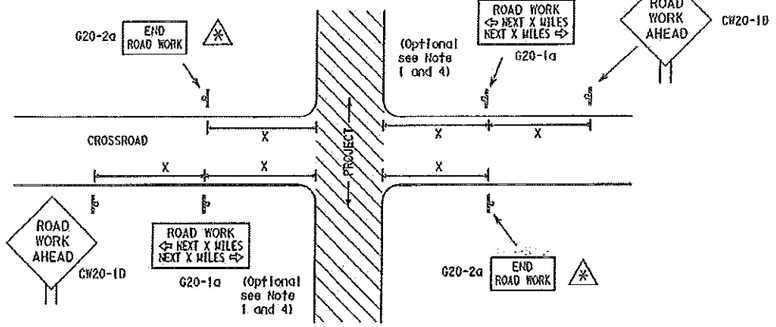
BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS

1 of 12 BC(1)-07

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
4-03 9-07	CONT	SECT	JOB	HIGHWAY	
	DIST	COUNTY			SHEET NO.

DATE:
FILE:

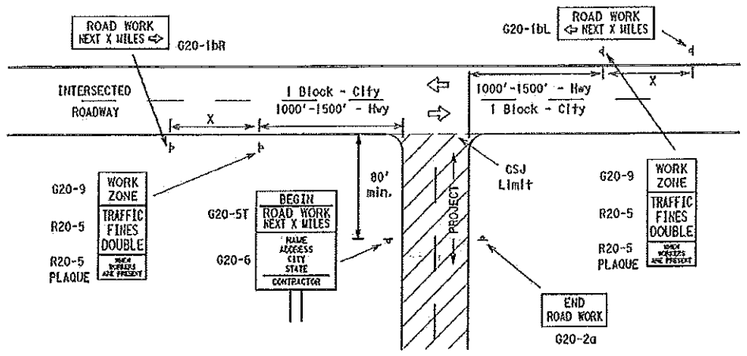
TYPICAL LOCATION OF CROSSROAD SIGNS



⚹ May be mounted on back of CW20-1D sign with approval of engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a CW20-1D ROAD WORK AHEAD sign and a G20-2a 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 (G20-2a) 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 G20-1a 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 G20-6 "Contractor Name" sign behind the Type III Barricades for the road closure (see BC(10) also). The G20-1bL and G20-1bR signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING [1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
[4] CW20, 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

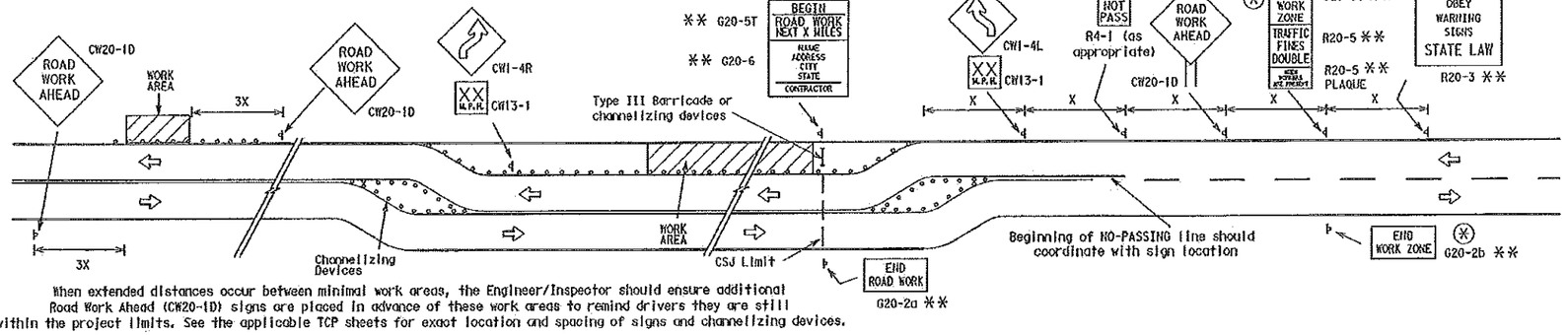
Posted Speed	Sign Spacing "X" [Δ]
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500 [2]
60	600 [2]
65	700 [2]
70	800 [2]
75	900 [2]
80	1000 [2]
⚹	⚹ [3]

⚹ 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 ½ 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.

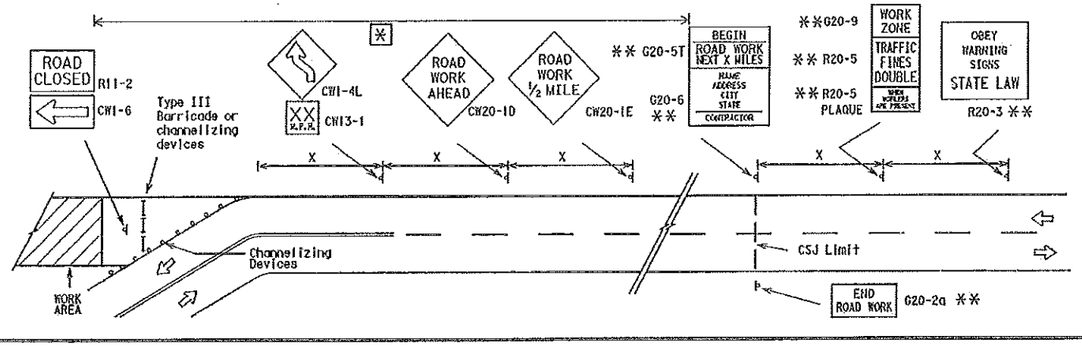
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work areas, 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 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 G20-9T and G20-2b shall be used when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a work zone where traffic fines may double if workers are present.

** Required CSJ Limit signing. See Note 10 on BC(1).

⚹ Area for placement of "ROAD WORK AHEAD" sign and other signs or devices as called for on the Traffic Control Plan.

LEGEND

- Sign
- O O Channelizing Devices
- I Type III Barricade
- X See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

R20-3
Legend/Border - Black
Background - White

Texas Department of Transportation
Traffic Operations Division

BARRICADE AND CONSTRUCTION PROJECT LIMIT STANDARD

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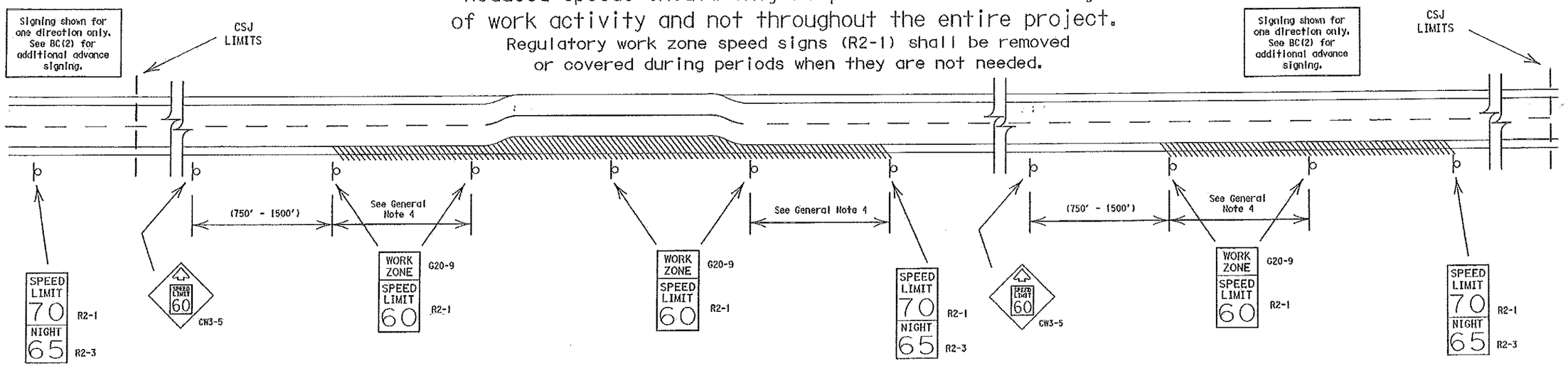
RECORD AS - BUILT DRAWINGS

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 should be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 15 feet of pavement edge or actually on the pavement.

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, errection and maintenance of the CW3-5 sign, G20-9 plaque and the R2-1 and R2-3 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 otherwise noted.
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.

Texas Department of Transportation
Traffic Operations Division

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT STANDARD

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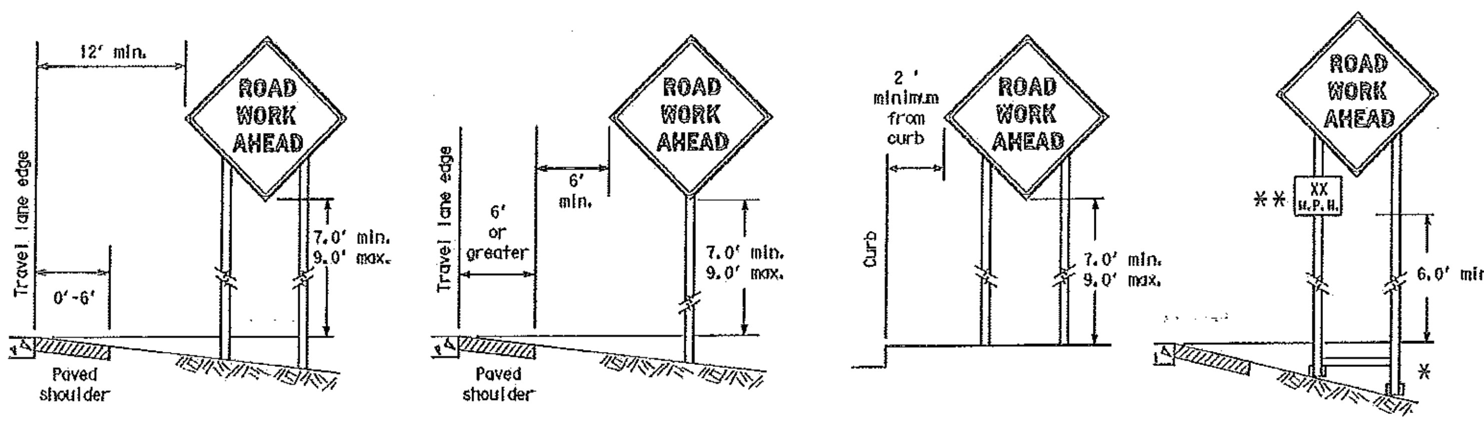
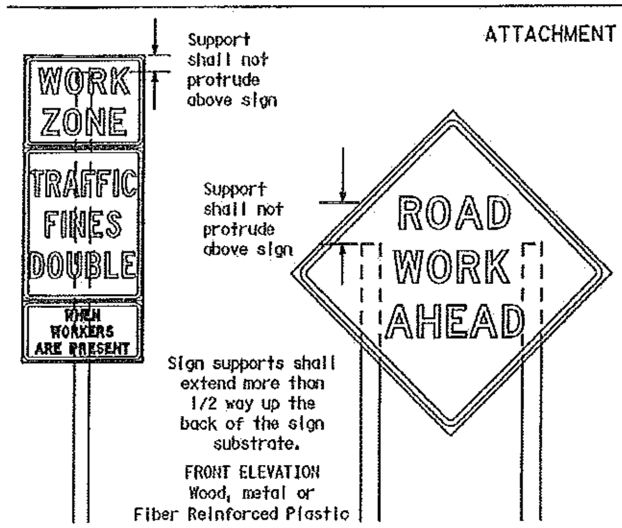
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



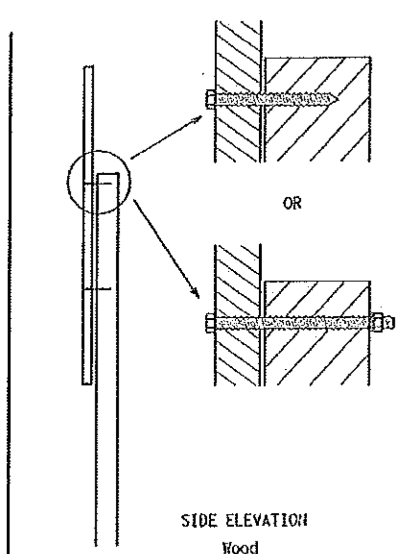
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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



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 splice 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 guage material.



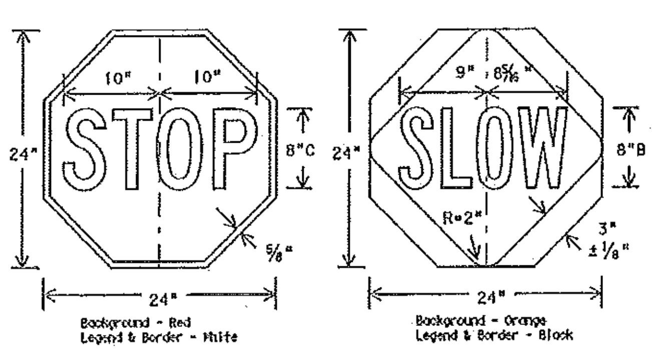
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails will 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.

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. Nails shall NOT be used to attach signs to any support.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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 Engineer may allow the use of smaller size construction warning signs on secondary roads or city streets where speeds are low if the sign size is listed as an option on the "Typical Construction Warning Sign Size and Spacing" chart shown on BC(2).
2. The Contractor shall furnish the sign sizes shown in plans, the BC Sheets, the TCP sheets 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 C (High Specific Intensity), shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type E (Fluorescent Prismatic), 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 type of sign support meets the crashworthiness standards regardless of the direction of impact. 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. These materials can damage the retroreflectivity of sheeting.
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 is recommended.
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.
6. Rubber (such as tire inner tubes) shall NOT be used for sandbags.
7. 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.
8. 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.
9. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

Texas Department of Transportation
Traffic Operations Division

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES STANDARD

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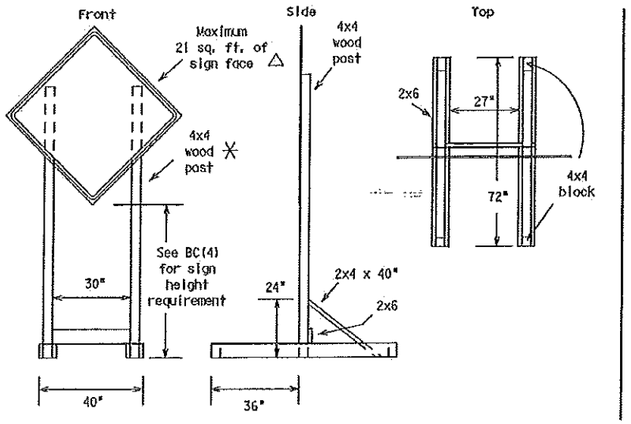
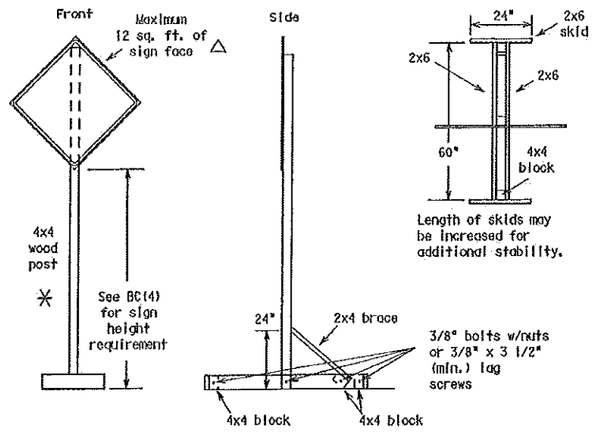
RECORD AS - BUILT DRAWINGS

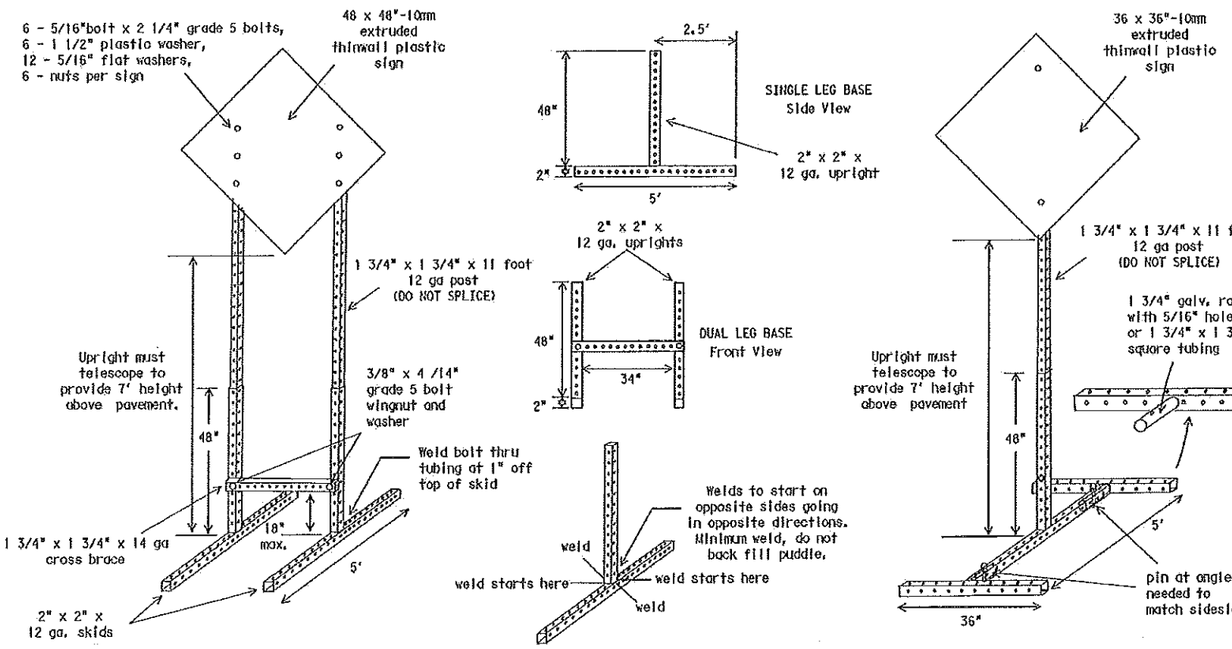
SKID MOUNTED WOOD SIGN SUPPORTS

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



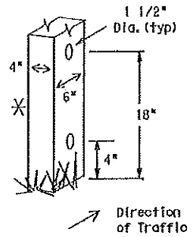


SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



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)).



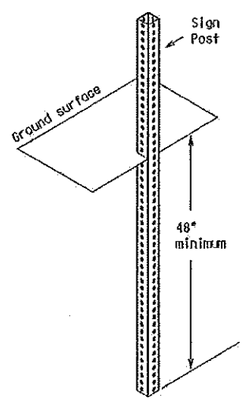
WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

Nominal Post Size	No. 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

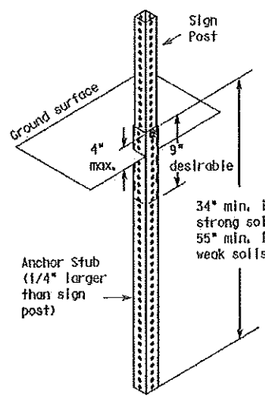
GROUND MOUNTED SIGN SUPPORTS

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.

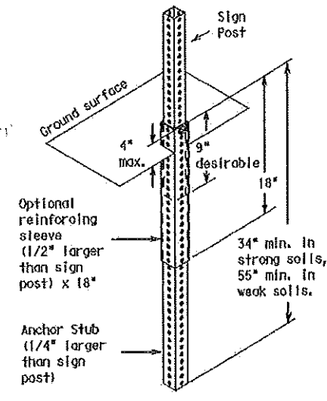
PERFORATED SQUARE METAL TUBING



OPTION 1
(Direct Embedment)



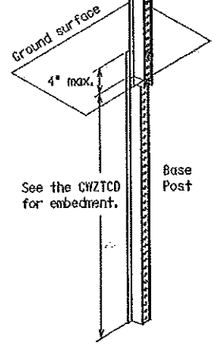
OPTION 2
(Anchor Stub)



OPTION 3
(Anchor Stub and Reinforcing Sleeve))

WING CHANNEL

Lap-splice/base bolted anchor



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. More details of approved Long/Intermediate and Short Term supports can be found on the CWZTCD list. See BC(1) for website location.
3. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
4. 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

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT STANDARD

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RECORD AS-BUILT DRAWINGS

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.
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 720 feet. 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	Abb.	Word or Phrase	Abb.
Access Road	ACCS RD	Major	MAJ
Air Quality	AIR QLTY	Miles	MI
Alternate	ALT	Miles Per Hour	MPH
Avenue	AVE	Minor	MNR
Best Route	BEST RTE	Monday	MON
Boulevard	BLVD	Normal	NORM
Bridge	BRDG	North	N
Cannot	CANT	Northbound	(route) N
Center	CNTR	Parking	PKING
Construction Ahead	CONST AHEAD	Parking Lot	PRK LOT
Detour Route	DETOUR RTE	Road	RD
Do Not	DONT	Right Lane	RGT LN
East	E	Saturday	SAT
Eastbound	(route) E	Service Road	SERV RD
Emergency	EMER	Shoulder	SHLDR
Emergency Vehicle	EMER VEH	Slippery	SLIP
Entrance, Enter	ENT	South	S
Express Lanes	EXP LANE	Southbound	(route) S
Expressway	EXPWY	Speed	SPD
XXXX Feet	XXXX FT	Street	ST
Fog Ahead	FOG AHD	Sunday	SUN
Freeway	FRWY, FWY	Telephone	PHONE
Freeway Blocked	FWY BLKD	Temporary	TEMP
Friday	FRI	Thursday	THURS
Hazardous Driving	HAZ DRIVING	To Downtown	TO DWNTN
Hazardous Materials	HAZMAT	Traffic	TRAF
High-Occupancy Vehicle	HOV	Travelers	TRVLRS
Highway	HWY	Tuesday	TUES
Hours	HR	Time Minutes	TIME MIN
Information	INFO	Upper Level	UPPR LVL
It Is	ITS	Vehicle	VEH
Junction	JCT	Warning	WARN
Left	LFT	Wednesday	WED
Left Lane	LFT LN	Weight Limit	WT LIMIT
Lane Closed	LN CLSD	West	W
Lower Level	LOWR LVL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

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

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

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

** 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.

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 CW20-7a Flagger Symbol, 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 panel 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

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) STANDARD

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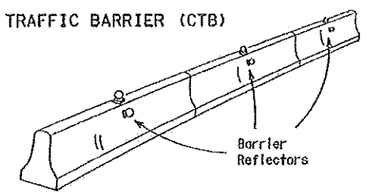
© TxDOT 11-4-02	DGN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-07 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

106

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

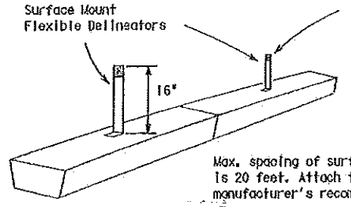
1. Barrier Reflectors shall be prequalified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors (Type C Delineators) can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 502.

CONCRETE TRAFFIC BARRIER (CTB)



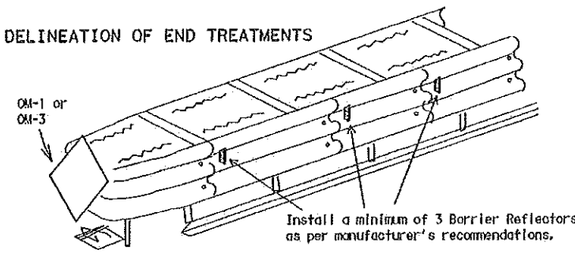
3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. 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. Yellow Barrier Reflectors shall be made with Type E Fluorescent Prismatic Yellow Retroreflective Sheeting. White reflectors shall be made with Type D White Prismatic sheeting.
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)



Max. spacing of surface mount flexible delineators is 20 feet. Attach the delineators as per manufacturer's recommendations.

DELINEATION OF END TREATMENTS



	APPROACHING TRAFFIC	
	BOTH SIDES	ONE SIDE
DELINEATION	OM-1	OM-3 or Vertical Panel

END TREATMENTS FOR CTB'S USED IN WORK ZONES

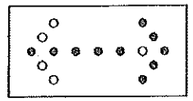
End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

TYPICAL FLASHING ARROW PANEL

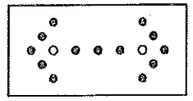
Arrow Panels may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Panel 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 Panels 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 Panel.
4. The Flashing Arrow Panel should be able to display the following symbols:

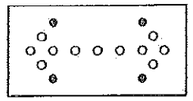
Flashing RIGHT (LEFT) ARROW



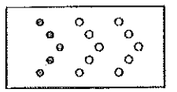
Flashing DOUBLE ARROW



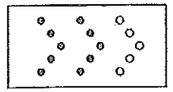
Flashing CAUTION

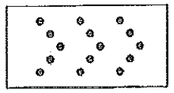


5. The "CAUTION" display consists of four corner lamps flashing simultaneously.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Panel shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 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.



Sequential Chevron





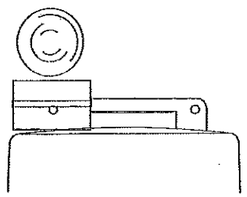
REQUIREMENTS

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

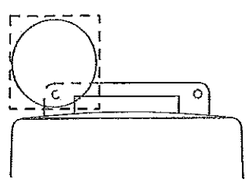
ATTENTION: Flashing Arrow Panels shall be equipped with automatic dimming devices.

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

11. The Flashing Arrow Panel shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Panel SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Panel 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 panels should be 7 feet from roadway to bottom of panel.



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



Warning reflector may be round or square. Must have a 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 E Sheeting (Fluorescent Prismatic) 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.

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 D (Non-fluorescent Prismatic).
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.

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).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the dates shown in the CWZTCD to ensure that the TMA meets the age requirements and the crashworthiness criteria established by the Federal Highway Administration (FHWA) for TMAs.
4. Refer to the CWZTCD for a list of approved TMAs.
5. TMAs are required on freeways unless otherwise noted in the plans.
6. A TMA should be used anytime that it can be positioned approximately 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
7. 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

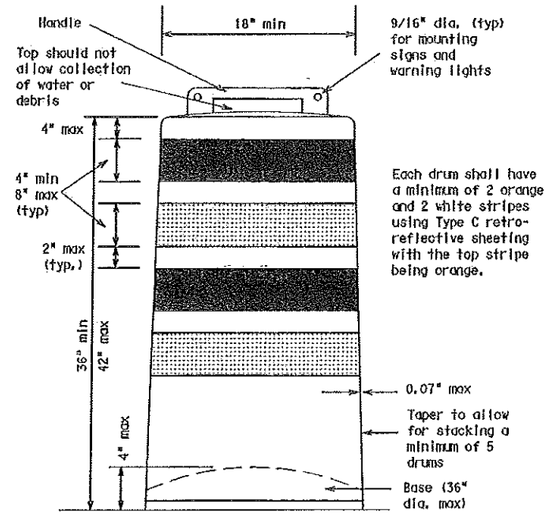
BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR STANDARD

7 of 12 BC(7)-07

FILE: TXDOT	DGN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-07 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

DATE:
FILE:

DATE:
FILE:



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

Prequalified plastic drums shall meet the following requirements:

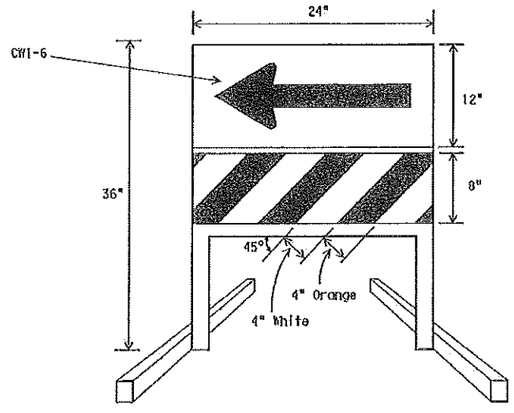
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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 minimum unballasted weight of 7.7 lbs. and maximum unballasted weight of 11 lbs. The wall of the drum body shall be a minimum of 0.07 inch in thickness. Weight of any drum supplied shall not vary more than 0.5 lb. from that of the prequalified sample.
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, "Flat Surface Reflective Sheeting." High Specific Intensity (Type C) retroreflective 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.

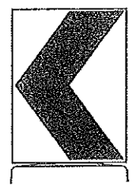
BALLAST

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. 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.
4. 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.
5. Ballast shall not be placed on top of drums.
6. Adhesives may be used to secure base of drums to pavement.

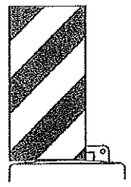


DIRECTION INDICATOR BARRICADE

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 E Fluorescent Prismatic Orange above a rail with Type C High Specific Intensity retroreflective sheeting in alternation 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass.
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.



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 E (Fluorescent Prismatic) 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 C (High Specific Intensity). 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.
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

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

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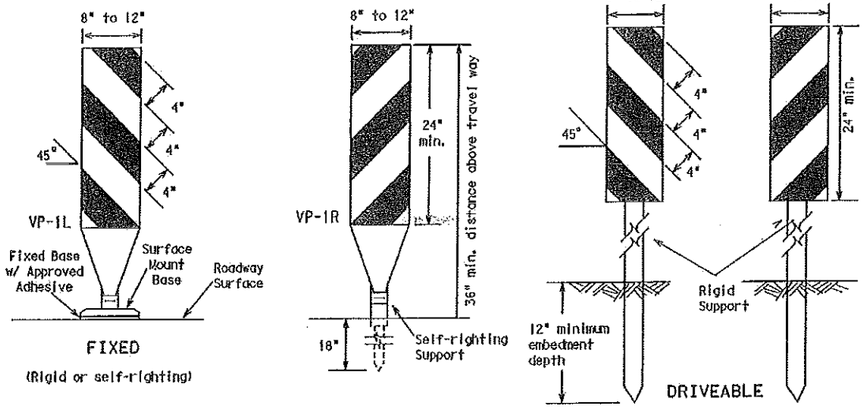
REVISIONS	FED.RD. DIV. NO.	STATE	DIST.	COUNTY	SHEET NO.
4-03					
9-07					

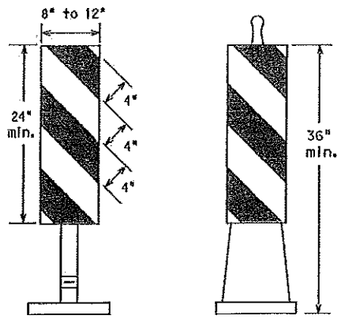
RECORD AS - BUILT DRAWINGS

CHANNELIZING DEVICES

VERTICAL PANELS (VPs)

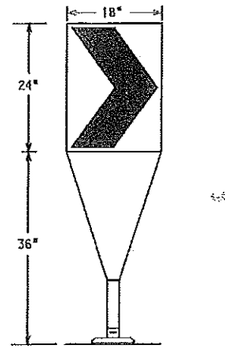


1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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, shall have a minimum of 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 C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is greater than 36 inches, a panel stripe of 6 inches shall be used.



PORTABLE

CHEVRONS



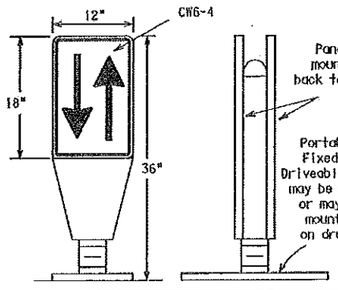
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 E (Fluorescent Prismatic) conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall be black vinyl non-reflective decal sheeting meeting 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.

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 approximately 35 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.
8. Examples on this sheet are commonly used channelizing devices in work zones. For other devices, refer to the CWZTCD.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

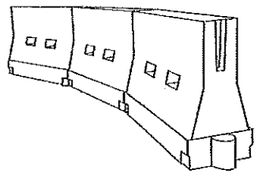


1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The 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 simple tubular markers or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. Tubular markers 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 E (Fluorescent Prismatic) conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall be black vinyl non-reflective decal sheeting meeting the requirements of DMS-8300.

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 = WS²/60	150'	165'	180'	30'	60'-75'
35		205'	225'	245'	35'	70'-90'
40		265'	295'	320'	40'	80'-100'
45	L=WS	450'	495'	540'	45'	90'-110'
50		500'	550'	600'	50'	100'-125'
55		550'	605'	660'	55'	110'-140'
60		600'	660'	720'	60'	120'-150'
65		650'	715'	780'	65'	130'-165'
70		700'	770'	840'	70'	140'-175'
75		750'	825'	900'	75'	150'-185'
80		800'	880'	960'	80'	160'-195'

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

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



LONGITUDINAL CHANNELIZING DEVICES

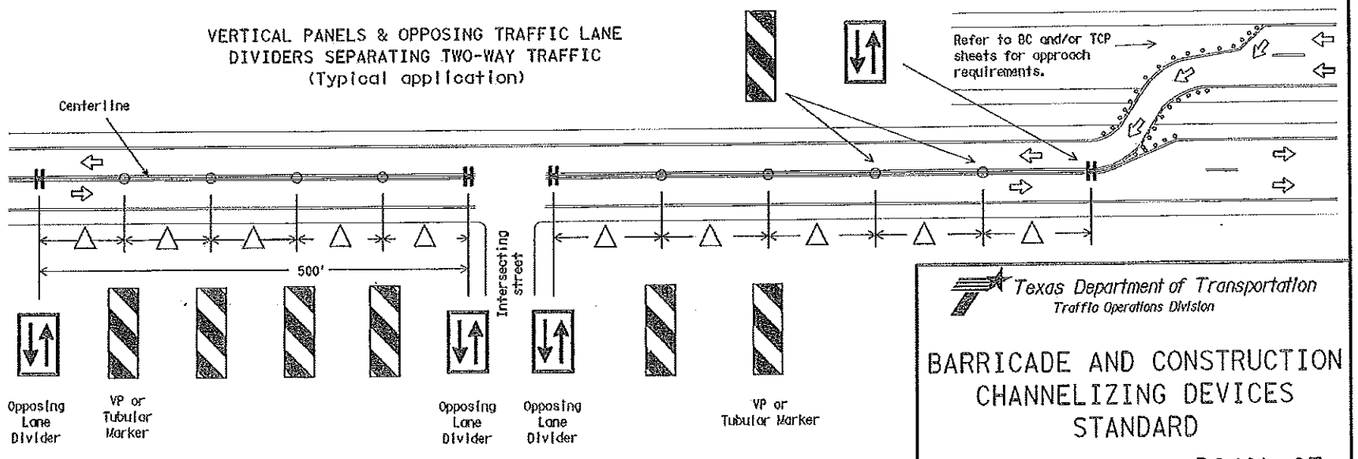
1. Longitudinal channelizing devices are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. Longitudinal channelizing devices may be used instead of a line of cones or drums.
3. Longitudinal channelizing devices shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Longitudinal channelizing devices should not be used to provide positive protection for obstacles, pedestrians or workers.
5. Longitudinal channelizing devices shall be retroreflective, or supplemented with retroreflective delineation as required for temporary barriers on BC(7)-07.

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 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 cones and the top of the unit shall be not less than 32 inches in height.

VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS SEPARATING TWO-WAY TRAFFIC (Typical application)



△ Spacing between the VP's or tubular markers shall not exceed 100 feet. On roadways with speeds less than 45 MPH, spacing between the tubular markers or VP's shall be as shown on the channelizing spacing table shown on this page. If the table shows spacing greater than 100 feet based on the roadway speed, then use a maximum of 100 feet spacing between the tubular markers or VP's. Every fifth channelizing device shall be on OTLD, except when the OLTD must be spaced closer to accomodate an intersection. Spacing between the OTLD shall not exceed 500 feet.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

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9-07 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

DATE:
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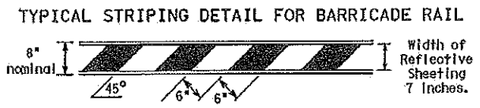
RECORD AS - BUILT DRAWINGS

TYPE III BARRICADES

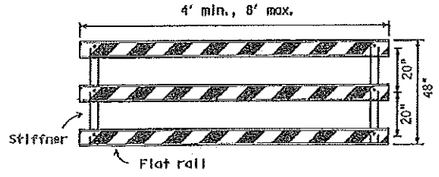
1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type III Barricades and a list of all materials used in the construction of Type III Barricades.
2. Type III Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades 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 C (High Specific Intensity) 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



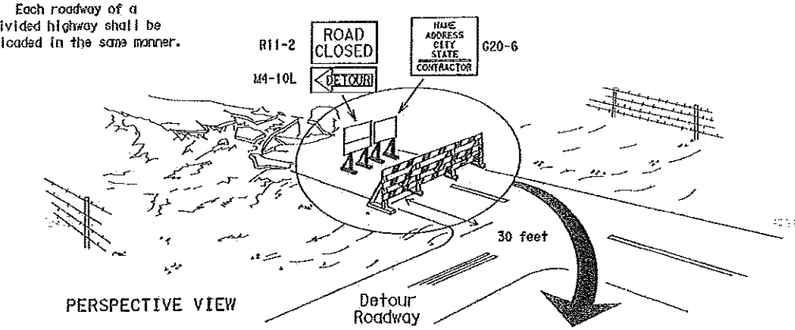
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



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

TYPE III BARRICADE (POST AND SKID) TYPICAL APPLICATION

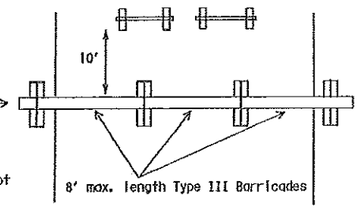
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type III barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

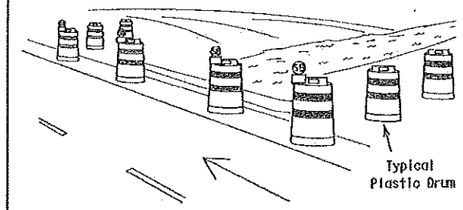
Barricade striping should slant downward in the direction of detour.



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 III Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

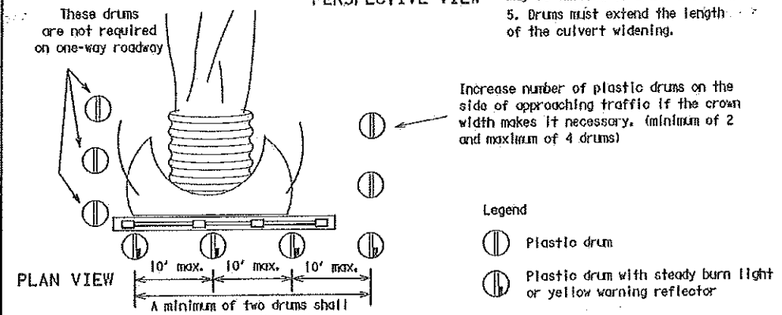
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



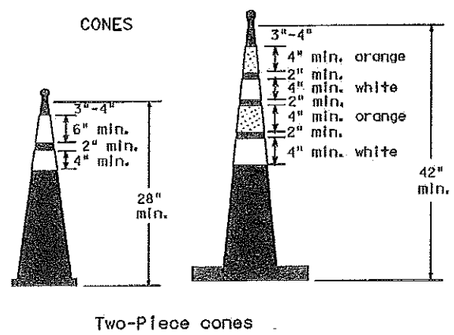
PERSPECTIVE VIEW

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.

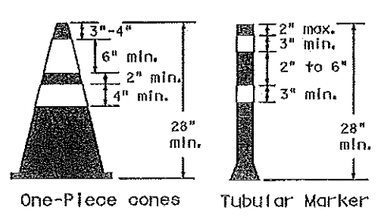


PLAN VIEW

CONES



Two-Piece cones

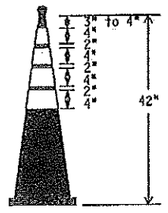


One-Piece cones Tubular Marker

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.

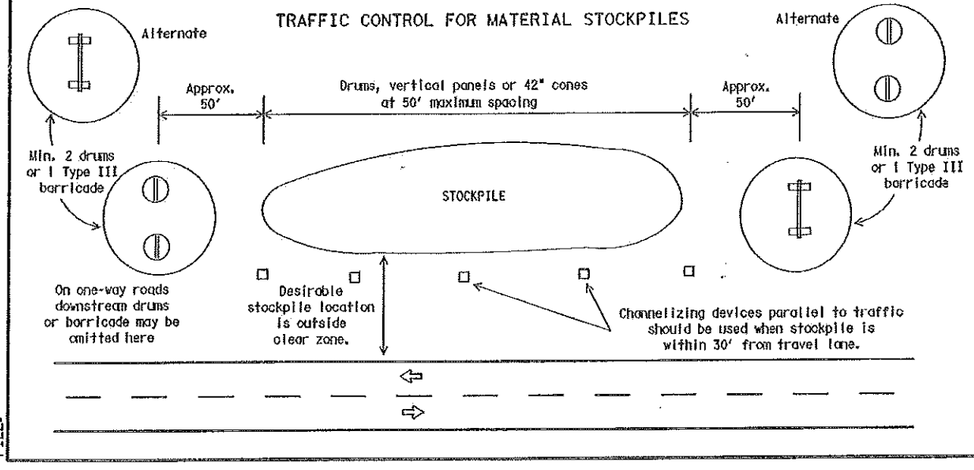
1. Traffic cones and tubular markers shall be a minimum of 28 inches in height when used either on freeways or at nighttime.
2. Cones or tubular markers shall be predominantly orange, fluorescent red-orange, or fluorescent yellow-orange. They should be kept clean and bright for maximum visibility.
3. Cones used only for daytime operations do not require the reflectorized bands.
4. Cones and tubular markers used for nighttime operations shall be reflectorized. Reflectorized material shall have a smooth, sealed outer surface that displays the same approximate color during the day and night. The reflectorized bands shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
5. When used at night, appropriate personnel shall ensure that cones and tubular markers remain in their proper location and in an upright position.
6. Reflectorization of 28"cones shall consist of a minimum 6 inch band placed at least 3 inches but not more than 4 inches from the top, supplemented by a minimum 4 inch band spaced a minimum of 2 inches below the 6 inch band.
7. Reflectorization of 42" cones shall be provided by alternating 4 to 6" orange and white stripes with orange on top.
8. Reflectorization of tubular markers shall be a minimum of two 3 inch bands placed a maximum of 2 inches from the top with a maximum of 6 inches between bands.
9. One-piece cones or tubular markers are generally suitable for temporary usage (up to 8 hours) with other channelization devices such as vertical panels, drums or two-piece cones for long term usage. Care should be taken to ensure they remain in their proper location and in an upright position.
10. Cones or tubular markers used on each project shall be of the same size and shape.
11. The handle may be designed as a hook or other shape, fabricated from non-rigid materials similar to the cone material, and may extend up to a maximum of 8 inches above the top of cone. Length of the handle shall not be considered with regard to the overall height of the cone.



EDGELINE CHANNELIZER

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 C encapsulated bead (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

TRAFFIC CONTROL FOR MATERIAL STOCKPILES



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9-07 REVISIONS	COUNT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

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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.

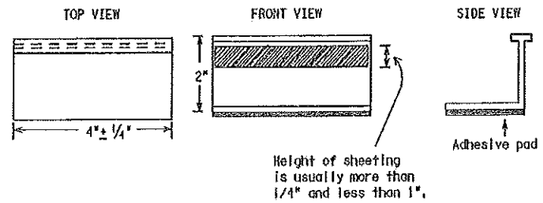
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 two weeks, 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.
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
PREFABRICATED PAVEMENT MARKINGS-PERMANENT	DMS-8240
PREFABRICATED PAVEMENT MARKINGS-REMOVABLE	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).

Texas Department of Transportation
Traffic Operations Division

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS STANDARD

11 of 12 BC(11)-07

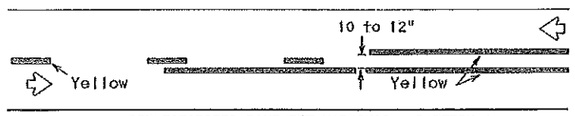
REVISIONS	DIST	SECT	JOB	HIGHWAY
2-98				
1-02				
11-02				
9-07				
	DIST	COUNTY		SHEET NO.

109B

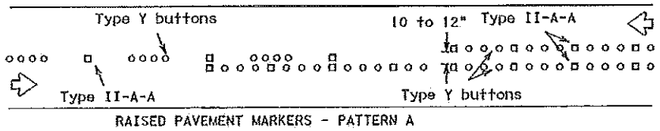
RECORD AS - BUILT DRAWINGS

PAVEMENT MARKING PATTERNS

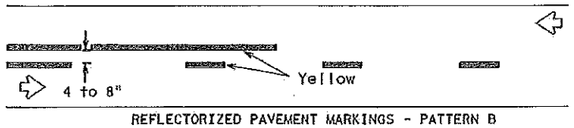
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



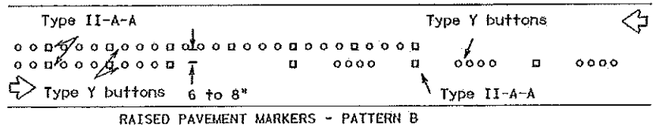
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



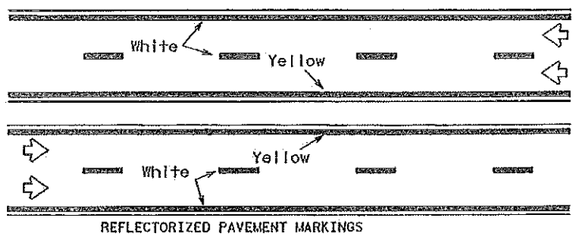
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



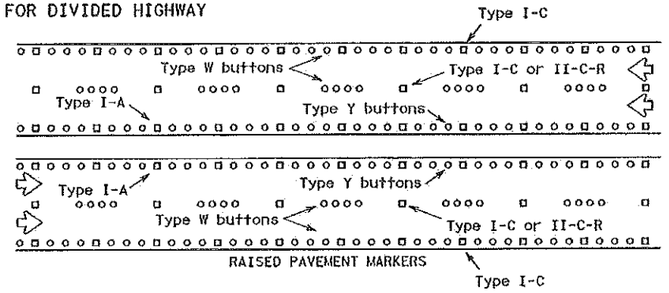
RAISED PAVEMENT MARKERS - PATTERN B

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.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



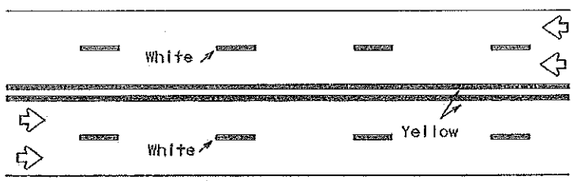
REFLECTORIZED PAVEMENT MARKINGS



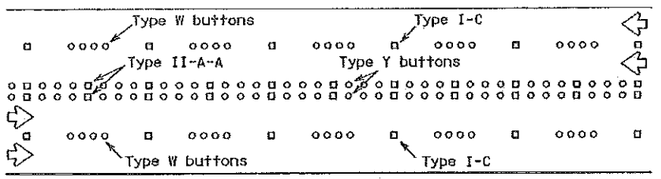
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



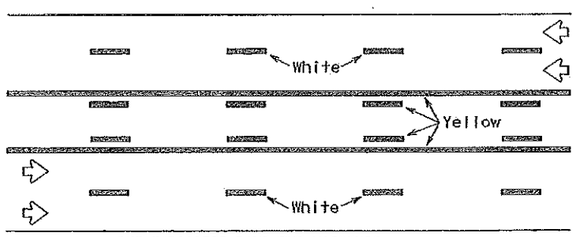
REFLECTORIZED PAVEMENT MARKINGS



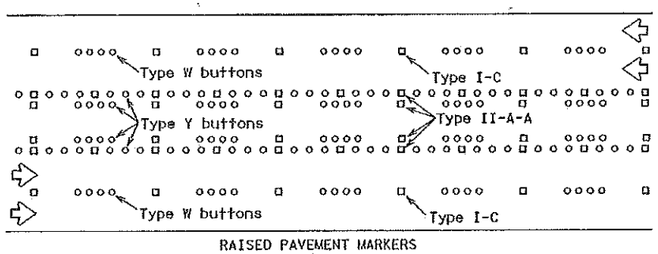
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE



REFLECTORIZED PAVEMENT MARKINGS



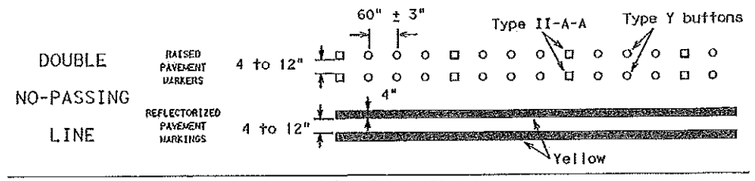
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

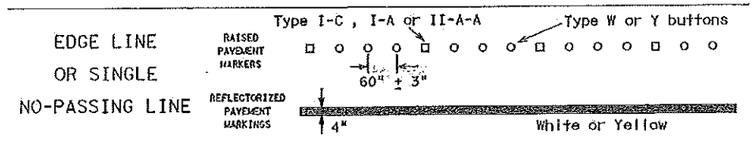
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

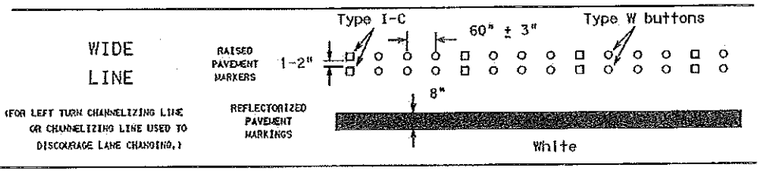


EDGE LINE OR SINGLE NO-PASSING LINE



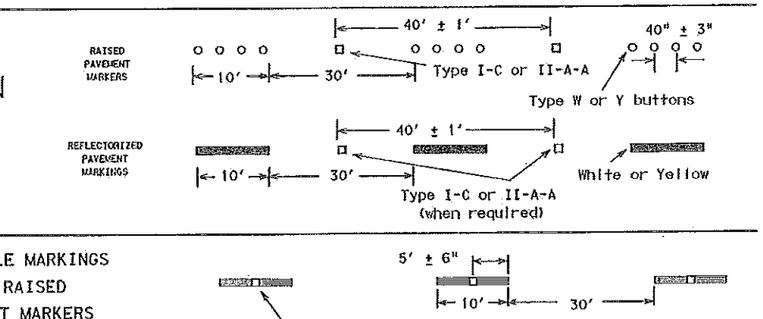
WIDE LINE

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



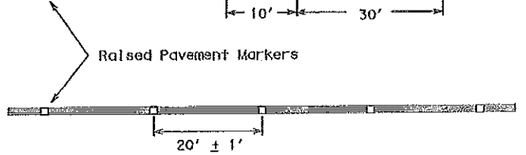
BROKEN LINE

(FOR CENTER LINE OR LANE 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."

Texas Department of Transportation
Traffic Operations Division

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS STANDARD

12 of 12 BC(12)-07

REVISIONS	DIST	COUNTY	SHEET NO.
1-97			
2-98			
11-02			
9-07			

DGN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT

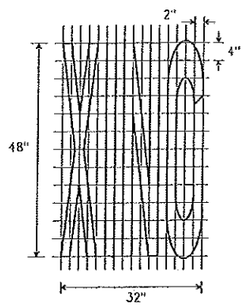
CONT | SECT | JOB | HIGHWAY

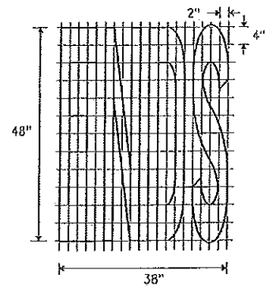
109C

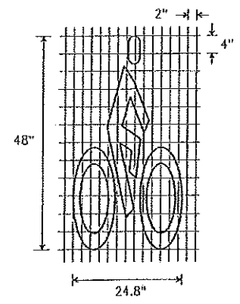
DATE:
FILE:

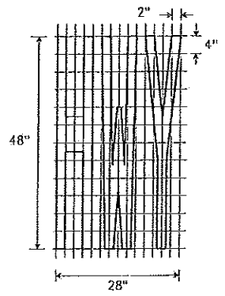
DATE:
FILE:

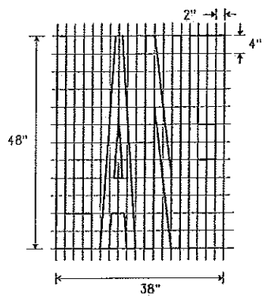
RECORD AS - BUILT DRAWINGS

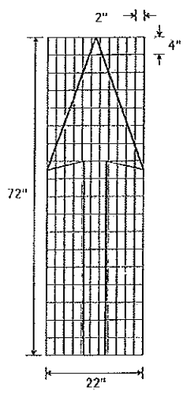


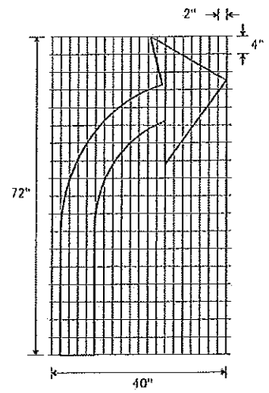


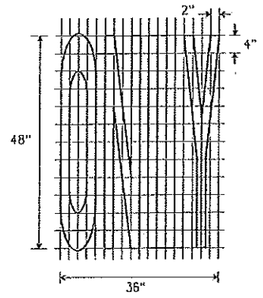


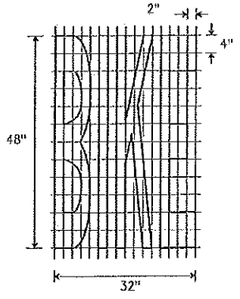


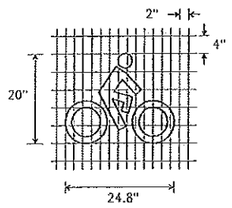


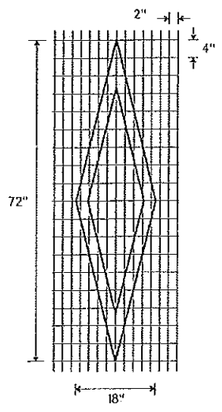


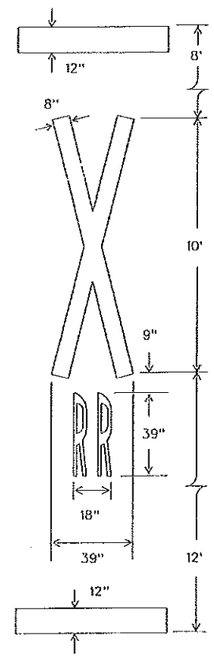


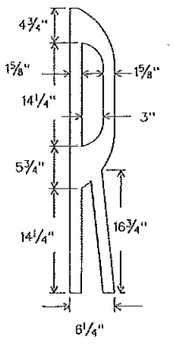


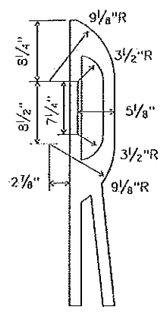












SPECIFICATION REFERENCE TABLE
MATERIALS AND TESTS DIVISION SPECIFICATIONS

TRAFFIC PAINT	D-9-8200
THERMOPLASTIC, HOT APPLIED	D-9-8220
PREFABRICATED PAVEMENT MARKINGS-PERMANENT	D-9-8240
GLASS BEADS	D-9-8290

GENERAL NOTES:

All pavement markings shall be white except when noted otherwise.

Pavement markings shall be of the materials specified and shall be in conformance with Department Material Specifications.

Texas Department of Transportation
Traffic Operations Division

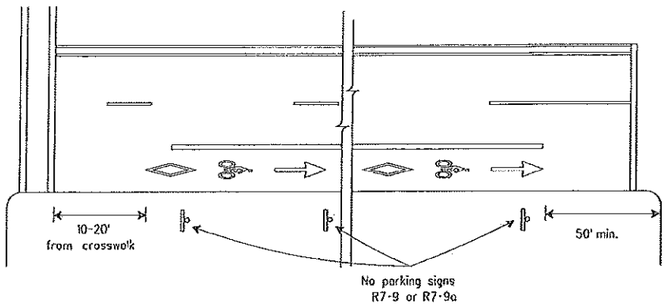
BICYCLE LANE PAVEMENT MARKINGS

BL(PM-1)-97

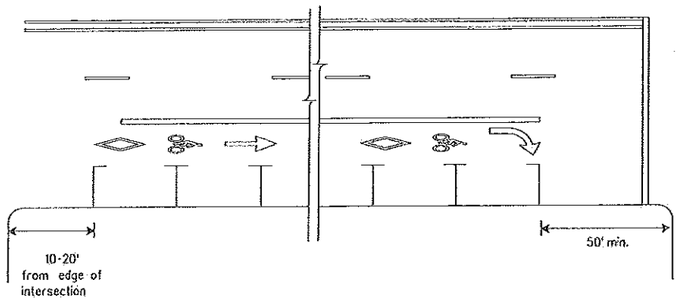
DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY	SHEET NO.

17A

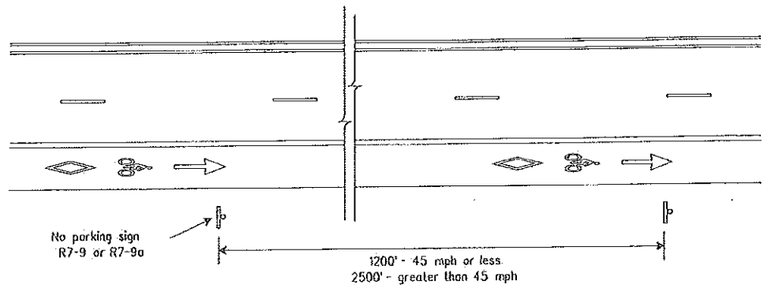
No Parking Along Bicycle Lane



No Parking Along Bicycle Lane

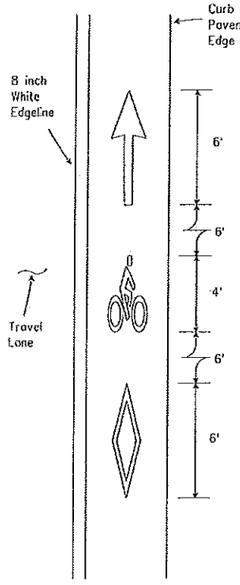


Roadways with Few Intersections

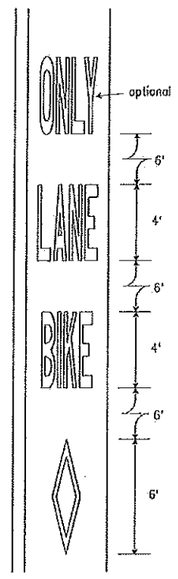


Adjacent to TravelLane

Preferred

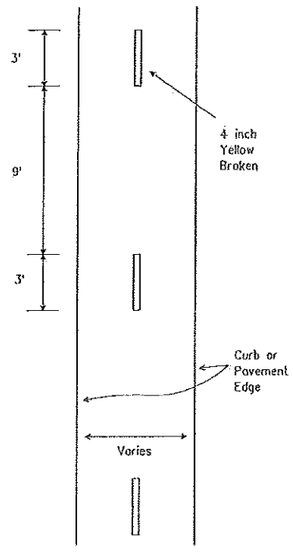


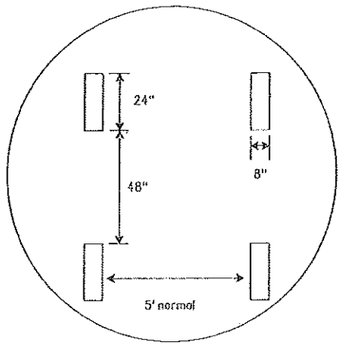
Alternate



Bicycle Lane Path

(Separate roadway with no motorized traffic)

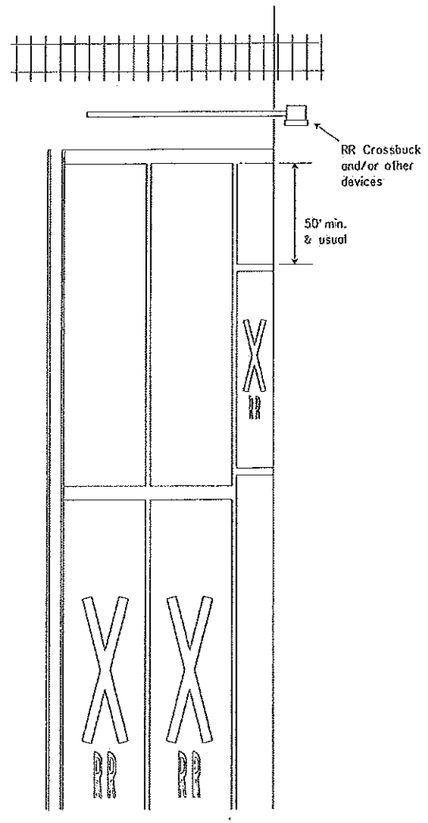




Detail "A"

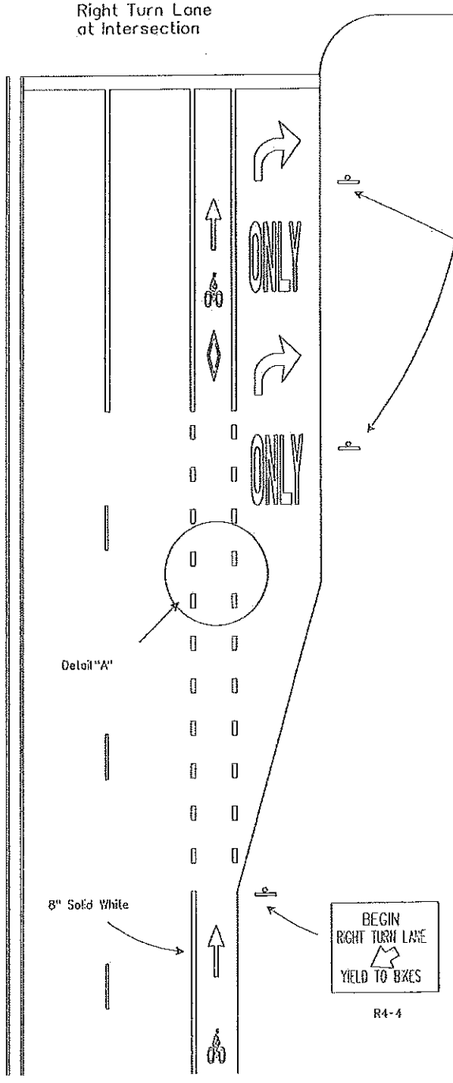
Railroad Crossing Approach

(with designated bicycle lane adjacent to travellane)



(See RCPM for travellane details)

Right Turn Lane at Intersection



SPECIFICATION REFERENCE TABLE
MATERIALS AND TESTS DIVISION SPECIFICATIONS

TRAFFIC PAINT	D-9-8200
THERMOPLASTIC, HOT APPLIED	D-9-8220
PREFABRICATED PAVEMENT MARKINGS-PERMANENT	D-9-8240
GLASS BEADS	D-9-8290

GENERAL NOTES:

All pavement markings shall be white except when noted otherwise.

Pavement markings shall be of the materials specified and shall be in conformance with Department Material Specifications.

Exact sign placement and details are shown elsewhere in the plans.

Additional References: TMUTCD
Guide for the Development of Bicycles Facilities, AASHTO, 1991.

Texas Department of Transportation
Traffic Operations Division

BICYCLE LANE PAVEMENT MARKINGS

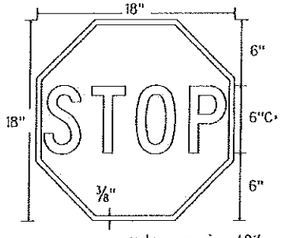
BL(PM-2)-97

DES: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

REVISIONS

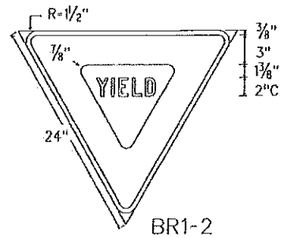
17R

DATE:
FILE:



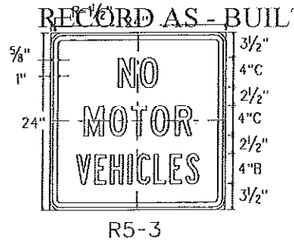
BR1-1

* reduce spacing 40%
Legend - White (refl.)
Background - Red (refl.)



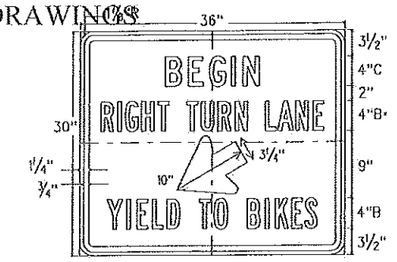
BR1-2

Legend - Red (refl.)
Background - White (refl.)



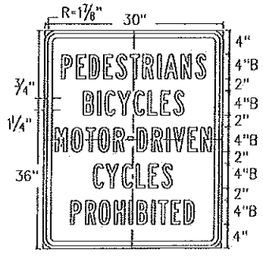
R5-3

Legend - Black
Background - White (refl.)



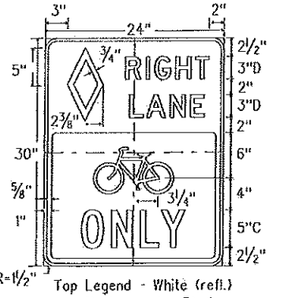
R4-4

Legend - Black
Background - White (refl.)



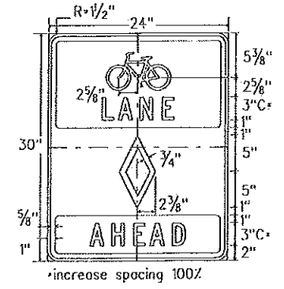
R5-10a

Legend - Black
Background - White (refl.)



R3-17

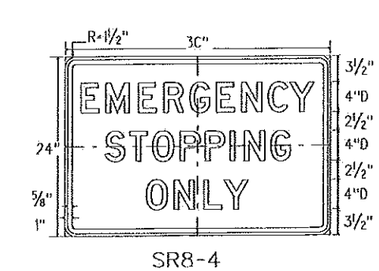
Top Legend - White (refl.)
Background - Black
Bottom Legend - Black
Background - White (refl.)



*increase spacing 100%

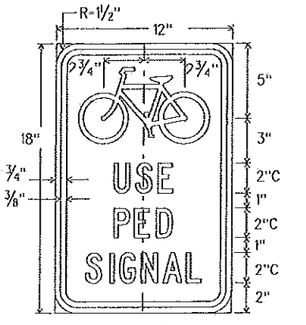
R3-16

Legend - Black
Background & Symbol - White (refl.)



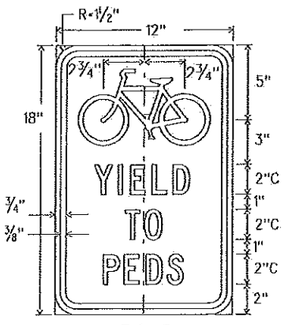
SR8-4

Legend - Black
Background - White (refl.)



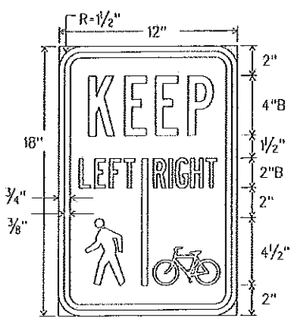
R9-5

Legend - Black
Background - White (refl.)



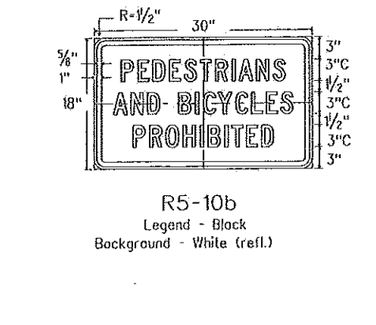
R9-6

Legend - Black
Background - White (refl.)



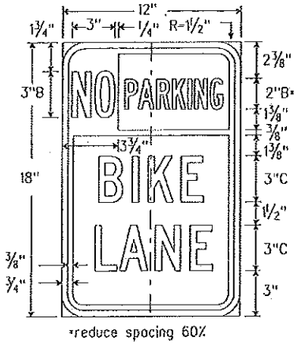
R9-7

Legend - Black
Background - White (refl.)



R5-10b

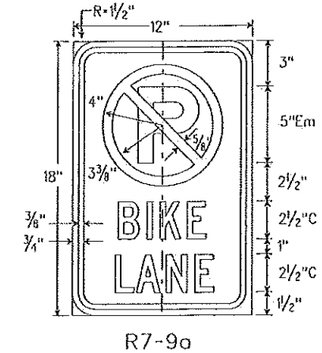
Legend - Black
Background - White (refl.)



*reduce spacing 60%

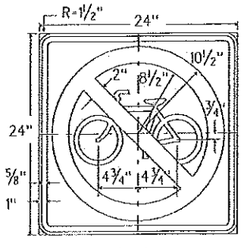
R7-9

Top Left - White on Red
Legend - Red
Background - White (refl.)



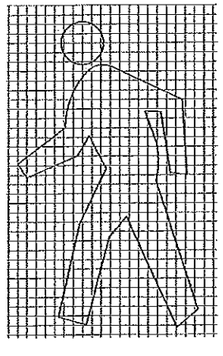
R7-9a

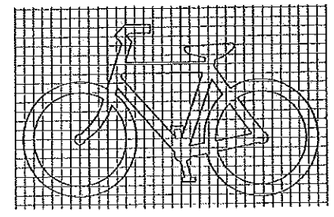
Legend, Circle & Dia. - Red (Refl.)
Border, Letter "P" - Black
Background - White (Refl.)



R5-6

Circle & Dia. - Red (Refl.)
Symbol - Black
Background - White (Refl.)





SPECIFICATION REFERENCE TABLE	
MATERIALS AND TESTS DIVISION SPECIFICATIONS	
PLYWOOD SIGN BLANKS	D-9-7100
ALUMINUM SIGN BLANKS	D-9-7110
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY)	D-9-8300
VINYL NON-REFLECTIVE DECAL SHEETING	D-9-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
RED	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
GREEN	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
WHITE	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
YELLOW	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
BLACK	LEGEND/BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING
WHITE	LEGEND/BORDERS	TYPE C (HIGH SPECIFIC INTENSITY)

GENERAL NOTES:

The alphabets and lateral spacing between letters and numerals shall conform with the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways", latest edition, and any approved changes thereto. Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.

Sign blanks shall be fabricated from 0.08 inch thick aluminum alloy (Type A) or 5/8 inch plywood as noted elsewhere in the plans. Signs shall be mounted in accordance with Standard SMD (series).

For red background signs, legend shall be applied by screening process, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting (Type C).

For white background signs, black legend shall be applied by screening process, cut-out vinyl non-reflective decal sheeting or combination thereof. Red, green or other colored legends, symbols, and/or borders shall be applied by screening process with transparent ink, cut-out reflective sheeting applied to white background or combination thereof. Background shall be reflective sheeting (Type C).

4/01 Revision

All white reflec. sheeting on ground mount signs shall be High Specific Intensity. Notes have been modified to reflect change.

Texas Department of Transportation
Traffic Operations Division

BICYCLE LANE REGULATORY SIGNS

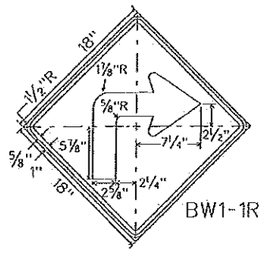
BL(RS)-01

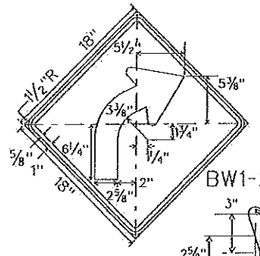
DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

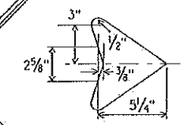
4-01 REVISIONS

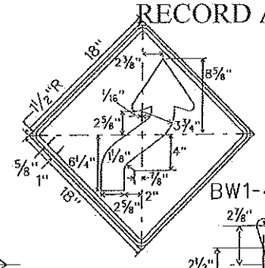
DATE:
FILE:

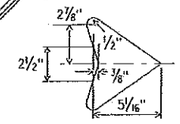
RECORD AS - BUILT DRAWINGS

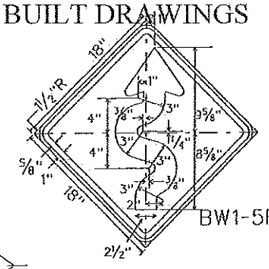


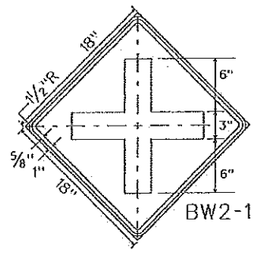


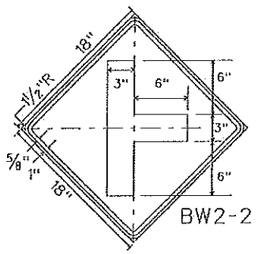


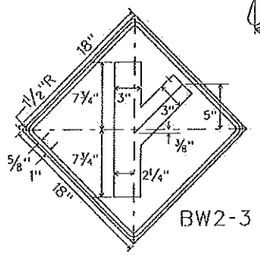


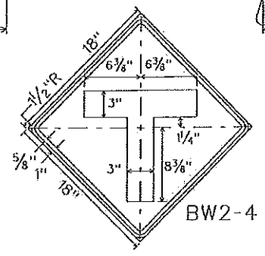


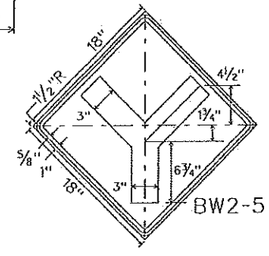


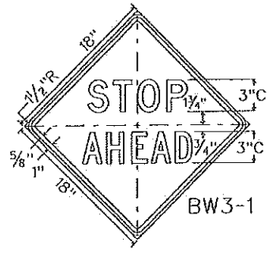


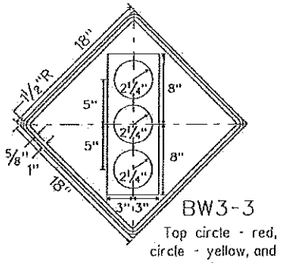




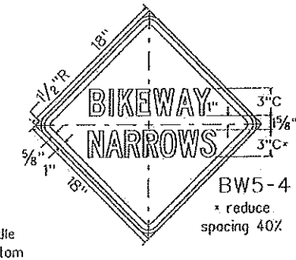




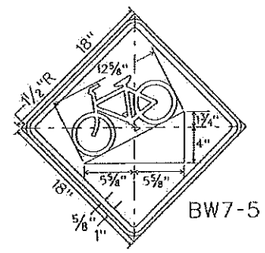


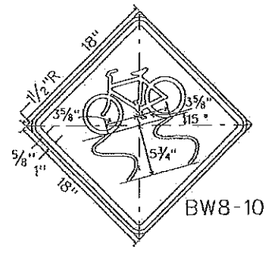


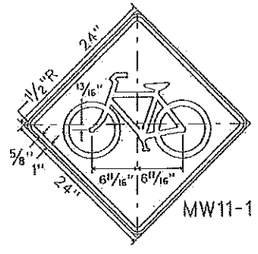
Top circle - red, middle circle - yellow, and bottom circle - green.

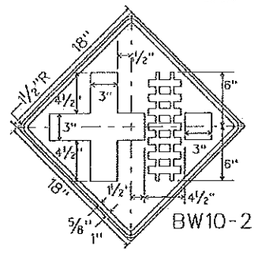


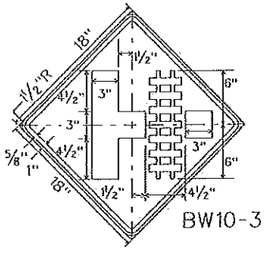
* reduce spacing 40%

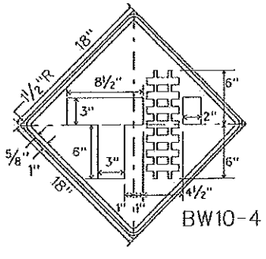


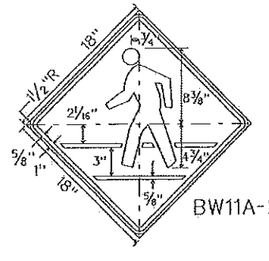


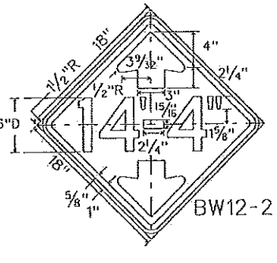


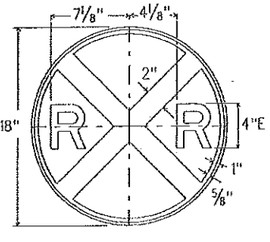


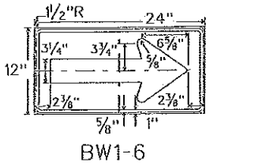


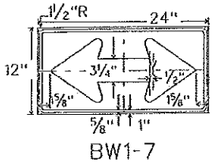


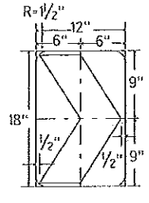


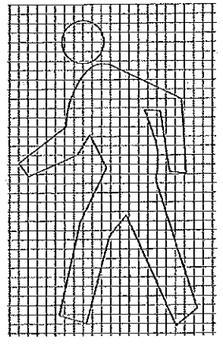












SPECIFICATION REFERENCE TABLE	
MATERIALS AND TESTS DIVISION SPECIFICATIONS	
PLYWOOD SIGN BLANKS	D-9-7100
ALUMINUM SIGN BLANKS	D-9-7110
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY)	D-9-8300
VINYL NON-REFLECTIVE DECAL SHEETING	D-9-8320

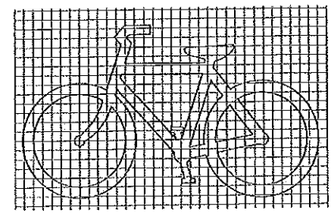
COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
RED	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
GREEN	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
WHITE	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
YELLOW	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
BLACK	LEGEND/BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING
WHITE	LEGEND/BORDERS	TYPE C (HIGH SPECIFIC INTENSITY)

GENERAL NOTES:

The alphabets and lateral spacing between letters and numerals shall conform with the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways", latest edition, and any approved changes thereto. Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.

Sign blanks shall be fabricated from 0.08 inch thick aluminum alloy (Type A) or 5/8 inch plywood as noted elsewhere in the plans. Signs shall be mounted in accordance with Standard SMD (series).

For yellow background signs, legend shall be black and applied by screening process, cut-out vinyl non-reflective decal sheeting or combination thereof. Red and green symbol shall be applied by screening process with transparent ink on white sheeting, cut-out reflective sheeting or combination thereof. Background shall be reflective sheeting (Type C).



4/01 Revision

⚠1 All white reflec. sheeting on ground mount signs shall be High Specific Intensity. Notes have been modified to reflect change.

Texas Department of Transportation
Traffic Operations Division

BICYCLE LANE WARNING SIGNS

BL(WS)-01

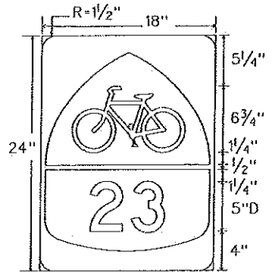
DSN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

4-01 REVISIONS

DATE:
FILE:

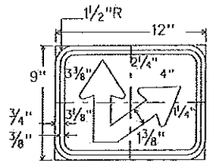
16B

DATE:
FILE:

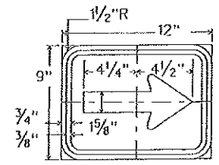


M1-9

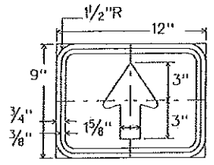
Bike, border & numbers - Black
Background - White (refl.)



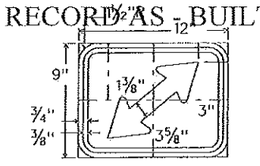
M7-7R



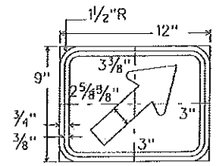
M7-1



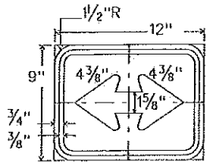
M7-2



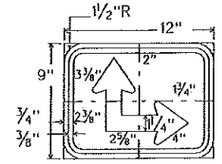
M7-3R



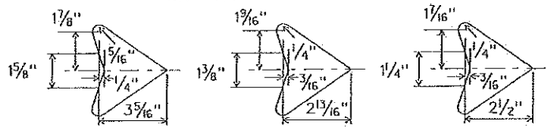
M7-4R



M7-5

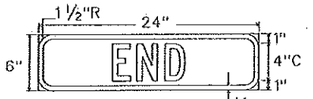


M7-6R

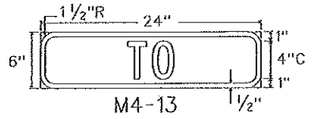


Signs in this section:
Legend - Black
Background - White (refl.)

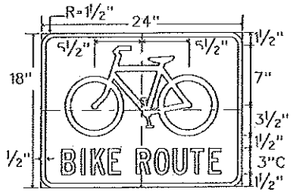
M4-11



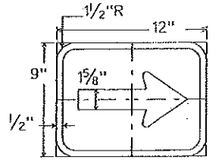
M4-12



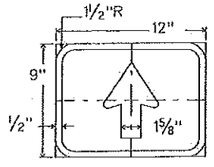
M4-13



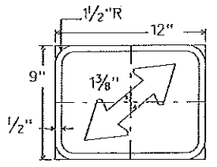
D11-1



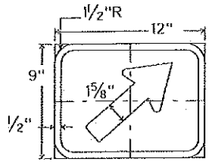
M7-1G



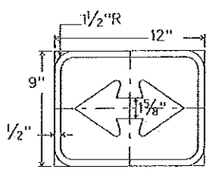
M7-2G



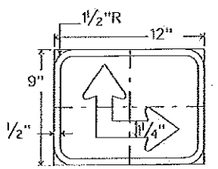
M7-3GR



M7-4GR

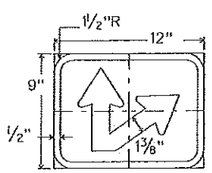


M7-5G

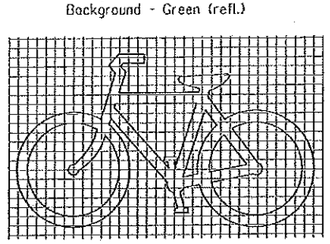


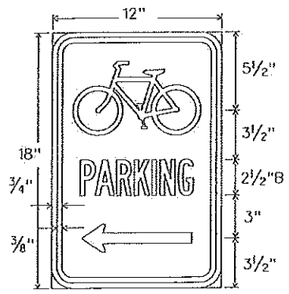
M7-6GR

Signs in this section:
Legend - White (refl.)
Background - Green (refl.)



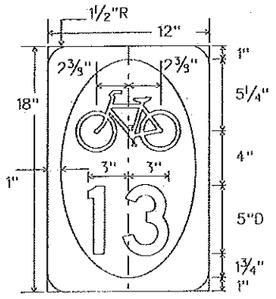
M7-7RG





D4-3

Legend - Green
Background - White (refl.)



M1-8

Bike, border & numbers - Green
Inside oval - White (refl.)

RECORD AS - BUILT DRAWINGS

This area reserved for special bicycle route sign details.

If additional details are included, a registered professional engineer shall sign, date, affix PE seal and change title block to BL(GS)-(MOD).

SPECIFICATION REFERENCE TABLE	
MATERIALS AND TESTS DIVISION SPECIFICATIONS	
PLYWOOD SIGN BLANKS	D-9-7100
ALUMINUM SIGN BLANKS	D-9-7110
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY)	D-9-8300
VINYL NON-REFLECTIVE DECAL SHEETING	D-9-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
RED	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
GREEN	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
WHITE	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
YELLOW	BACKGROUND	TYPE C (HIGH SPECIFIC INTENSITY)
BLACK	LEGEND/BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING
WHITE	LEGEND/BORDERS	TYPE C (HIGH SPECIFIC INTENSITY)

4/01 Revision

⚠1 All white reflec. sheeting on ground mount signs shall be High Specific Intensity. Notes have been modified to reflect change.

GENERAL NOTES:

The alphabets and lateral spacing between letters and numerals shall conform with the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways", latest edition, and any approved changes thereto. Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.

Sign blanks shall be fabricated from 0.08 inch thick aluminum alloy (Type A) or 5/8 inch plywood as noted elsewhere in the plans. Signs shall be mounted in accordance with Standard SMD (series).

For white background signs, black legend shall be applied by screening process, cut-out vinyl non-reflective decal sheeting or combination thereof. Green or other colored legends, symbols, and/or borders shall be applied by screening process with transparent ink, cut-out reflective sheeting applied to white background or combination thereof. Background shall be reflective sheeting (Type C).

For green background signs, legend shall be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting (Type C).

⚠1

Texas Department of Transportation
Traffic Operations Division

BICYCLE LANE GUIDE SIGNS

BL(GS)-01

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

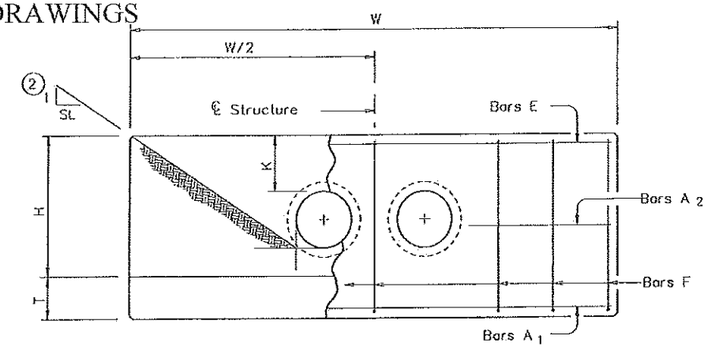
4-01 REVISIONS

16C

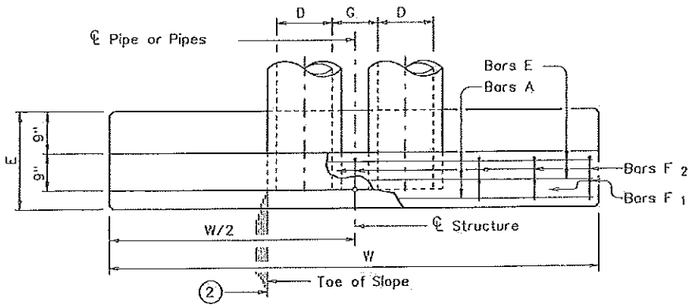
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (4)

SLOPE	DIA OF PIPE,D	Values for one Pipe W	Reinf (Lbs)	Conc (CY) (1)	Values to be added for each addt'l Pipe W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	9'- 0"	122	1.1	19'- 9|2		
	15"	10'- 3"	136	1.3	2'- 2" 16	0.2	
	18"	11'- 6"	163	1.5	2'- 8"19	0.3	
	21"	12'- 9"	200	1.8	3'- 1" 31	0.4	
	24"	14'- 0"	217	2.1	34- 70.4		
	27"	15'- 3"	254	2.4	3'-11"	37 0.5	
	30"	16'- 6"	272	2.7	4'- 4"	40 0.6	
	33"	17'- 9"	314	3.1	43- 80.6		
	36"	19'- 0"	371	3.9	5'- 1"46	0.8	
	42"	21'- 6"	442	4.9	5'-10" 52	1.0	
	48"	25'- 0"	569	6.4	6'- 7"	59 1.3	
	54"	27'- 6"	701	7.5	7'- 6" 82	1.6	
	60"	30'- 0"	794	8.8	8'- 3"	90 1.8	
	66"	32'- 6"	894	10.2	8'- 9" 96	2.0	
	72"	35'- 0"	1055	11.7	9'- 4" 103	2.3	
3:1	12"	13'- 0"	175	1.6	1'- 9" 14	0.2	
	15"	14'- 9"	193	1.9	2'- 2"17	0.2	
	18"	16'- 6"	228	2.2	2'- 8" 19	0.3	
	21"	18'- 3"	299	2.6	3'- 1" 31	0.4	
	24"	20'- 0"	323	3.0	3'- 7"	33 0.4	
	27"	21'- 9"	371	3.5	3'-11" 37	0.5	
	30"	23'- 6"	415	4.0	4'- 4"	40 0.5	
	33"	25'- 3"	469	4.6	4'- 8" 43	0.6	
	36"	27'- 0"	556	5.7	5'- 1"	46 0.8	
	42"	30'- 6"	675	7.1	5B210"1.0		
	48"	35'- 6"	837	9.2	6'- 7"	59 1.3	
	54"	39'- 0"	1015	11.0	7'- 6" 84	1.6	
	60"	42'- 6"	1171	12.9	8'- 3"91	1.8	
	66"	46'- 0"	1298	14.9	8'- 9" 98	2.0	
	72"	49'- 6"	1561	17.1	109'- 8:3		
4:1	12"	17'- 0"	229	2.0	1'- 9" 15	0.2	
	15"	19'- 3"	266	2.4	2'- 2"	17 0.2	
	18"	21'- 6"	308	2.9	2'- 8" 19	0.3	
	21"	23'- 9"	382	3.5	3'- 1"	31 0.3	
	24"	26'- 0"	430	3.9	3'- 7"	34 0.4	
	27"	28'- 3"	486	4.7	3'-11"	37 0.5	
	30"	30'- 6"	539	5.2	4'- 4"	40 0.6	
	33"	32'- 9"	603	6.0	4'- 8"	42 0.6	
	36"	35'- 0"	738	7.5	5'- 1"	47 0.8	
	42"	39'- 6"	881	9.3	5'-10" 52	1.0	
	48"	46'- 0"	1102	12.1	6B'-1.8"		
	54"	50'- 6"	1364	14.4	7'- 6"	84 1.6	
	60"	55'- 0"	1547	16.9	8'- 3" 91	1.8	
	66"	59'- 6"	1741	19.5	8'- 9" 98	2.0	
	72"	64'- 0"	2069	22.4	9'- 4"	102 2.3	
6:1	12"	25'- 0"	336	3.0	1'- 9" 14	0.2	
	15"	28'- 3"	384	3.6	2'- 2" 17	0.2	
	18"	31'- 6"	452	4.2	2'- 8" 19	0.3	
	21"	34'- 9"	581	5.1	3B'0.8"		
	24"	38'- 0"	644	5.8	3'- 7"	34 0.4	
	27"	41'- 3"	737	6.9	3'-11" 37	0.5	
	30"	44'- 6"	807	7.7	4'- 4"	39 0.6	
	33"	47'- 9"	912	8.9	4'- 8" 44	0.6	
	36"	51'- 0"	1108	11.0	5'- 1" 48	0.8	
	42"	57'- 6"	1318	13.7	5'-10" 54	1.0	
	48"	67'- 0"	1674	17.9	6'- 7" 59	1.3	
	54"	73'- 6"	2064	21.3	7'- 6"	33 1.6	
	60"	80'- 0"	2343	24.9	8'- 3"	89 1.8	
	66"	86'- 6"	2635	28.9	8'- 9"	96 2.0	
	72"	93'- 0"	3123	33.1	101 2:3		

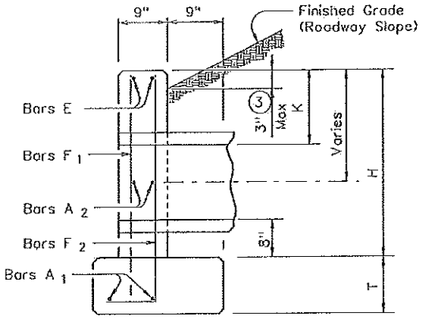
RECORD AS - BUILT DRAWINGS



ELEVATION



PLAN OF NON-SKEWED PIPES



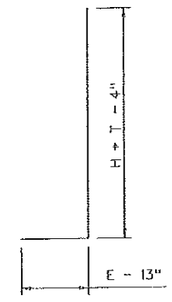
℄ SECTION

TABLE OF CONSTANT DIMENSIONS

DIA OF PIPE,D	G	K	H	T	E
12"	9"	1'- 0"	2'- 8"	9"	1'- 9"
15"	11"	1'- 0"	2'-11"	9"	1'- 9"
18"	1'- 2"	1'- 0"	3'- 2"	9"	1'- 9"
21"	1'- 4"	1'- 0"	3'- 5"	9"	2'- 0"
24"	1'- 7"	1'- 0"	3'- 8"	9"	2'- 0"
27"	1'- 8"	1'- 0"	3'-11"	9"	2'- 3"
30"	1'-10"	1'- 0"	4'- 2"	9"	2'- 3"
33"	1'-11"	1'- 0"	4'- 5"	9"	2'- 6"
36"	2'- 1"	1'- 0"	4'- 8"	1'- 0"	2'- 6"
42"	2'- 4"	1'- 0"	5'- 2"	1'- 0"	2'- 9"
48"	2'- 7"	1'- 3"	5'-11"	1'- 0"	3'- 0"
54"	3'- 0"	1'- 3"	6'- 5"	1'- 0"	3'- 3"
60"	3'- 3"	1'- 3"	6'-11"	1'- 0"	3'- 6"
66"	3'- 3"	1'- 3"	7'- 5"	1'- 0"	3'- 9"
72"	3'- 4"	1'- 3"	7'-11"	1'- 0"	4'- 0"

TABLE OF REINFORCING STEEL (4)

Bar	Size	Spo	No.
A1	# 5	~	2
A2	# 5	1'-6"	~
E	# 5	~	2
F	# 5	1'-0"	~



BARS F2

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.

All reinforcing steel shall be Grade 60.

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

No bridge rails of any type may be mounted directly to these culvert headwalls.

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) Indicated slope is perpendicular to centerline Pipe or Pipes.

(3) 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.

(4) Quantities shown are for one structure end only (one headwall).

Texas Department of Transportation
Bridge Division

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

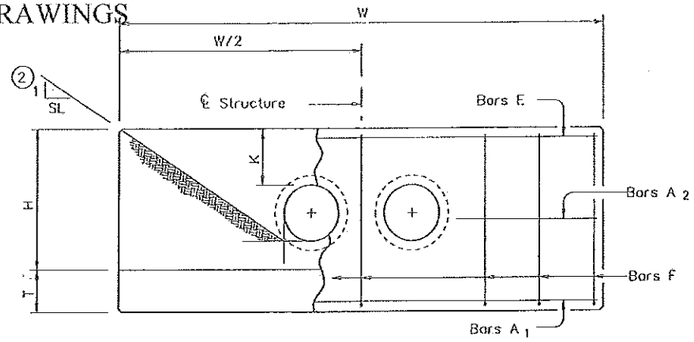
FILE: chpw0ste.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS	COUNTY	CONTROL	SECT	JOB	HIGHWAY

LEVELS DISPLAYED ACC:

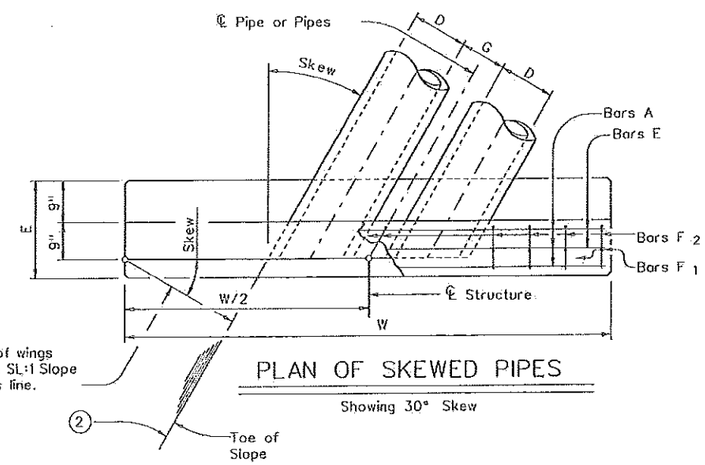
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (4)

RECORD AS - BUILT DRAWINGS

SLOPE	DIA OF PIPE, D	15 Degrees						30 Degrees						45 Degrees					
		Values for one Pipe			Values to be added for each addt'l Pipe			Values for one Pipe			Values to be added for each addt'l Pipe			Values for one Pipe			Values to be added for each addt'l Pipe		
		W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	9'- 4"	124	1.1	1'-19 3/8"	2		10'- 5"	130	1.2	2'- 0"	16	0.2	12'- 9"	159	1.5	2'- 5 3/4"	17	0.3
	15"	10'- 7"	136	1.3	2'- 3"	17	0.2	11'-10"	159	1.5	2'- 6"	18	0.2	14'- 6"	191	1.8	3'- 0 3/4"	20	0.3
	18"	11'-11"	165	1.5	2'- 9"	18	0.3	13'- 3"	174	1.7	3'- 1"	29	0.3	16'- 3"	207	2.1	3'- 9 3/4"	20	0.4
	21"	13'- 2"	203	1.9	3'- 2 1/4"	31	0.4	14'- 9"	233	2.1	3'- 5 3/4"	30	0.4	18'- 0"	276	2.6	4'- 4 1/4"	36	0.5
	24"	14'- 6"	240	2.1	3'- 8 1/4"	30	0.4	16'- 2"	251	2.4	4'- 1 3/4"	36	0.5	19'-10"	318	2.9	5'- 0 3/4"	39	0.6
	27"	15'- 9"	258	2.5	4'- 0 3/4"	38	0.5	17'- 7"	292	2.8	4'- 6 1/4"	39	0.6	21'- 7"	342	3.4	5'- 6 1/4"	44	0.7
	30"	17'- 1"	287	2.8	4'- 5 3/4"	40	0.6	19'- 1"	311	3.1	4'- 10 3/4"	42	0.6	23'- 4"	388	3.8	6'- 1 3/4"	47	0.8
	33"	18'- 5"	320	3.3	4'- 9 3/4"	43	0.6	20'- 6"	358	3.6	5'- 4 3/4"	46	0.7	25'- 1"	439	4.4	6'- 7 1/4"	51	0.9
	36"	19'- 8"	401	4.0	5'- 3"	47	0.9	21'-11"	422	4.5	5'-10 3/4"	50	0.9	26'-10"	517	5.5	7'- 2 1/4"	55	1.2
	42"	22'- 3"	476	5.0	6'- 0 3/4"	53	1.1	24'-10"	528	5.6	6'- 8 3/4"	56	1.2	30'- 5"	634	6.9	8'- 3"	76	1.4
	48"	25'-11"	577	6.6	6'- 9 3/4"	60	1.3	28'-10"	637	7.3	7'- 7 1/4"	79	1.5	35'- 4"	791	9.0	9'- 3 3/4"	83	1.8
	54"	28'- 6"	711	7.8	7'- 9"83		1.6	31'- 9"	781	8.7	8'- 8"87		1.8	38'-11"	958	10.7	10'- 7 1/4"	97	2.2
	60"	31'- 1"	805	9.2	8'- 6 1/4"	98	1.9	34'- 8"	881	10.2	9'- 6 1/4"	97	2.1	42'- 5"	113	12.5	11'- 8"124		2.6
	66"	33'- 8"	907	10.6	9'- 0 3/4"	98	2.1	37'- 6"	028	11.8	10'- 1 1/4"	102	2.4	46'- 0"	235	14.5	12'- 4 1/4"	132	2.9
	72"	36'- 3"	1071	12.1	10'- 3 3/4"			40'- 5"	1207	13.5	10'- 9 1/4"	110	2.6	49'- 6"	1446	16.6	13'- 2 1/4"	14	3.2
3:1	12"	13'- 6"	178	1.6	1'- 9 3/4"	15	0.2	15'- 0"	189	1.8	2'- 0"	15	0.2	18'- 5"	237	2.2	2'- 5 3/4"	17	0.2
	15"	15'- 3"	212	1.9	2'- 3"	17	0.2	17'- 0"	223	2.1	2'- 8"	13		20'-10"	276	2.6	3'- 0 3/4"	20	0.3
	18"	17'- 1"	251	2.3	2'- 9"	19	0.3	19'- 1"	259	2.5	3'- 1"	29	0.3	23'- 4"	318	3.1	3'- 9 2 1/4"		0.4
	21"	18'-11"	306	2.7	3'- 2 1/4"	31	0.4	21'- 1"	339	3.0	3'- 6 3/4"	33	0.4	25'-10"	413	3.7	4'- 4 1/4"	36	0.5
	24"	20'- 8"	345	3.1	3'- 8 3/4"		0.4	23'- 1"	384	3.5	4'- 1 3/4"	36	0.5	28'- 3"	462	4.2	5'- 0 3/4"	40	0.6
	27"	22'- 6"	376	3.7	4'- 0 3/4"	38	0.5	25'- 1"	438	4.1	4'- 8 3/4"		0.6	30'- 9"	522	5.0	5'- 6 1/4"	44	0.7
	30"	24'- 4"	422	4.1	4'- 8 3/4"		0.6	27'- 2"	466	4.6	5'- 0"	42	0.6	33'- 3"	578	5.6	6'- 1 3/4"	47	0.8
	33"	26'- 2"	476	4.8	4'-10"	43	0.6	29'- 2"	522	5.3	5'- 4 3/4"	46	0.7	35'- 9"	644	6.5	6'- 7 1/4"	51	0.9
	36"	27'-11"	590	5.9	5'- 3 1/4"	47	0.8	31'- 2"	645	6.6	5'-10 3/4"	50	0.9	38'- 2"	787	8.0	7'- 2 1/4"	56	1.2
	42"	31'- 7"	684	7.3	6'- 0 1/4"	53	1.1	35'- 3"	776	8.2	6'- 8 3/4"	56	1.2	43'- 2"	933	10.0	8'- 3"	79	1.4
	48"	36'- 9"	880	9.6	6'- 9 3/4"	61	1.3	41'- 0"	953	10.7	7'- 7 1/4"	81	1.5	50'- 2"	166	13.1	9'-88 3/4"		
	54"	40'- 5"	1065	11.4	7'- 9"	85	1.6	45'- 0"	185	12.7	8'- 8"	89	1.8	55'- 2"	1435	15.5	10'- 7 1/4"	97	2.2
	60"	44'- 0"	1224	13.3	8'- 6 1/4"	93	1.9	49'- 1"	1356	14.8	9'- 6 1/4"	96	2.1	60'- 1"	1627	18.2	11'- 8"124		2.6
	66"	47'- 7"	1357	15.4	9'- 1"	98	2.1	53'- 1"	1497	17.2	10'- 1 1/4"	103	2.3	65'- 1"	1834	21.1	12'-130 1/42.9		
	72"	51'- 3"	1624	17.7	9'- 8"105		2.3	57'- 2"	1787	19.7	10'- 9 1/4"	109	2.6	70'- 0"	2210	24.1	13'- 239/4"3.2		
4:1	12"	17'- 7"	232	2.1	1'- 3 3/4"	2		19'- 8"	259	2.4	2'- 0"	16	0.2	24'- 0"	314	2.9	2'- 5 3/4"	18	0.2
	15"	19'-11"	272	2.9	2'- 3"	17	0.2	22'- 3"	301	2.8	2'- 6"	18	0.3	27'- 3"	361	3.5	3'- 0 3/4"	21	0.3
	18"	22'- 3"	313	3.0	2'- 9"	19	0.3	24'-10"	344	3.3	3'- 1"	29	0.3	30'- 5"	427	4.0	3'- 9 1/4"	32	0.4
	21"	24'- 7"	407	3.6	3'- 2 1/4"	31	0.4	27'- 5"	446	4.0	3'- 6 3/4"	33	0.4	33'- 7"	549	4.9	4'- 4 1/4"	36	0.5
	24"	26'-11"	455	4.1	3'- 8 3/4"		0.4	30'- 0"	499	4.5	4'- 1 3/4"	36	0.5	36'- 9"	609	5.6	5'- 0 3/4"	40	0.6
	27"	29'- 3"	514	4.8	4'- 0 3/4"	38	0.5	32'- 7"	562	5.4	4'- 6 1/4"	40	0.6	39'-11"	703	6.6	5'- 6 1/4"	43	0.7
	30"	31'- 7"	568	5.4	4'- 5 3/4"	40	0.6	35'- 3"	620	6.0	5'- 0"	42	0.6	43'- 2"	768	7.4	6'- 1 3/4"	49	0.8
	33"	33'-11"	634	6.2	4'-10"	43	0.7	37'-10"	710	7.0	5'- 4 3/4"	46	0.7	46'- 4"	848	8.5	6'- 7 1/4"	52	0.9
	36"	36'- 3"	776	7.7	5'- 3"	48	0.9	40'- 5"	868	8.6	5'-10 3/4"	49	0.9	49'- 6"	1058	10.6	7'- 2 1/4"	56	1.1
	42"	40'-11"	921	9.6	6'- 0 1/4"	83	1.0	45'- 7"	022	10.7	6'- 8 3/4"	57	1.2	55'-10"	1262	13.1	78- 3 1/4		
	48"	47'- 7"	1152	12.6	6'-10"61		1.3	53'- 1"	1268	14.0	7'- 7 1/4"	80	1.5	65'- 1"	1579	17.2	9'- 3 3/4"	86	1.8
	54"	52'- 3"	1416	14.9	7'- 9 1/4"86		1.6	58'- 4"	1589	16.6	8'- 8"89		1.8	71'- 5"	1916	20.4	10'- 7 1/4"	95	2.2
	60"	56'-11"	1606	17.5	8'- 6 3/4"92		1.9	63'- 6"	1798	19.5	9'- 6 1/4"	95	2.1	77'- 9"	2184	23.9	11'- 8" 122		2.6
	66"	61'- 7"	1811	20.2	9'- 0 3/4"97		2.1	68'- 8"	2011	22.5	10'- 1 1/4"	101	2.4	84'- 2"	2464	27.6	12'- 4 1/4"	131	2.9
	72"	66'- 3"	2142	23.2	9'- 8"104		2.4	73'-11"	2371	25.9	10'- 9 1/4"108		2.6	90'- 6"	2929	31.7	13'- 2 1/4"	138	3.2
6:1	12"	25'-11"	342	3.1	1'-19 3/8"	2		28'-10"	374	3.5	2'- 0"	16	0.2	35'- 4"	456	4.3	2'- 5 3/4"	17	0.2
	15"	29'- 3"	390	3.7	2'- 3"	17	0.2	32'- 7"	442	4.2	2'- 6"	18	0.2	39'-11"	549	5.1	3'- 20 3/4"0.3		
	18"	32'- 7"	459	4.4	2'- 9"	20	0.3	36'- 4"	515	4.9	3'- 1"	29	0.3	44'- 7"	629	5.0	3'- 9 1/4"	33	0.4
	21"	36'- 0"	608	5.3	3'- 2 1/4"	31	0.4	40'- 2"	660	5.9	3'- 6 3/4"	33	0.4	49'- 2"	823	7.2	4'- 4 1/4"	38	0.5
	24"	39'- 4"	872	6.0	3'- 8 3/4"	35	0.4	43'-11"	748	6.7	4'- 1 3/4"	36	0.5	53'- 9"	920	8.2	5'- 0 3/4"	42	0.6
	27"	42'- 8"	770	7.1	4'- 08 3/4"0.5			47'- 8"	852	8.0	4'- 6 1/4"	41	0.5	58'- 4"	1039	9.7	5'- 6 1/4"	45	0.7
	30"	46'- 1"	839	8.0	4'- 5 3/4"	40	0.6	51'- 5"	949	8.9	5'- 0"44		0.6	62'-11"	1154	10.9	6'- 1 3/4"	48	0.8
	33"	49'- 5"	947	9.2	4'-10"	45	0.7	55'- 2"	040	10.3	5'- 4 3/4"	48	0.7	67'- 6"	1284	12.6	6'- 7 1/4"	50	0.9
	36"	52'-10"	1151	11.4	5'- 349		0.8	58'-11"	1287	12.7	5'-10 3/4"	51	1.0	72'- 1"	1575	15.6	7'- 2 1/4"55		1.1
	42"	59'- 6"	1365	14.2	6'- 0 1/4"	55	1.0	66'- 5"	1522	15.8	6'- 8 3/4"	57	1.2	81'- 4"	1867	19.4	8'- 3"	76	1.4
	48"	69'- 4"	1729	18.5	6'-10"	59	1.3	77'- 4"	1934	20.7	7'- 7 1/4"	79	1.5	94'- 9"	2360	25.3	9'- 3 3/4"	86	1.8
	54"	76'- 1"	2130	22.0	7'- 9 1/4"	83	1.6	84'-10"	2370	24.6	8'- 8"	87	1.8	103'-11"	2904	30.1	10'- 7 1/4"	95	2.2
	60"	82'-10"	2414	25.8	8'- 6 3/4"	90	1.9	92'- 5"	2673	28.8	9'- 6 1/4"	94	2.1	113'-2"	3286	35.3	11'- 8" 122		2.6
	66"	89'- 7"	2712	29.9	9'- 0 3/4"	96	2.1	99'-11"	3030	33.3	10'- 1 1/4"	101	2.4	122'-4"	3689	40.8	12'- 4 1/4"	130	2.9
	72"	96'- 3"	3210	34.2	9'- 8"102		2.4	107'-5"	3572	38.2	10'- 9 1/4"	108	2.6	131'-6"	4364	46.8	13'- 2 1/4"	139	3.2

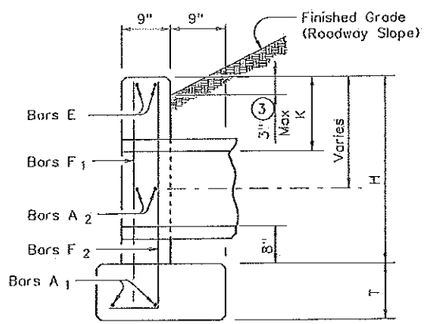


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° Skew



℄ SECTION

BARS F2

TABLE OF CONSTANT DIMENSIONS

DIA OF PIPE, D	G	K	H	T	E
12"	9"	1'- 0"	2'- 8"	9"	1'- 9"
15"	11"	1'- 0"	2'-11"	9"	1'- 9"
18"	1'- 2"	1'- 0"	3'- 2"	9"	1'- 9"
21"	1'- 4"	1'- 0"	3'- 5"	9"	2'- 0"
24"	1'- 7"	1'- 0"	3'- 8"	9"	2'- 0"
27"	1'- 8"	1'- 0"	3'-11"	9"	2'- 3"
30"	1'-10"	1'- 0"	4'- 2"	9"	2'- 3"
33"	1'-11"	1'- 0"	4'- 5"	9"	2'- 6"
36"	2'- 1"	1'- 0"	4'- 8"	1'- 0"	2'- 6"
42"	2'- 4"	1'- 0"	5'- 2"	1'- 0"	2'- 9"
48"	2'- 7"	1'- 3"	5'-11"	1'- 0"	3'- 0"
54"	3'- 0"	1'- 3"	6'- 5"	1'- 0"	3'- 3"
60"	3'- 3"	1'- 3"	6'-11"	1'- 0"	3'- 6"
66"	3'- 3"	1'- 3"	7'- 5"	1'- 0"	3'- 9"
72"	3'- 4"	1'- 3"	7'-11"	1'- 0"	4'- 0"

TABLE OF REINFORCING STEEL (4)

Bar	Size	Spa	No.
A1	# 5	~	2
A2	# 5	1'-6"	~
E	# 5	~	2
F	# 5	1'-0"	~

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.

All reinforcing steel shall be Grade 60.

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

No bridge rails of any type may be mounted directly to these culvert headwalls.

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) Indicated slope is perpendicular to centerline Pipe or Pipes.

(3) 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.

(4) Quantities shown are for one structure end only (one headwall).

ACC:

LEVELS DISPLAYED

Texas Department of Transportation
Bridge Division

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

CH-PW-S

FILE: chpwsste.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB	HIGHWAY

ACC:

LEVELS DISPLAYED

1

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

Maximum Wingwall Height Hw	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing (2~Wings) ④ Reinf (Lb/Ft)	Estimated Quantities per ft of wing (2~Wings) ④ Conc (CY/Ft)	Estimated Quantities per ft of Toewall (1~Toewall) Reinf (Lb/Ft)	Estimated Quantities per ft of Toewall (1~Toewall) 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"	63.46	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"	30.67	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	8.31	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	1.458	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'-	0" 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

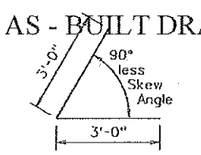
TABLE OF WINGWALL REINFORCING (2~Wings)

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"

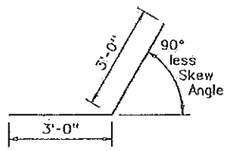
TABLE OF TOEWALL REINFORCING

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

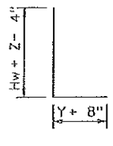
RECORD AS - BUILT DRAWINGS



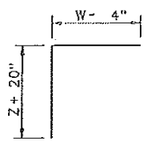
BARS D1



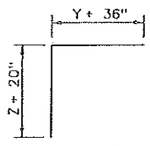
BARS D2



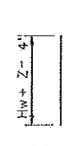
BARS J1



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 —

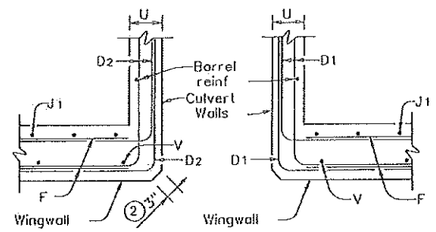
For Precast culverts:

Ltw = [(N) (2 U + S) + (N - 1) (0.5')] Cosine θ —

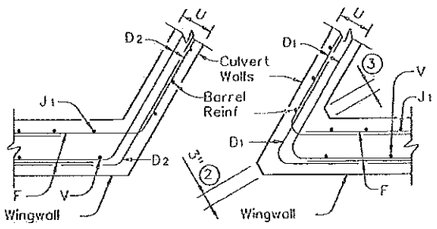
Total Wingwall Area (Two Wings ~ SF)
= (2)(Hw)(Lw) for Ty PW-1
= (2)(Hw)(Lw) - 6 SF for Ty PW-2 and Hw 4' ≥
= (2)(Hw)(Lw) - 1.5 SF for Ty PW-2 and Hw 4' <

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.



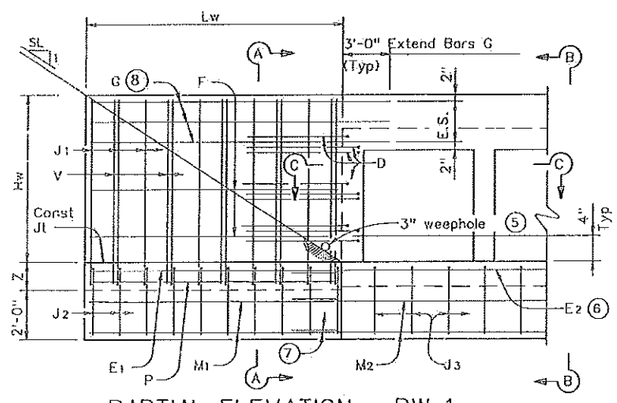
SECTION C-C



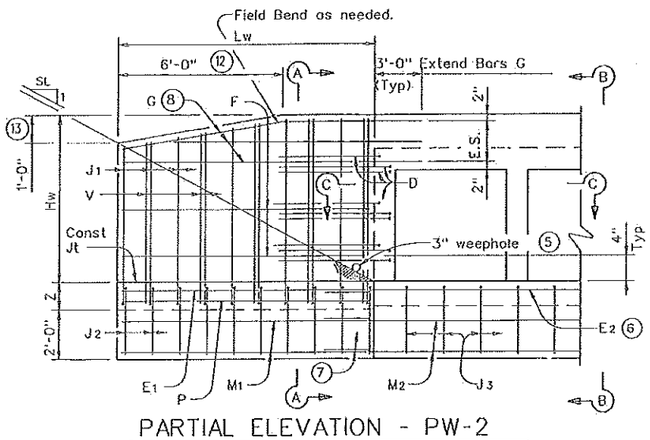
SECTION C-C

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 E 2'-6" minimum into the wingwall footing.
7. Lap Bars M 1'-6" minimum with Bars M .
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.

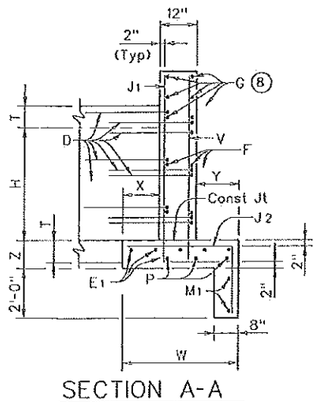
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-0" typical when RAC standard is referenced elsewhere in the plans.
12. 3'-0" for Hw 4'.
13. 6" for Hw <4'.



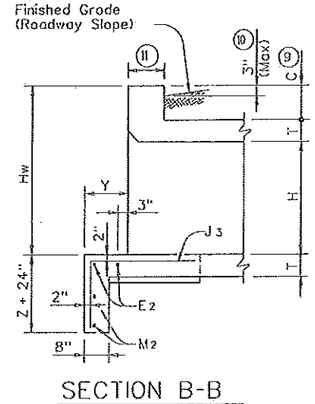
PARTIAL ELEVATION - PW-1



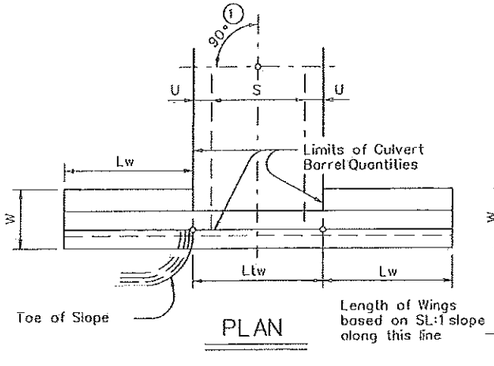
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing Wing Reinf)

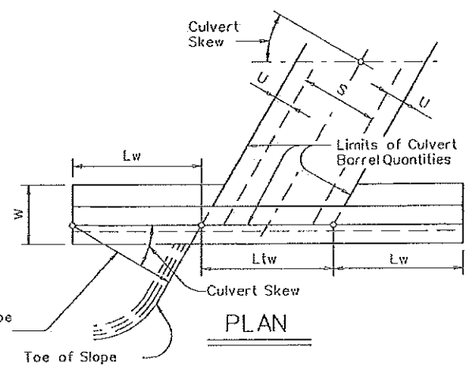


SECTION B-B
(Showing Wing Reinf)



PLAN

DETAILS FOR
NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR
SKEWED BOX CULVERTS
(Showing 30° Skew)

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 1¼" 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

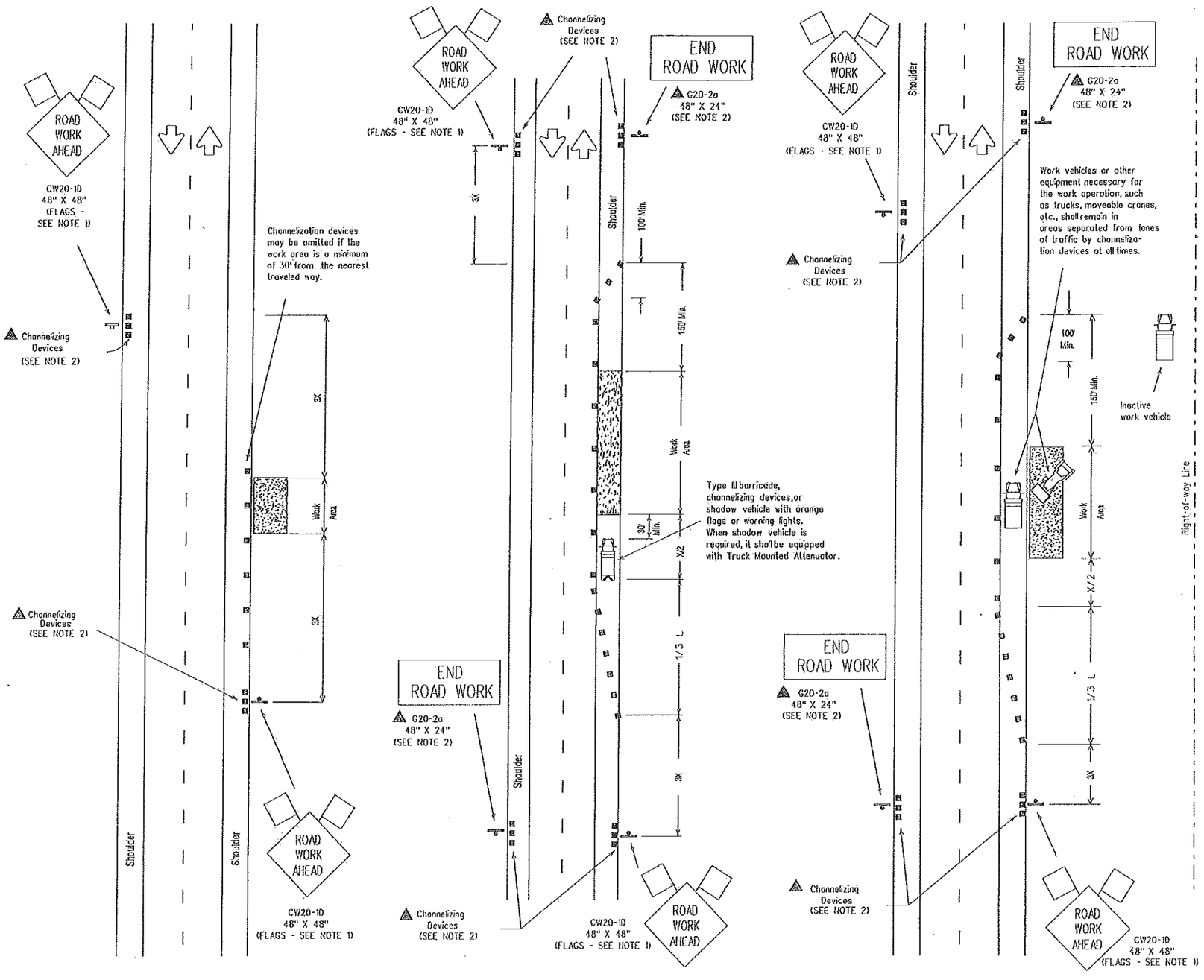
CONCRETE WINGWALLS WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW

FILE: pwsldet01.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
©TxDOT February 2010	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS 11-10: Reinforcing Quantities. 01-12: Pd-1 & Pd-2.	COUNTY	CONTROL	SECT	JOB	HIGHWAY

DATE:
FILE:

RECORD AS - BUILT DRAWINGS



TCP (1-1a)

Work Area Near Shoulder

TCP (1-1b)

Work Area on Shoulder

TCP (1-1c)

Work Vehicles on Shoulder

LEGEND

Type III Barricade ▯ ▯ Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (M)

Flagger Sign Post

Posted Speed X	Formula	Minimum Desirable Taper Lengths X x 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	x 600'
65		650'	715'	780'	65'	130'-165'	x 700'
70		700'	770'	840'	70'	140'-175'	x 800'

X Conventional Roads Only

XX 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. Unless otherwise stated in the plans, flags attached to signs 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.
3. On high speed facilities advance warning signs should be installed approximately 3X from the work area or from the beginning of a lane or shoulder taper. On low speed facilities the advance warning signs should be placed based on the "X" minimum distance.
4. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARD@mailgw.dot.state.tx.us

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(1-1)-98

DIST	COUNTY	CONT	SECT	JOB	HIGHWAY

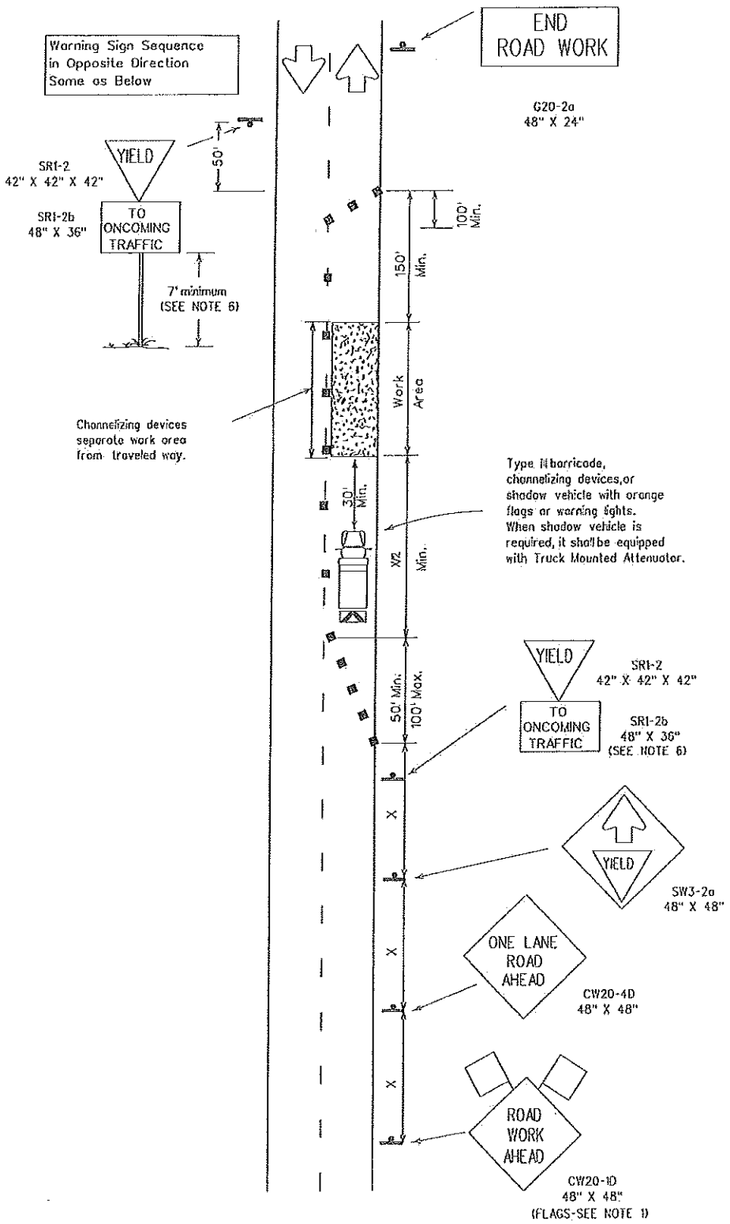
REVISIONS
2-94
8-95
1-97
4-98

SHEET NO.

151

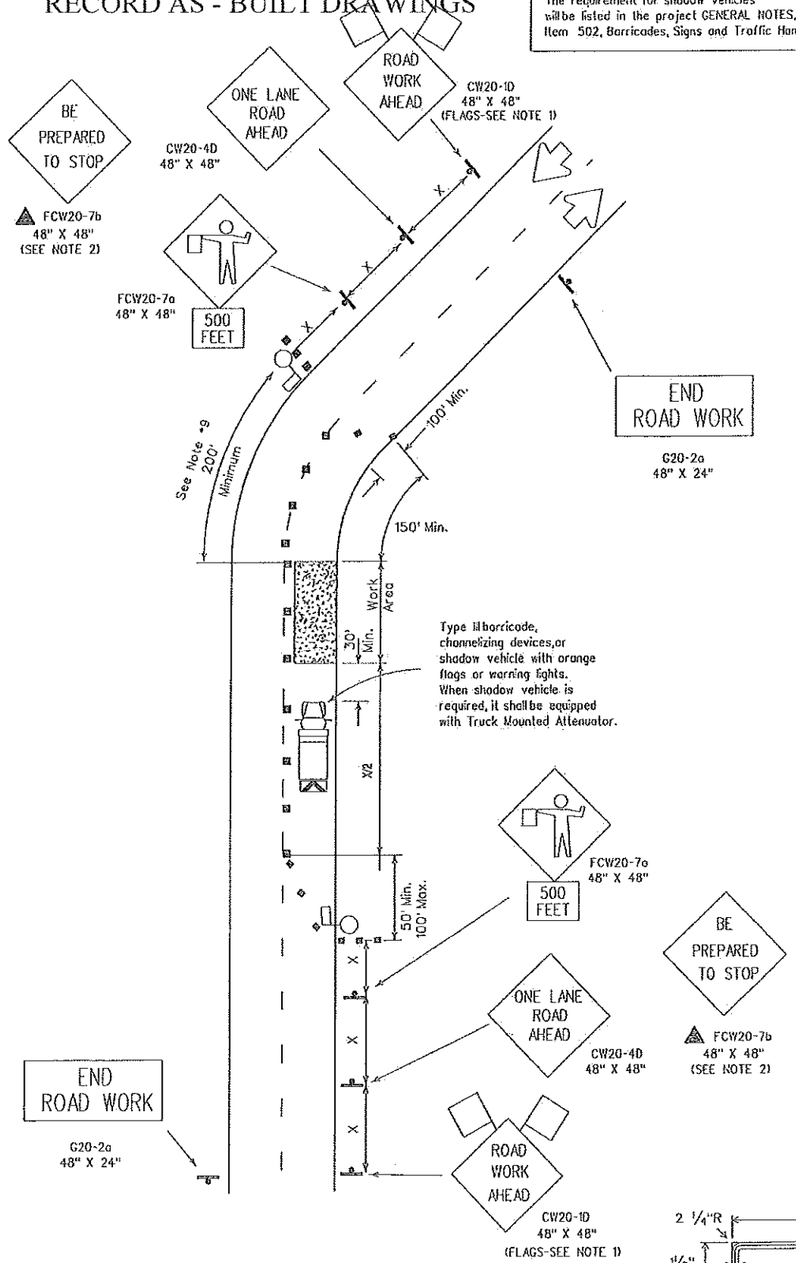
DATE:
FILE:

RECORD AS - BUILT DRAWINGS



TCP (1-2a)

One Lane Closed
Adequate Field of View



TCP (1-2b)

One Lane Closed
Inadequate Field of View

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.

LEGEND

Type III Barricade ▯▯ Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (M)

Flagger Sign Post

Posted Speed X	Formula	Minimum Desirable Taper Lengths X X 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device: On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	x 600'
65		650'	715'	780'	65'	130'-165'	x 700'
70		700'	770'	840'	70'	140'-175'	x 800'

X Conventional Roads Only

X X 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 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.
3. The BE PREPARED TO STOP sign may be installed after the ONE LANE ROAD AHEAD sign, but proper sign spacing shall be maintained.
4. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.

TCP(1-2a)

5. YIELD sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work zones should be no longer than one half city block. In rural areas on roadways with less than 4000 ADT, work areas should be no longer than 400'.
6. YIELD TO ONCOMING TRAFFIC sign shall be placed on a support at a 7' minimum mounting height.

TCP(1-2b)

7. Flaggers should use two-way radios or other methods of communication to control traffic.
8. Length of work area should be based on the ability of flaggers to communicate.
9. Distance along curve of work area should be adequate length for motorists to identify and react to flagger signals.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail: TRF-STANDARD@mail.gw.dot.state.tx.us

SR1-2b
48" x 36"

Letters - Black
Background - White
Reflective

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(1-2)-98

REVISIONS	DIST	CONT	SECT	JOB	HIGHWAY
4-90					
2-94					
1-97	DIST	COUNTY			SHEET NO.
4-98					

DIF: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT

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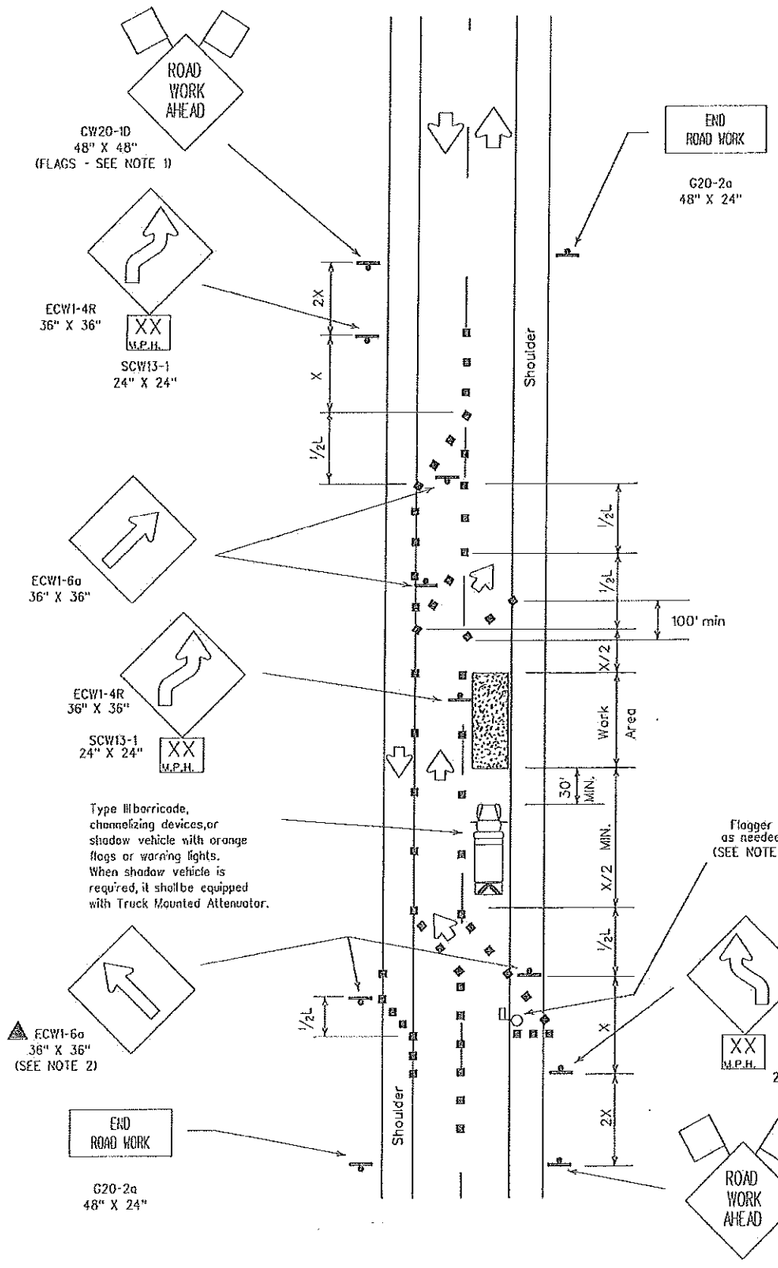
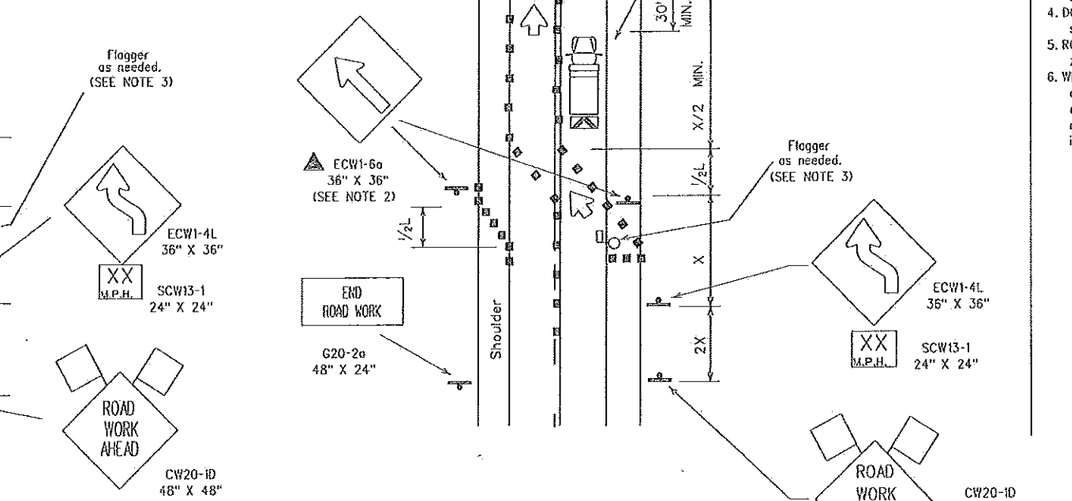
DATE:
FILE:

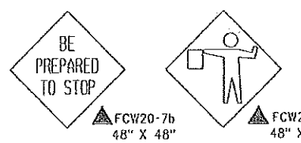
RECORD AS - BUILT DRAWINGS



TCP (1-3a)
2-Lane Roadway With Paved Shoulders
One Lane Closed
Adequate Field of View



TCP (1-3b)
2-Lane Roadway With Paved Shoulders
One Lane Closed
Inadequate Field of View



Use Only When Flaggers Control Traffic (SEE NOTE 2)

LEGEND

Type III Barricade Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (M)

Flagger Sign Post

Posted Speed X	Formula	Minimum Desirable Taper Lengths X X 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

X Conventional Roads Only

X X 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. Unless otherwise stated in the plans, flags attached to signs 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.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers should be positioned at end of traffic queues unless 24" x 24" STOP/SLOW paddle is used.
4. DO NOT PASS, PASS WITH CARE, and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.
6. When the work zone is made up of several work areas, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500' to 1000' in urban areas and every 1/4 to 1/2 mile in rural areas.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARDS@mail.dot.state.tx.us

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

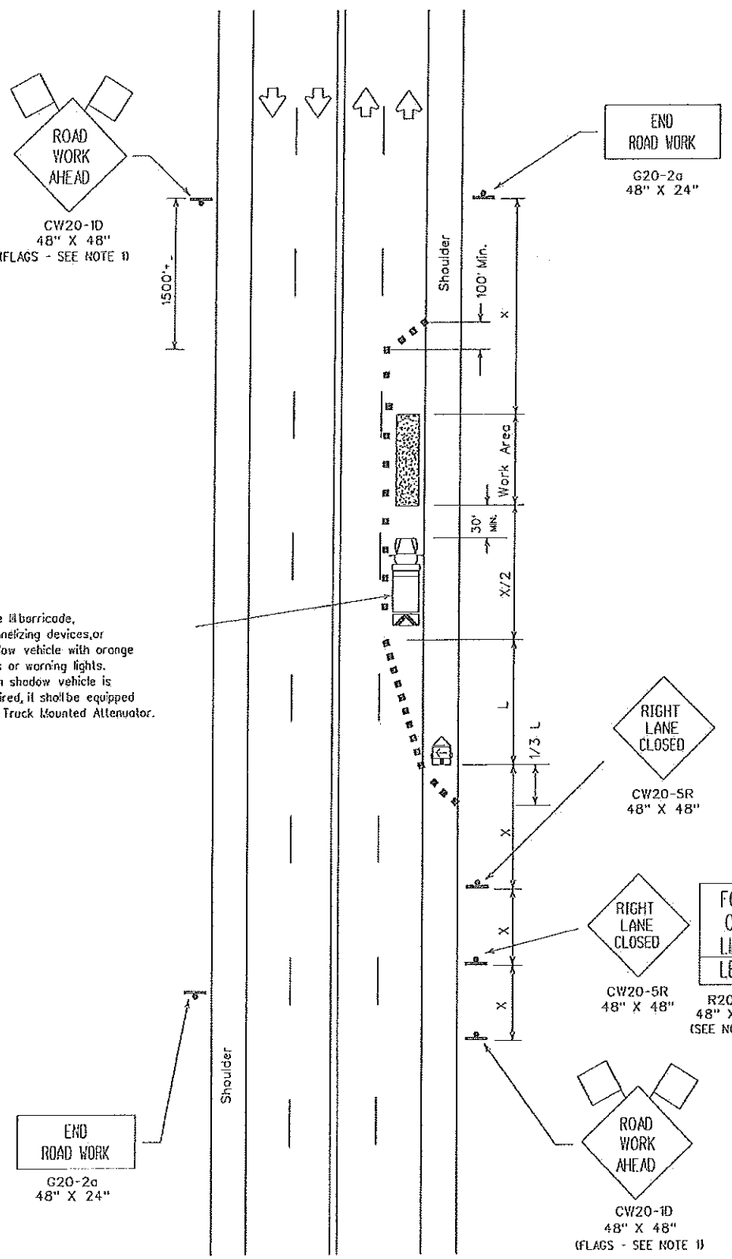
TRAFFIC CONTROL PLAN

TCP(1-3)-98

REVISIONS	DIST	COUNTY	SHEET NO.
2-94			
8-95			
1-97			
4-98			

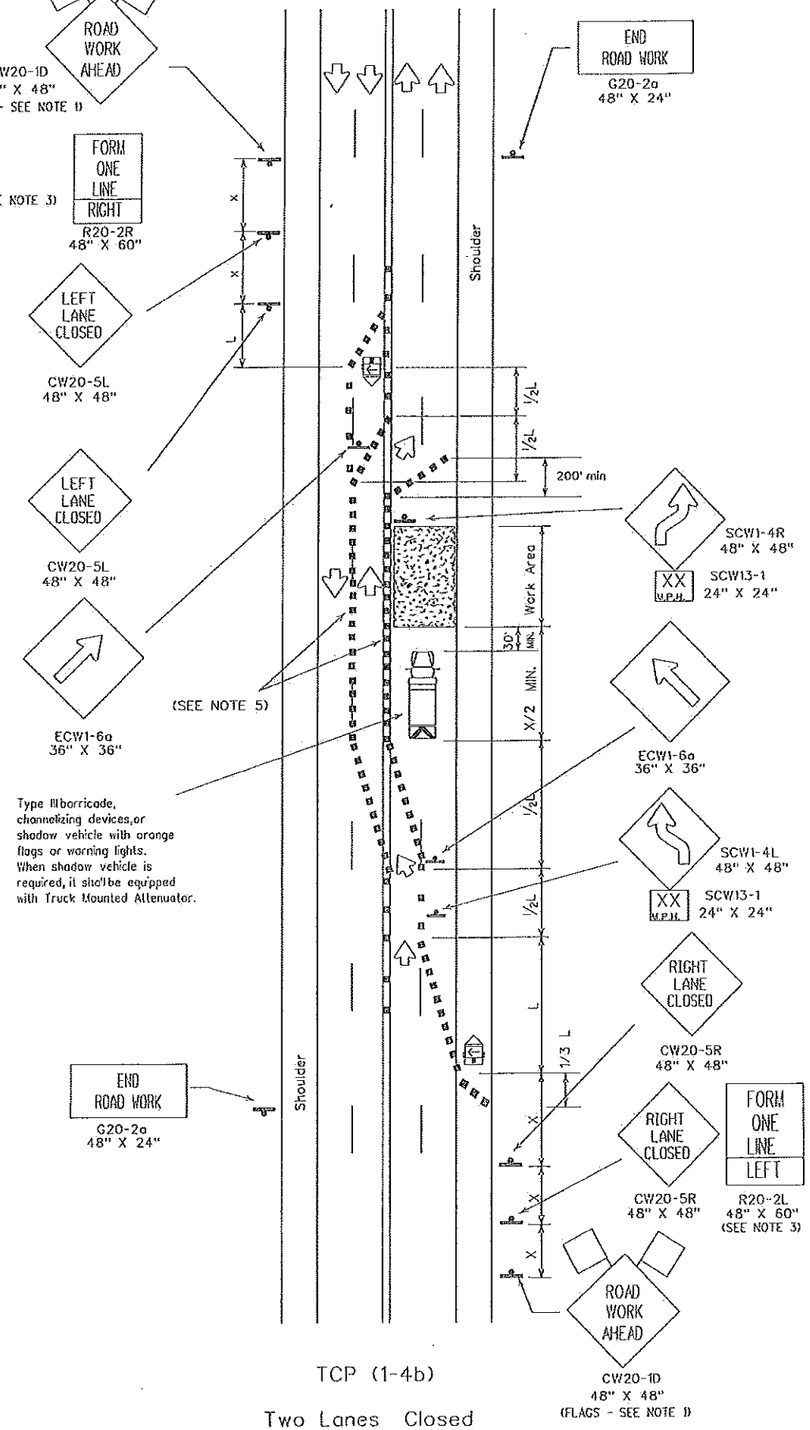
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY

RECORD AS - BUILT DRAWINGS



TCP (1-4a)

One Lane Closed



TCP (1-4b)

Two Lanes Closed

LEGEND

Type III Barricade ▣ ▣ Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (M)

Flagger Sign Post

Posted Speed ×	Formula	Minimum Desirable Taper Lengths ×× 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing × Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

× 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. Unless otherwise stated in the plans, flags attached to the signs 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.
3. The FORM ONE LANE LEFT sign may be used following the RIGHT LANE CLOSED sign. Spacing distance between signs should be the minimum distance indicated.
4. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.
5. If pavement markings are not removed and traffic is directed over a double yellow centerline, the maximum spacing of channelizing devices in a tangent section should be no greater than 10 feet.

Only pre-qualified products shallbe used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARD@mailgw.dot.state.tx.us

The requirement for shadow vehicles willbe listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

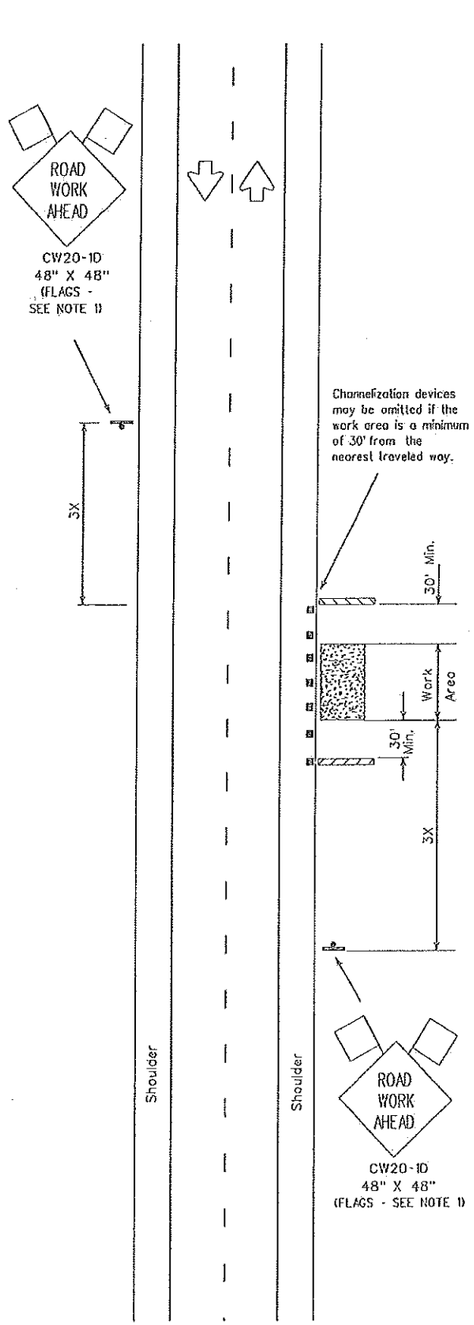
TCP(1-4)-98

REVISIONS	CONT	SECT	JOB	HIGHWAY
2-94				
8-95				
1-97	DIST	COUNTY		SHEET NO.
4-98				

DATE:
FILE:

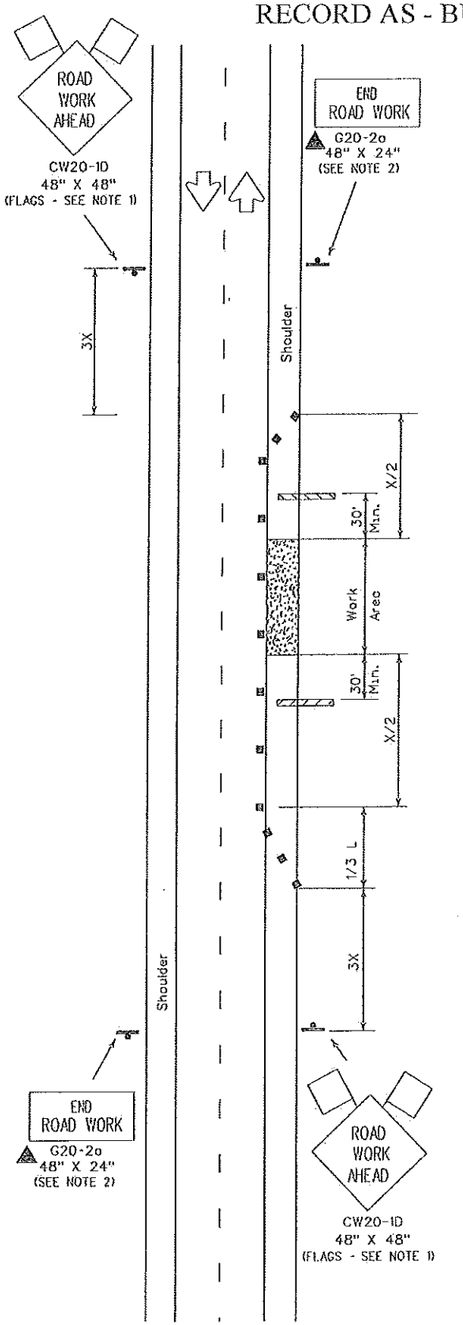
154

RECORD AS - BUILT DRAWINGS



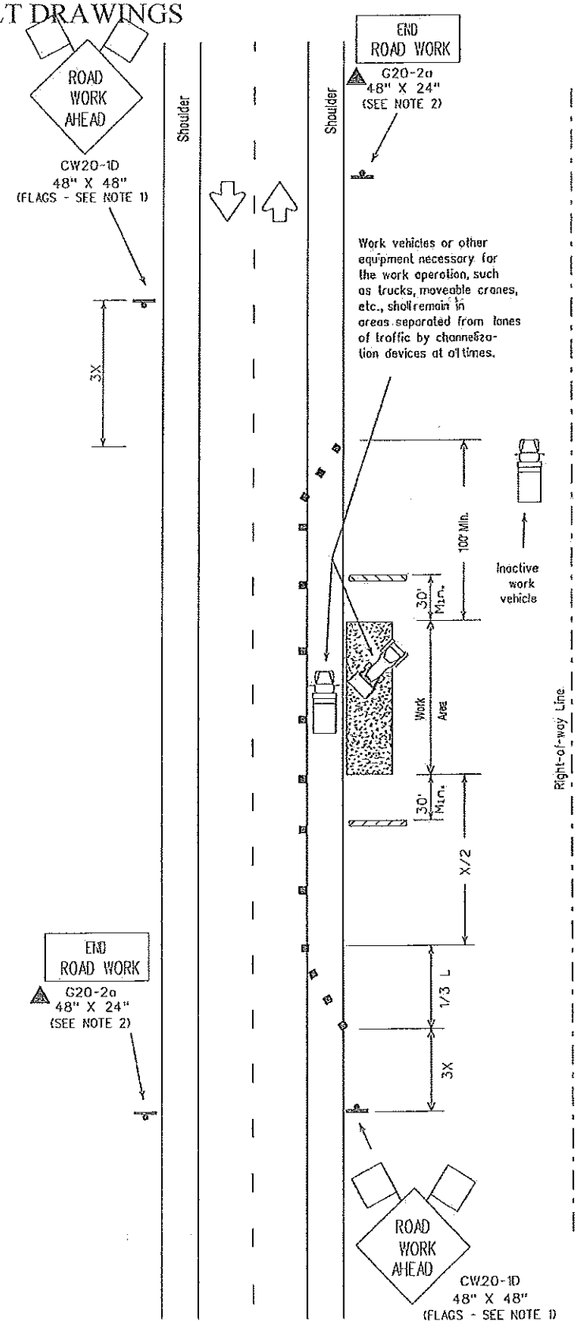
TCP (2-1a)

Work Area Near Shoulder



TCP (2-1b)

Work Area on Shoulder



TCP (2-1c)

Work Vehicles on Shoulder

LEGEND

Type III Barricade | Channelizing Devices | Flag

Heavy Work Vehicle | Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel | Portable Changeable Message Sign (M)

Flagger | Sign Post

Posted Speed ×	Formula	Minimum Desirable Taper Lengths × × 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

× 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. Unless otherwise stated in the plans, flags attached to signs 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.
3. Type III barricades are required on both sides of work area at all times. (See BC Standards for barricade details.)
4. Stockpiled material should be placed a minimum 30' from nearest traveled way.
5. On high speed facilities advance warning signs should be installed approximately 3X from the work area or from the beginning of a lane or shoulder taper. On low speed facilities the advance warning sign should be placed on the "X" minimum distance.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARD@mailgw.dot.state.tx.us

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(2-1)-98

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

REVISIONS
2-94
8-95
1-97
4-98

DATE:
FILE:

161

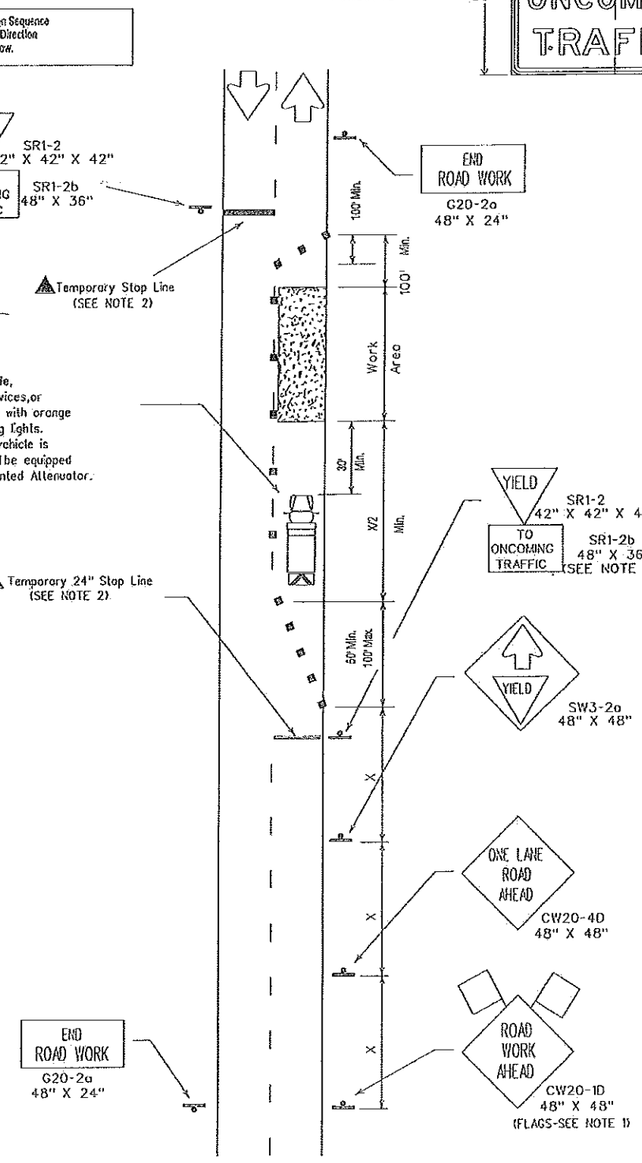
RECORD AS - BUILT DRAWINGS

SR1-2b
48" x 36"
Legend & Boarder - Black
Background - White
Reflective

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.

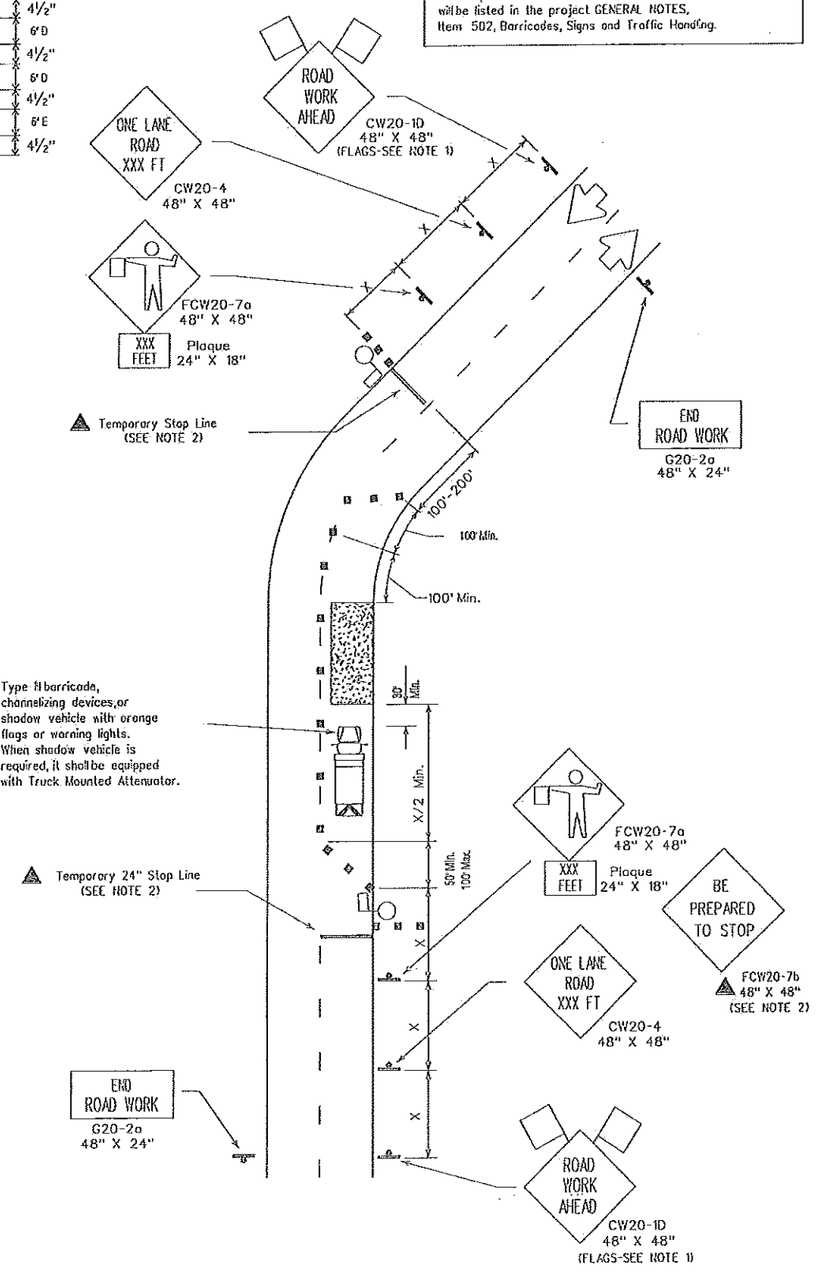
TCP (2-2a)

2-Lane Roadway Without Paved Shoulders
One Lane Closed
Adequate Field of View



TCP (2-2b)

2-Lane Roadway Without Paved Shoulders
One Lane Closed
Inadequate Field of View



LEGEND

Type II Barricade — Channelizing Devices — Flag
Heavy Work Vehicle — Truck Mounted Attenuator
Trailer Mounted Flashing Arrow Panel — Portable Changeable Message Sign (M)
Flagger — Sign Post

Posted Speed ×	Formula	Minimum Desirable Taper Lengths × × 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing × Distance
30	L = WS²/60	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

× 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 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.
3. The BE PREPARED TO STOP sign may be installed after the ONE LANE ROAD XXX FT sign, but proper sign spacing shall be maintained.
4. YIELD sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work zones should be no longer than one half city block. In rural areas on roadways with less than 4000 ADT and work areas should be no longer than 400'.
5. YIELD TO ONCOMING TRAFFIC sign shall be placed on a support at a 7' minimum mounting height.
6. Flaggers should use two-way radios or other methods of communication to control traffic.
7. Length of work area should be based on the ability of flaggers to communicate.
8. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(2-2)-03

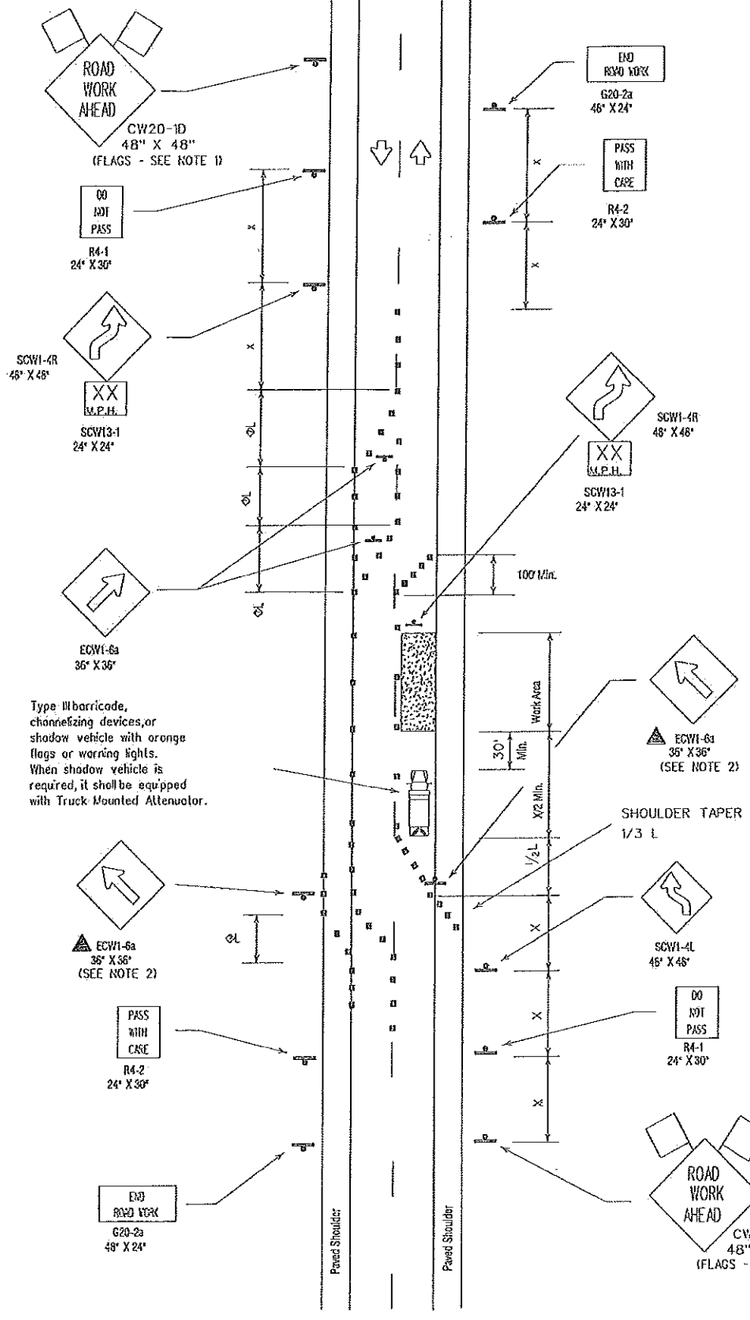
REVISIONS	DIST	COUNTY	SHEET NO.
8-95			
1-97			
4-98			
3-03			

DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
CONT SECT JOB HIGHWAY

DATE:
FILE:

DATE:
FILE:

RECORD AS - BUILT DRAWINGS

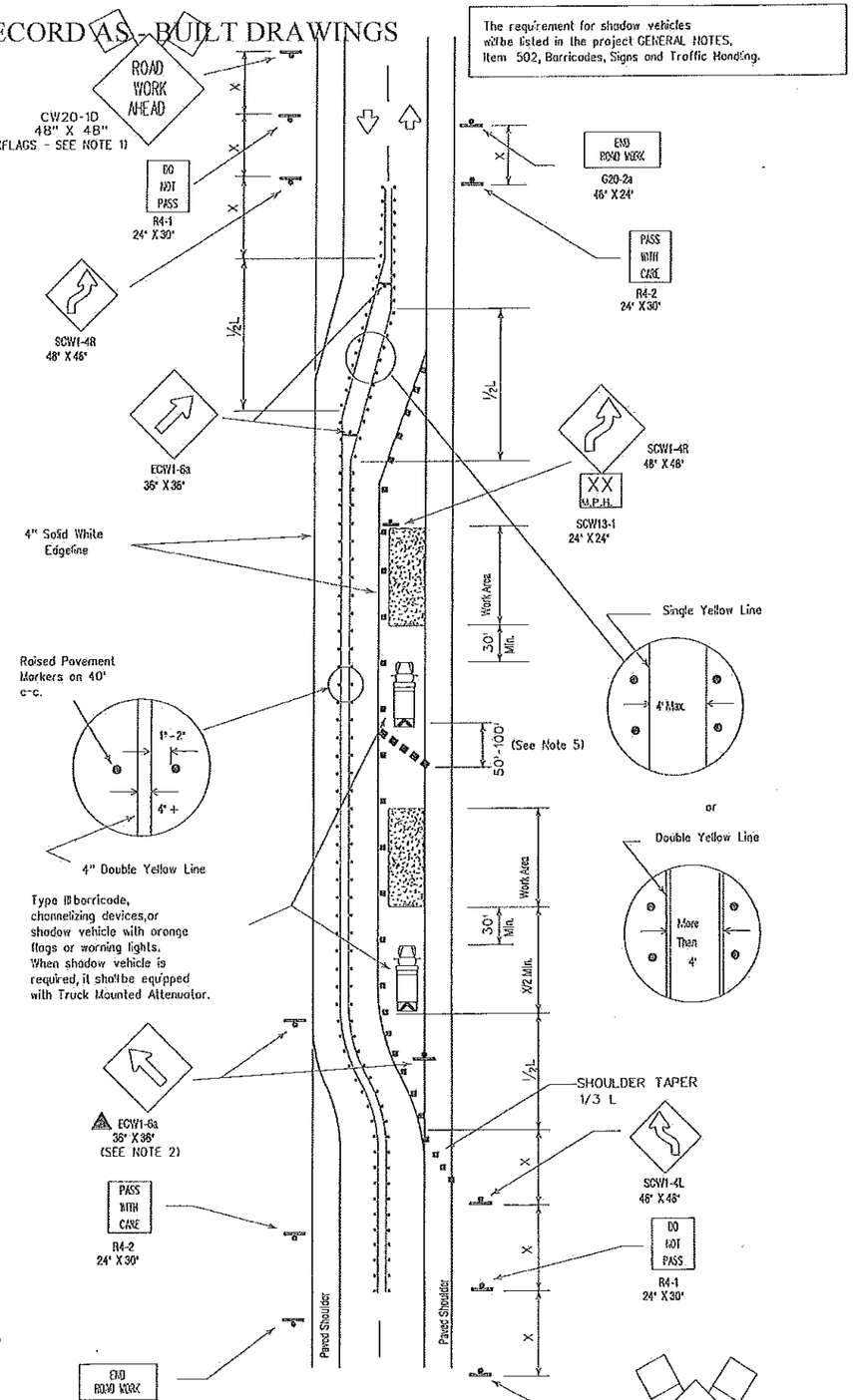


Type III barricade, channelizing devices, or shadow vehicle with orange flags or warning lights. When shadow vehicle is required, it shall be equipped with Truck Mounted Attenuator.

TCP (2-3a)

2-Lane Roadway With Paved Shoulders
One Lane Closed
Adequate Field of View

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.



Type III barricade, channelizing devices, or shadow vehicle with orange flags or warning lights. When shadow vehicle is required, it shall be equipped with Truck Mounted Attenuator.

TCP (2-3b)

2-Lane Roadway With Paved Shoulders
One Lane Closed
Inadequate Field of View

LEGEND

Type III Barricade ▯▯ Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (M)

Flagger Sign Post

• • • Raised Pavement Markers Type II-A-A (40' spacing)

Posted Speed S	Formula	Minimum Desirable Taper Lengths ×× 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

× 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
		✓	✓	✓(2-3b only)

GENERAL NOTES:

1. Unless otherwise stated in the plans, flags attached to signs 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.
3. When work area will be in place more than one day but less than 2 weeks existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. DO NOT PASS, PASS WITH CARE, and construction regulatory speed zone signs may be installed within ROAD WORK AHEAD signs. Proper spacing of signs shall be maintained.
6. When the work zone will be in place more than two weeks, conflicting pavement markings shall be removed, unless approved by the Engineer. New markings shall be placed and maintained to the satisfaction of the Engineer.
7. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(2-3)-03

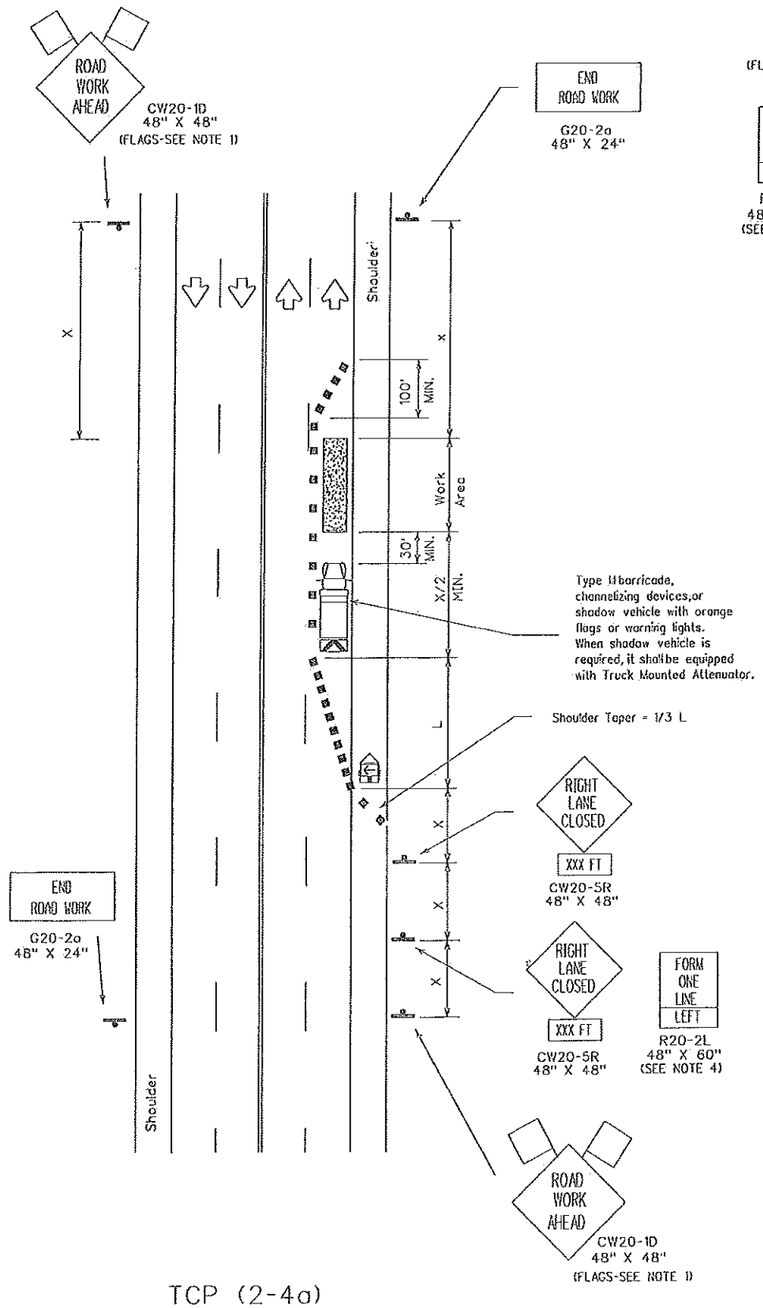
REVISIONS	DIST	COUNTY	SHEET NO.
8-95			
1-97	CONT	SECT	JOB	HIGHWAY
4-98				
3-03				

DIST: TXDOT CK: TXDOT DSN: TXDOT CK: TXDOT

163

DATE:
FILE:

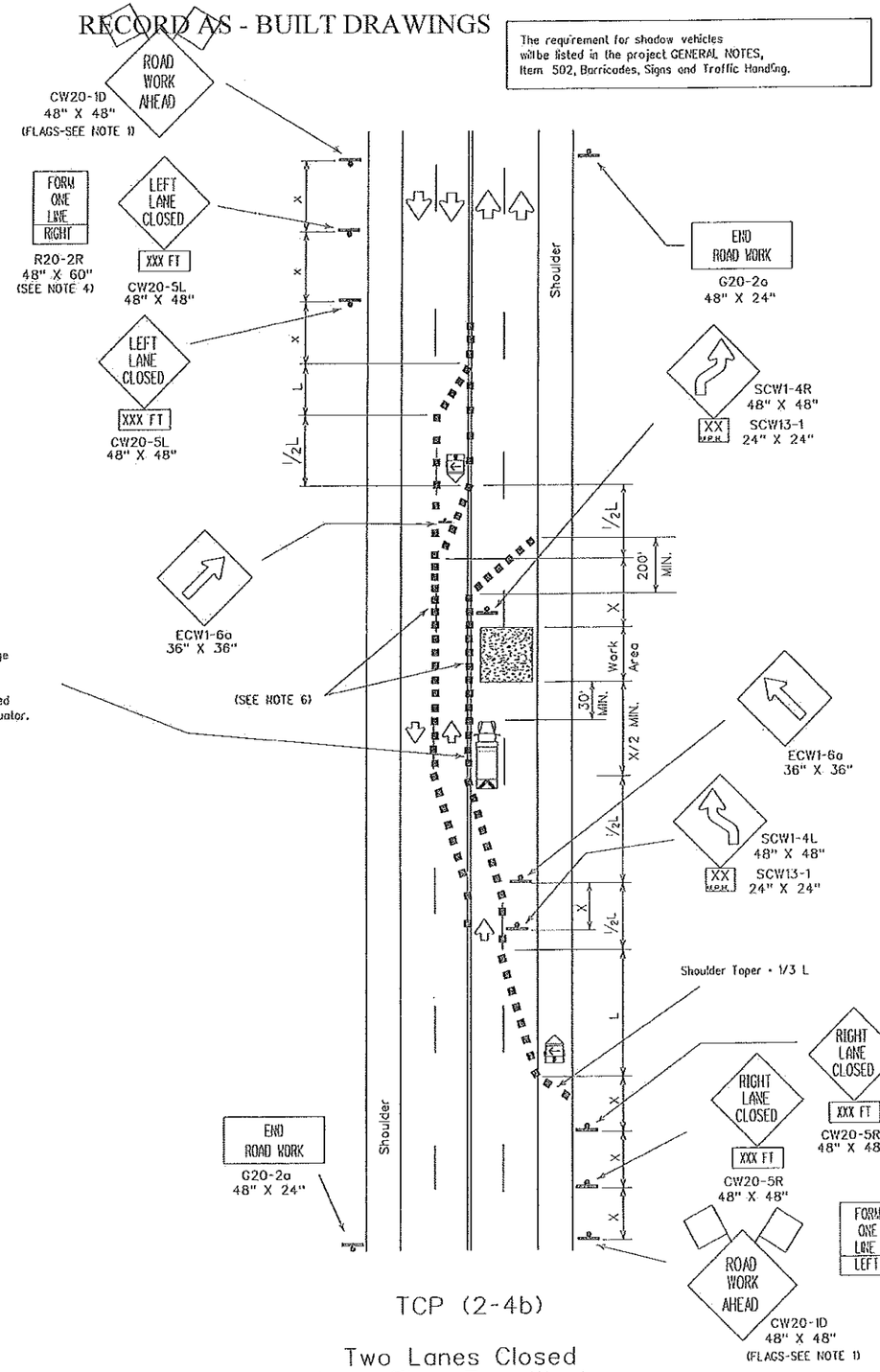
RECORD AS - BUILT DRAWINGS



TCP (2-4a)

One Lane Closed
Less Than Two Weeks

The requirement for shadow vehicles will be listed in the project GENERAL NOTES, Item 502, Barricades, Signs and Traffic Handling.



TCP (2-4b)

Two Lanes Closed
Less Than Two Weeks

LEGEND

Type III Barricade | Channelizing Devices | Flag

Heavy Work Vehicle | Truck Mounted Attenuator

Trailer Mounted Flashing Arrow Panel | Portable Changeable Message Sign (M)

Flagger | Sign Post

Posted Speed ×	Formula	Minimum Desirable Taper Lengths ×× 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device ×× On a Taper	On a Tangent	Minimum Sign Spacing × Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	× 600'
65		650'	715'	780'	65'	130'-165'	× 700'
70		700'	770'	840'	70'	140'-175'	× 800'

× 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. Unless otherwise stated in the plans, flags attached to signs are REQUIRED.
2. TCP (2-4b) shall be used only on projects that will be of a location for less than two weeks.
3. Existing pavement markings may remain in place for projects less than two weeks in duration.
4. The FORM ONE LINE LEFT (or RIGHT) sign may be used following the RIGHT (or LEFT) LANE CLOSED XXX FT sign. Spacing distance between signs should be the minimum distance indicated.
5. Downstream taper is optional. When used, it should be 100' minimum length per lane.
6. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN

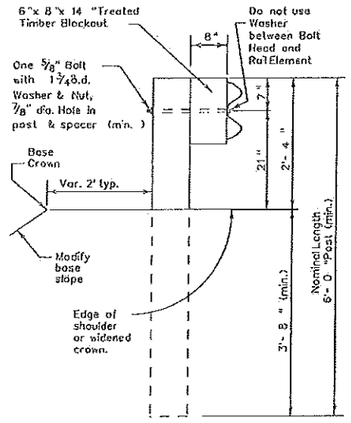
TCP(2-4)-03

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

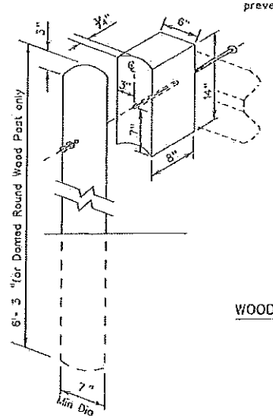
REVISIONS
8-95
1-97
4-98
3-03

164

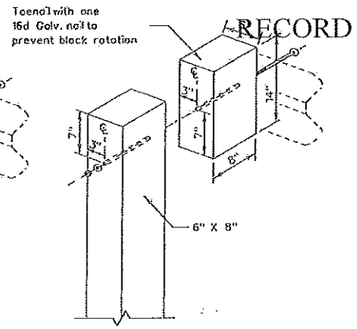
RECORD AS - BUILT DRAWINGS



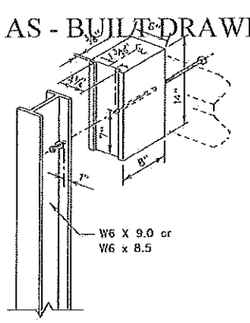
TYPICAL POST



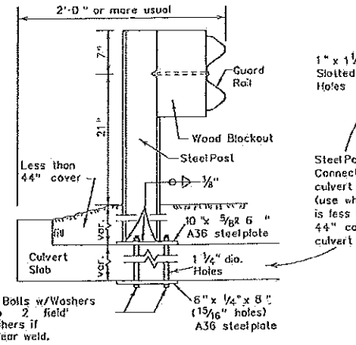
WOOD BLOCKOUT TO ROUND WOOD POST DETAIL



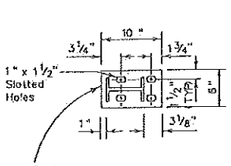
WOOD BLOCKOUT TO RECTANGULAR WOOD POST DETAIL

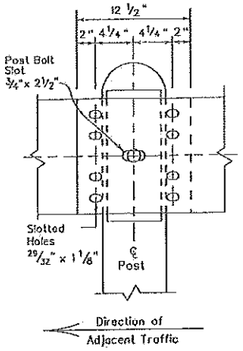


WOOD BLOCKOUT TO STEEL POST DETAIL

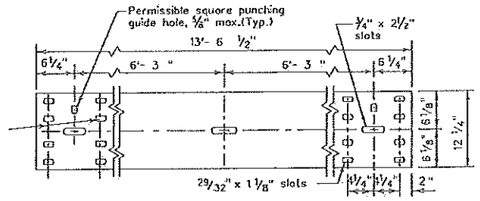


LOW FILL CULVERT POST MOUNTING OPTION





RAIL SPLICE

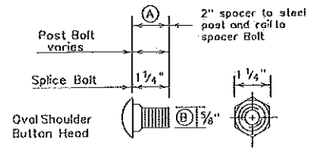


ELEVATION OF NOMINAL 12 1/2 FOOT GUARD RAIL

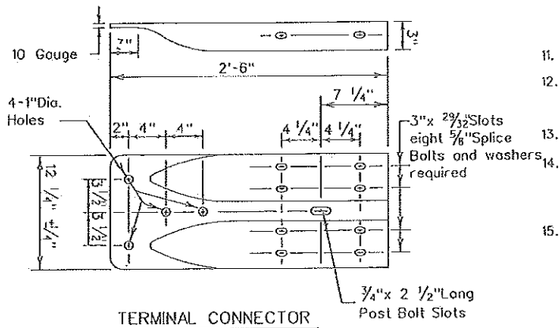
(25 foot sections may also be supplied)

Ⓐ 1 1/4" spacer to steel post hex bolt. 2" rail to spacer button head bolt.

Ⓑ (7/8" hex bolts required for terminal connector)



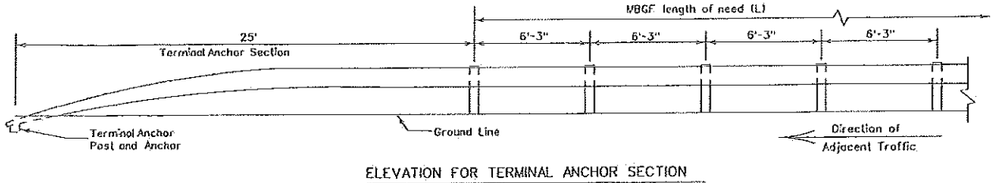
CONNECTOR DETAIL



TERMINAL CONNECTOR

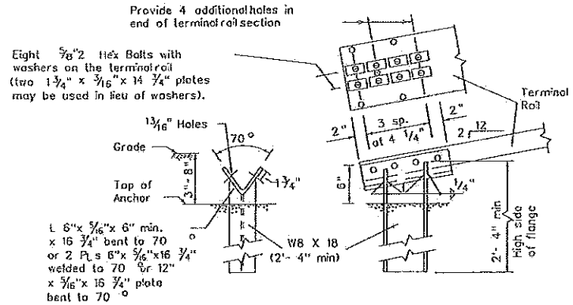
GENERAL NOTES

1. The exact position of guard fence shall be as shown elsewhere on the plans or as directed by the Engineer. Guard fence shall be transitioned to a smooth connection with other guard fence or structure railing as shown elsewhere on plans.
2. Rail element shall meet all requirements of AASHTO M-180 except as modified on the plans. The terminal connectors shall be of the same material, but shall not be less than 10 gauge. Contractor shall verify that the locations of bolt holes match those in the Terminal Connector prior to ordering of materials.
3. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be blocked out so that the face of curb is located directly below or behind the face of the blockout. Rail placed over curbs shall be installed so that the post bolt is located approximately 21-inches above the gutter pan or roadway surface.
4. Unless otherwise shown in the plans, MBGF shall be placed with the face of rail directly above the shoulder edge (or curbface) except for upstream end treatments.
5. At the option of the Contractor, the rail elements for the guard fence may be furnished in either 12 ½ or 25 foot nominal lengths with post bolt slots for connection to posts.
6. The terminal anchor post shall be set in Class A "concrete in (unless otherwise shown on plans) in accordance with Item, Portland Cement Concrete ."Concrete shall be subsidiary to the bid item requiring construction of the terminal rail section and anchorage system.
7. An anchor other than to a terminal anchor post shall consist of a connection similar to the rail splice or similar to the terminal connector.
8. Galvanized washers used with the eight 5/8" splice bolts and nuts that are provided for terminal connectors and/or terminal anchor posts shall be 1 7/8" x 3 x 7/16 or 1 i.d. and 2 o.d. x 0.134 (ANSI B27.2) narrow Type A plain washers.
9. Special fabrication will be required at installations having a curvature of less than 150' radius.
10. Button head post bolts (A307) shall be of sufficient length to extend through the full thickness of the nut and no more than 3/4" beyond it. Button head splice bolts (A307) are 5/8"x 1 1/4" with a 5/8" double recessed nut. Fittings (bolts, nuts, and washers) shall be in accordance with Item, Metal for Structures". Fittings shall be subsidiary.
11. Crown will be widened to accommodate guard fence.
12. If guardrail is placed on a side slope away from the pavement edge, then the slope rate between the edge of the pavement and the face of the barrier will be 1V:10H or flatter.
13. Posts shall not be set full depth in concrete.
14. Where solid rock is encountered or where shown on the plans, the diameter of the holes shall be approximately 12 inches, the backfilling shall be with a cohesionless material, and embedment depth shall be 1'-6 or more as directed by the Engineer.
15. Unless otherwise directed by the Engineer, a composite material post and/or blockout from the Department approved list of suppliers may be substituted for a post and/or blockout of similar dimensions. The list of approved suppliers of posts and blockouts will be maintained by the Construction Division, TxDOT.

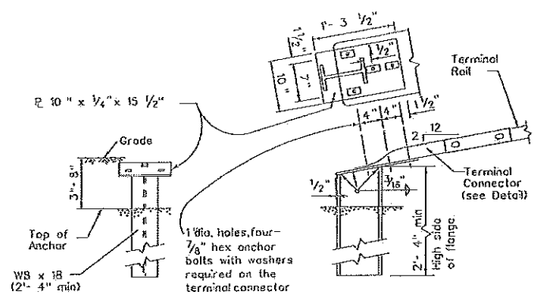


ELEVATION FOR TERMINAL ANCHOR SECTION

(Terminal anchor sections are only for downstream guardrail end anchorage usage outside the horizontal clearance area of opposing traffic)

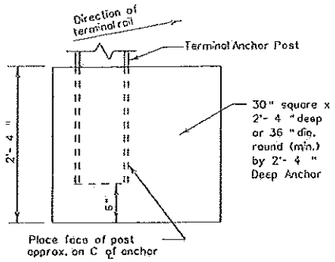


Note : This post requires four additional holes (shop or field) in the terminal rail member with eight 5/8" bolts and washer plates as shown for attachment.



Note : This optional post requires the use of the 10 ga. terminal connector with four 7/8" hex bolts for attachment to the anchor post.

TERMINAL ANCHOR POST OPTIONS

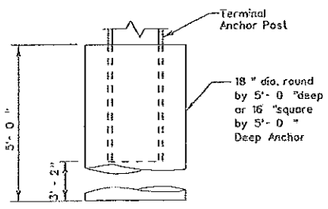


Notes : Either post may be used with either anchor.

No construction joint is allowed in the concrete anchor.

Terminal rail may be bolted to post and in twist position prior to placing concrete anchor.

If concrete anchor is precast, the area should be compacted as directed by the Engineer, when placed in the field.



TERMINAL CONCRETE ANCHOR OPTIONS

DISCLAIMER :
The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

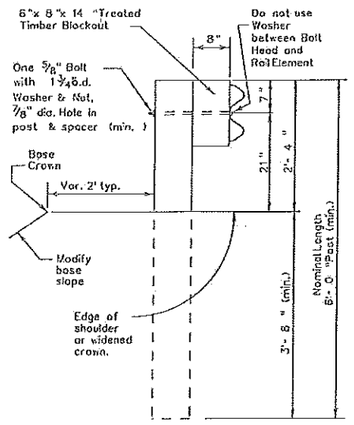
LEVEL DISPLAYED																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

Texas Department of Transportation
Design Division (Roadway)

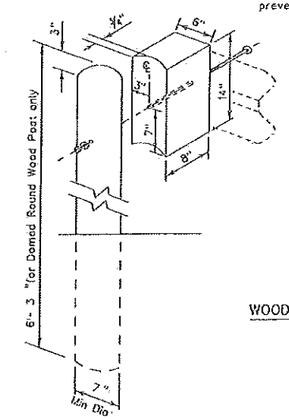
METAL BEAM GUARD FENCE

MBGF-01

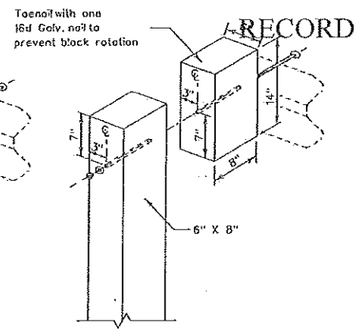
FILE: mbgf01.dgn	DN: MAN	CK: MAN	DW: RAR	CK: MAN	MBGF
© TxDOT JULY 1994	DIST.	FED REG	FEDERAL AID PROJECT #		SHEET
REVISIONS		6			
	COUNTY		CONTROL	SECT	JOB	HIGHWAY



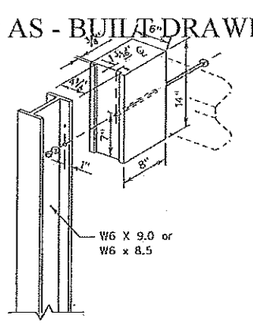
TYPICAL POST



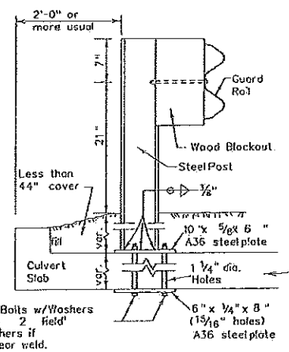
WOOD BLOCKOUT TO ROUND WOOD POST DETAIL



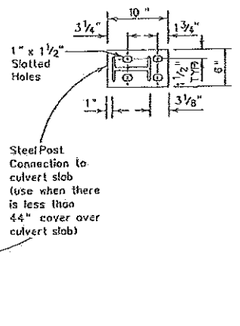
WOOD BLOCKOUT TO RECTANGULAR WOOD POST DETAIL

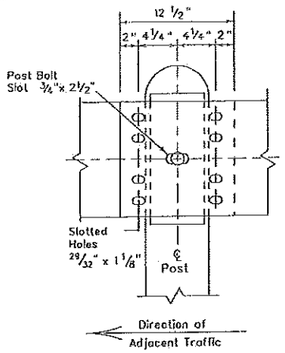


WOOD BLOCKOUT TO STEEL POST DETAIL

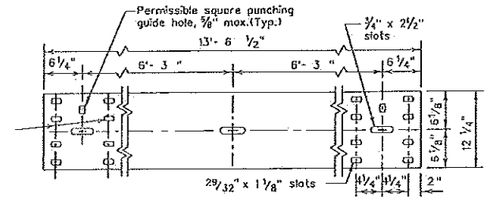


LOW FILL CULVERT POST MOUNTING OPTION





RAIL SPLICE



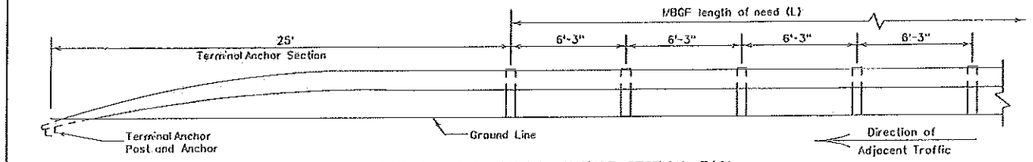
℄ 8 - 5/8" Dia x 1 1/4" (A307) button head splice bolts with 5/8" double recessed nut.

ELEVATION OF NOMINAL 12 1/2 FOOT GUARDRAIL

(25 foot sections may also be supplied)

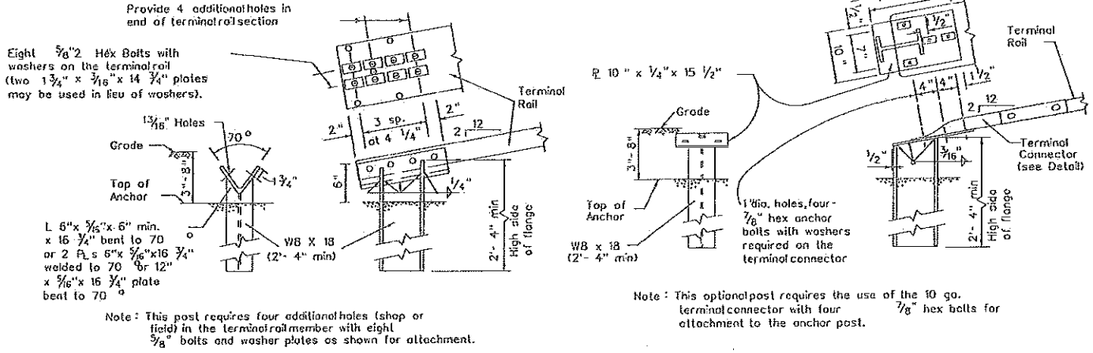
GENERAL NOTES

1. The exact position of guard fence shall be as shown elsewhere on the plans or as directed by the Engineer. Guard fence shall be transitioned to a smooth connection with other guard fence or structure railing as shown elsewhere on plans.
2. Rail element shall meet all requirements of AASHTO M-180 except as modified on the plans. The terminal connectors shall be of the same material, but shall not be less than 10 gauge. Contractor shall verify that the locations of bolt holes match those in the Terminal Connector prior to ordering of materials.
3. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be blocked out so that the face of curb is located directly below or behind the face of the blockout. Rail placed over curbs shall be installed so that the post bolt is located approximately 21-inches above the gutter pan or roadway surface.
4. Unless otherwise shown in the plans, MBGF shall be placed with the face of rail directly above the shoulder edge (or curbface) except for upstream end treatments.
5. At the option of the Contractor, the rail elements for the guard fence may be furnished in either 12 / or 25 foot nominal lengths with post bolt slots for connection to posts.
6. The terminal anchor post shall be set in Class A concrete in (Unless otherwise shown on plans) in accordance with Item, Portland Cement Concrete ."Concrete shall be subsidiary to the bid item requiring construction of the terminal rail section and anchorage system.
7. An anchor other than to a terminal anchor post shall consist of a connection similar to the rail splice or similar to the terminal connector.
8. Galvanized washers used with the eight 5/8" splice bolts and nuts that are provided for terminal connectors and/or terminal anchor posts shall be 1 5/8" 3 x 7/16 or 1 i.d. and 2 o.d. x 0.134 (ANSI B27.2) narrow Type A plain washers.
9. Special fabrication will be required at installations having a curvature of less than 150' radius.
10. Button head post bolts (A307) shall be of sufficient length to extend through the full thickness of the nut and no more than 3/4" beyond it. Button head splice bolts (A307) are 5/8"x 1 1/4" with a 5/8" double recessed nut. Fittings (bolts, nuts, and washers) shall be in accordance with Item, Metal for Structures". Fittings shall be subsidiary.
11. Crown will be widened to accommodate guard fence.
12. If guardrail is placed on a side slope away from the pavement edge, then the slope rate between the edge of the pavement and the face of the barrier will be 1V:10H or flatter.
13. Posts shall not be set full depth in concrete.
14. Where solid rock is encountered or where shown on the plans, the diameter of the holes shall be approximately 12 inches, the backfilling shall be with a cohesionless material, and embedment depth shall be 1'-6 or more as directed by the Engineer.
15. Unless otherwise directed by the Engineer, a composite material post and/or blockout from the Department approved list of suppliers may be substituted for a post and/or blockout of similar dimensions. The list of approved suppliers of posts and blockouts will be maintained by the Construction Division, TxDOT.

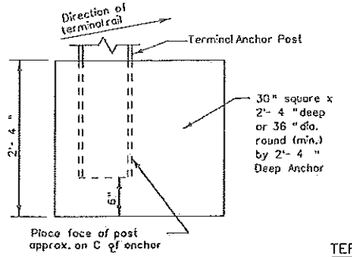


ELEVATION FOR TERMINAL ANCHOR SECTION (TAS)

(Terminal anchor sections are only for downstream guardrail end anchorage usage outside the horizontal clearance area of opposing traffic)



TERMINAL ANCHOR POST OPTIONS



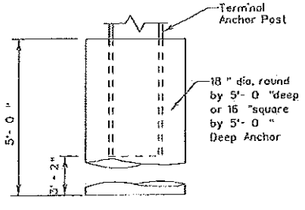
Notes :

Either post may be used with either anchor.

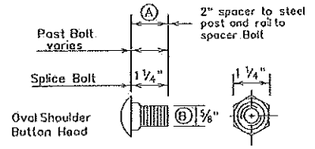
No construction joint is allowed in the concrete anchor.

Terminal rail may be bolted to post and in twist position prior to placing concrete anchor.

If concrete anchor is precast, the area should be compacted as directed by the Engineer, when placed in the field.



TERMINAL CONCRETE ANCHOR OPTIONS

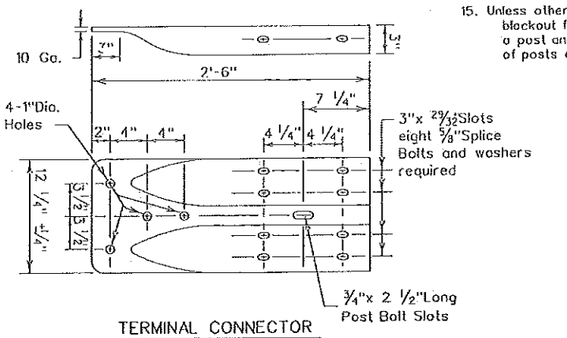


SPLICE BOLT

(A) 1 1/4" spacer to steel post hex bolt. 2" rail to spacer button head bolt.

(B) (5/8" hex bolts required for terminal connector)

TERMINAL CONNECTOR : The terminal connector may also be used on the MBGF(TL2) transition (See MBGF(TL2) Standard Sheet), or on the downstream end of a concrete rail located outside the horizontal clearance area of opposing traffic.(See BED Standard Sheet)



TERMINAL CONNECTOR

R = Radius
D = Diameter

Texas Department of Transportation
Design Division (Roadway)

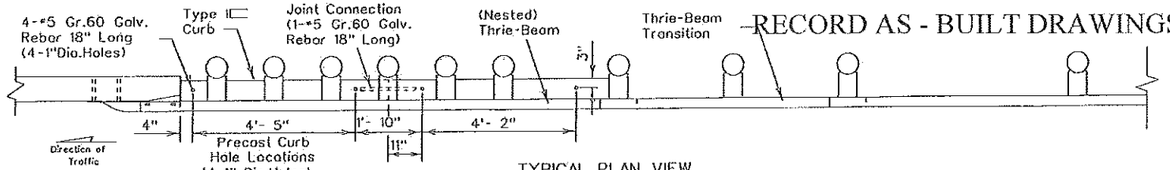
METAL BEAM GUARD FENCE

MBGF-03A

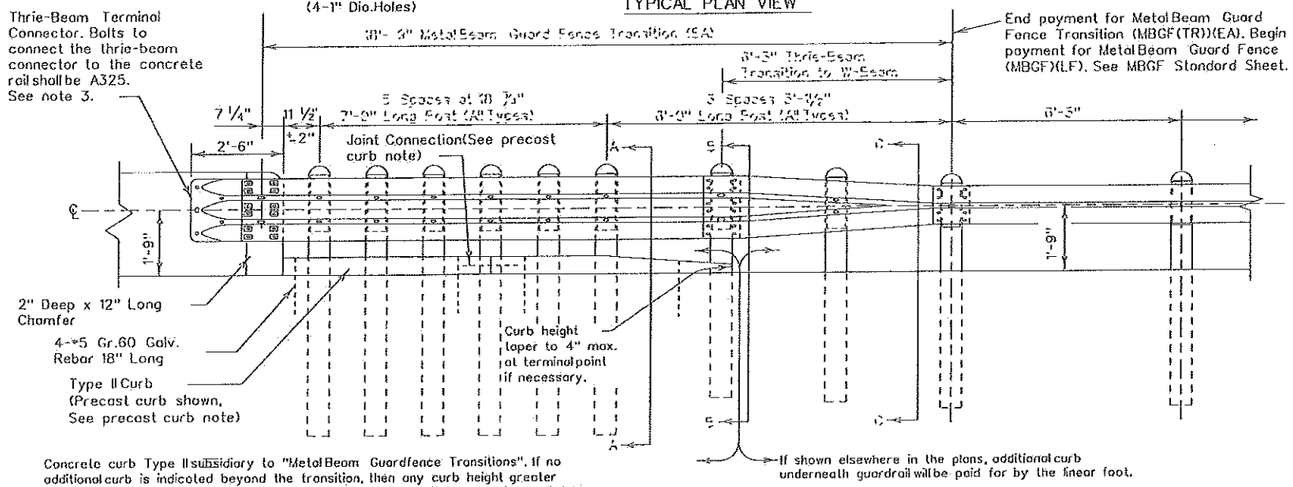
FILE: mbgf03a.dgn	DN: MAM	CK: MAM	DW: RAR	CK: MAM	
©TxDOT JULY 1994	DIST	FEDERAL AID PROJECT			SHEET
REVISIONS					
	COUNTY		CONTROL	SECT	JOB	HIGHWAY

LEVELS DISPLAYED

RECORD AS - BUILT DRAWINGS

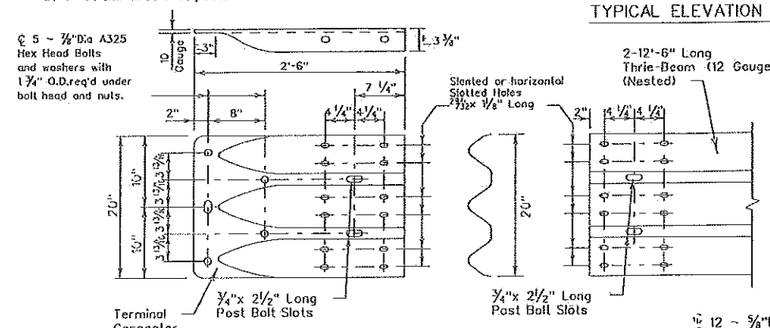


TYPICAL PLAN VIEW

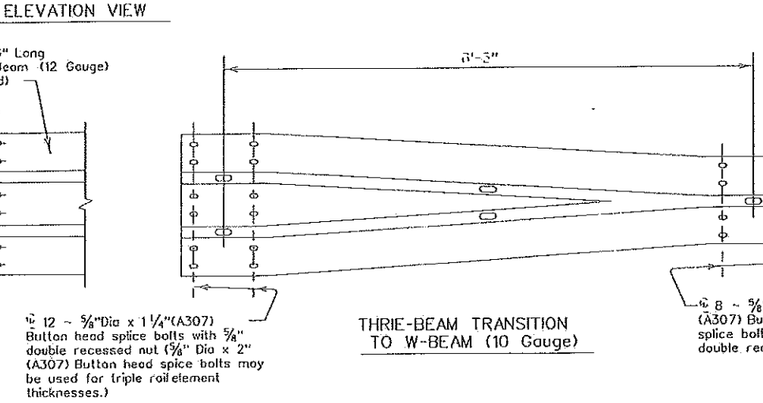


Concrete curb Type II subsidiary to "Metal Beam Guardfence Transitions". If no additional curb is indicated beyond the transition, then any curb height greater than 4" will be tapered down beginning at the last 7 ft post to a maximum height of 4" at the first 6 ft post.

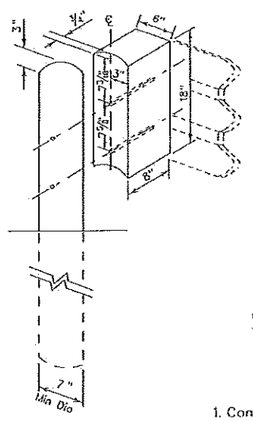
TYPICAL ELEVATION VIEW



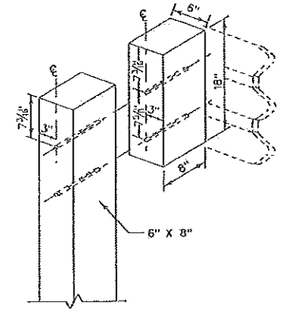
THRIE-BEAM TERMINAL CONNECTION



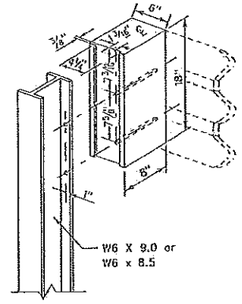
THRIE-BEAM TRANSITION TO W-BEAM (10 Gauge)



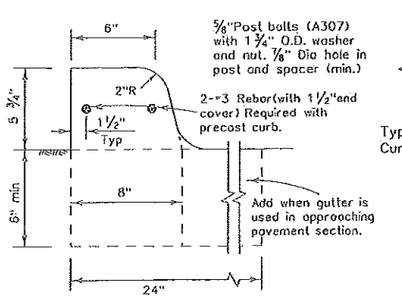
WOOD BLOCKOUT TO ROUND WOOD POST DETAIL



WOOD BLOCKOUT TO RECTANGULAR WOOD POST DETAIL

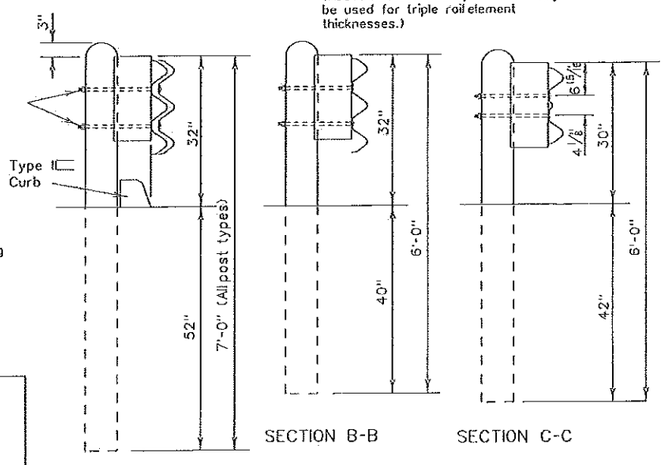


WOOD BLOCKOUT TO STEEL POST DETAIL

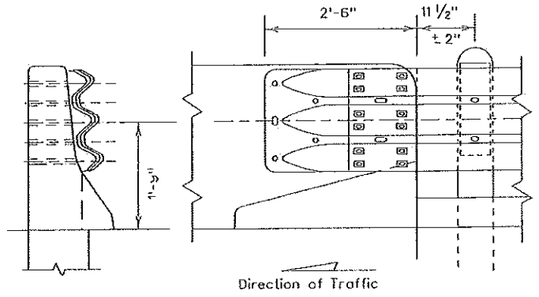


TYPE II CURB
Cast-in-Place or Precast

PRECAST CURB: Type II Precast Curb secured with 4-#5 Gr.60 Galv. Rebar stakes 18" long. The 12'- 2" section of curb may be cast in two sections.
Section 1 Ⓢ - 8" long
Section 2 Ⓒ 3'- 6" long with the last 3'- 6" of curb tapered to a 4" height.
The Joint Connection is two 9" long 1" dia female ends connected with 1-#5 Gr.60 Galv.Rebar 18" long.



TRANSITION SECTIONS



CONNECTION TO T5, SSTR, & HT SERIES BRIDGE RAILS AND CTB & SSCB TRAFFIC BARRIERS

(24) Washers (FWR03)(3"x 1 3/4"x 3/16" with 1"x 3/4" slotted hole) under the head and nut will be required for the terminal connector to nested thrie beam. (12) 2" x 5/8" splice bolts for these series rails.
See typical views and T5, SSTR, HT, CTB & SSCB Series Standard Sheets for additional details.

GENERAL NOTES

1. Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guardfence transitions, curb shall be Type II (typically 5 3/4" height above surface; See CCCG standard sheet) unless otherwise shown in the plans. If other curb heights are shown in the plans in conjunction with the transition, this curb height may be from 4" to 8" with a relatively vertical face. Concrete curbs shall be continuous to the seventh post. Any drainage cuts must be located post this post.

2. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer. See MBGF standard sheet for additional details and information.

3. Rail element shall meet all requirements of AASHTO M-180 except as modified on the plans. The terminal connector and the thrie-beam transition to w-beam shall be of the same material, but shall not be less than 10 gauge.

   Contractor shall verify that the locations of bolt holes match those in the Terminal Connector prior to ordering of materials.

4. Unless otherwise shown in the plans, transitions shall be placed with the blockout face in front of or directly above the curbface.

5. Galvanized washers used with the 5/8" splice bolts and nuts that are provided for terminal connectors shall be (FWR03)(3"x 1 3/4"x 3/16" with 1"x 3/4" slotted hole).

6. Button head post bolts (A307) shall be of sufficient length to extend through the full thickness of the nut and no more than 3/4" beyond it. Button head spice bolts (A307) are 5/8" x 1 1/4" with a 5/8" double recessed nut. Galvanized fittings (bolts, nuts, and washers) shall be in accordance with Item, "Metal For Structures". Fittings shall be subsidiary to the bid item requiring construction of transition.

7. Crown will be widened to accommodate transitions.

8. Where solid rock is encountered or where shown on the plans, the diameter of the holes shall be approximately 12 inches, the backfilling shall be with a cohesionless material, and embedment depth shall be 1'- 6" or more as directed by the Engineer.

9. Posts shall not be set full depth in concrete.

10. Unless otherwise directed by the Engineer, a composite material post and/or blockout from the Department approved list of suppliers may be substituted for a post and/or blockout of similar dimensions. The list of approved suppliers of posts and blockouts will be maintained by the Construction Division, TxDOT.

11. Refer to MBGF Standard Sheet for additional details.

If connecting to existing Bridge Rails. Contact the Bridge Division for proper retrofit details.

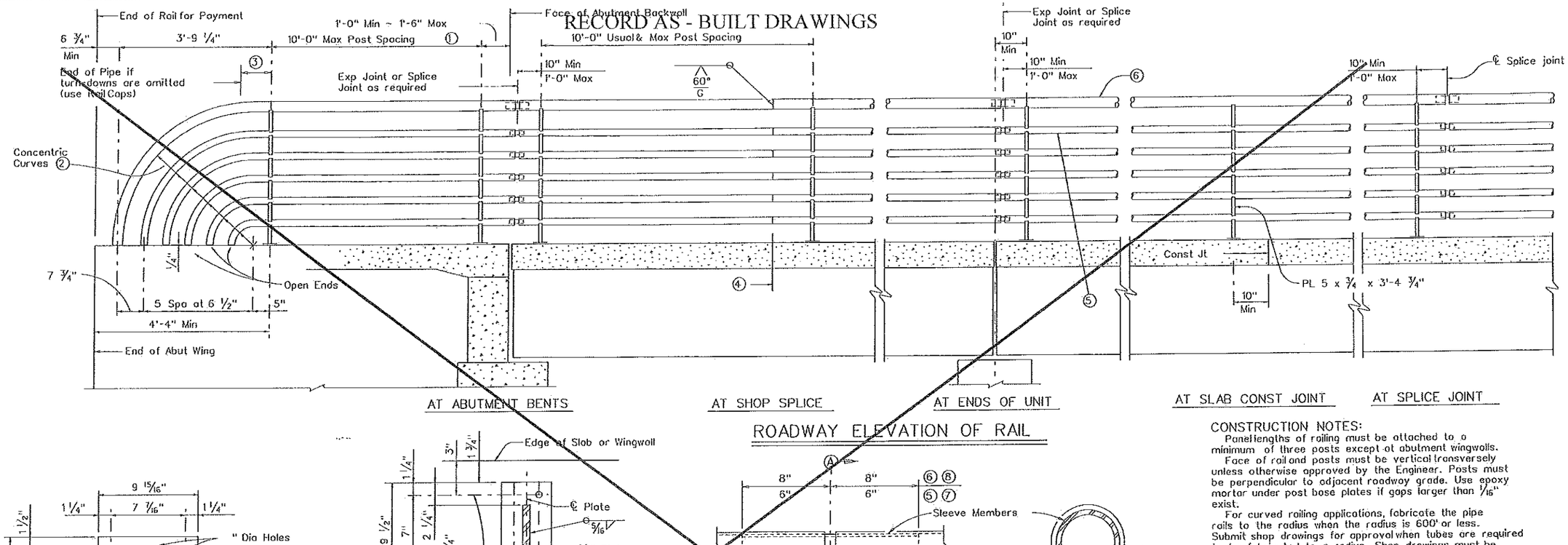
Texas Department of Transportation
Design Division (Roadway)

METAL BEAM GUARD FENCE TRANSITION

MBGF(TR)-05

FILE	mbgftr05.dgn	DW: MAM	CK: MAM	DW: BGD	CK:
© TxDOT December 2001		DIST	FEDERAL AID PROJECT		SHEET
REVISIONS					
		COUNTY	CONTROL	SECT	JOB	HIGHWAY

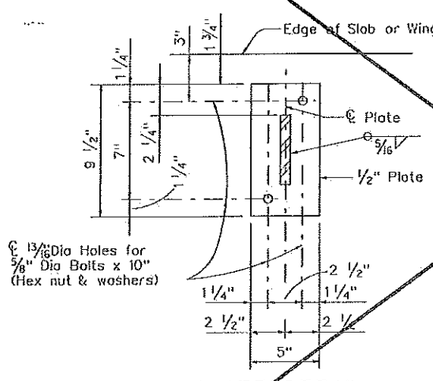
LEVELS DISPLAYED



AT ABUTMENT BENTS | AT SHOP SPLICE | AT ENDS OF UNIT | AT SLAB CONST JOINT | AT SPLICE JOINT

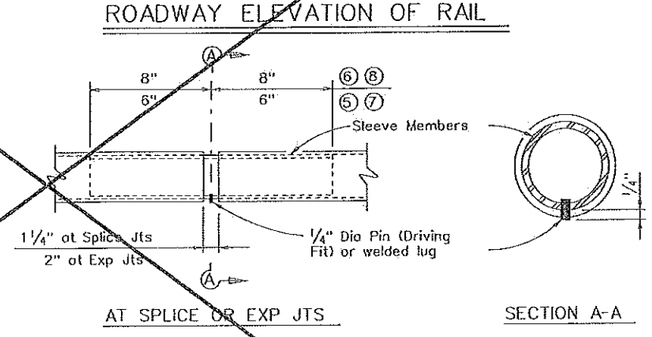
ROADWAY ELEVATION OF RAIL

BOTTOM PLATE DETAIL

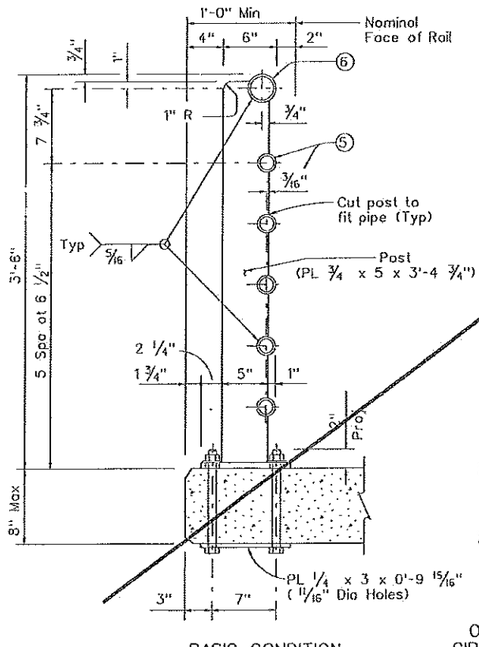


BASE PLATE DETAIL

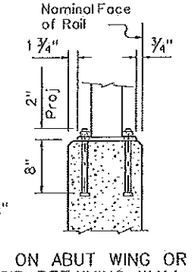
RAIL CAP DETAIL



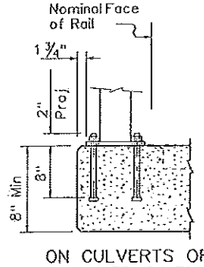
PIPE SPLICE DETAIL



BASIC CONDITION



ON ABUT WING OR CIP RETAINING WALL



ON CULVERTS OR SLABS OVER 8" THICK

POST MOUNTING DETAILS

① Min of 2 posts required on wingwall

② Portion of railing with turn-downs to be used or omitted as indicated on Bridge Layout.

③ 10" Min ~ 1'-6" Max if turn-downs are omitted.

④ One shop splice per panel is permitted (with minimum 85 percent penetration). The weld may be square groove or single vee groove. Grind smooth.

⑤ 2" Std Pipe (2.375" O.D., 0.154" wall thickness)

⑥ 3" Std Pipe (3.500" O.D., 0.216" wall thickness)

⑦ 1 1/2" Std Pipe Sleeve (1.900" O.D., 0.145" wall thickness)

⑧ 2 1/2" Std Pipe Sleeve (2.875" O.D., 0.203" wall thickness)

CONSTRUCTION NOTES:

Panel lengths of railing must be attached to a minimum of three posts except at abutment wingwalls.

Face of rail and posts must be vertical transversely unless otherwise approved by the Engineer. Posts must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

For curved railing applications, fabricate the pipe rails to the radius when the radius is 600' or less. Submit shop drawings for approval when tubes are required to be fabricated to a radius. Shop drawings must be submitted to the Engineer for approval.

Exposed edges of pipe rail and pipe rail posts must be rounded or chamfered to approximately 1/16" by grinding.

MATERIAL NOTES:

Pipe for pipe rail must conform to ASTM A53 Gr B, or A500 Gr B. Posts and Plates must be ASTM A36.

All steel components to be galvanized unless otherwise shown in plans.

Anchor bolts must be 5/8" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one lock welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Threaded rods may be 0.557" minimum diameter with rolled threads. Nuts must conform to A563 requirements.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

This railing cannot be used on bridges with expansion joints providing more than 5" movement.

For all rails, erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting must be submitted to the Engineer for approval.

Average weight of railing is 30 plf.

Texas Department of Transportation
Bridge Division

PEDESTRIAN RAIL

TYPE PR1

FILE: rlstd028.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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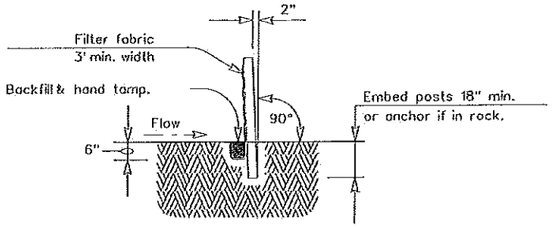
REVISIONS	COUNTY	CONTROL	SECT	JOB	HIGHWAY

ACC:
LEVELS DISPLAYED

RECORD AS - BUILT DRAWINGS



SECTION A-A

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.

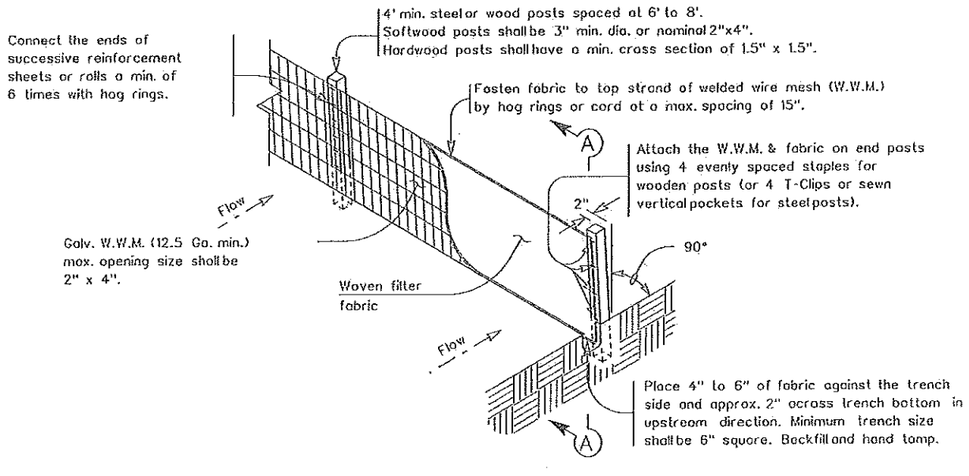
Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT . Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

PLAN SHEET LEGEND

Sediment Control Fence —— SCF ——

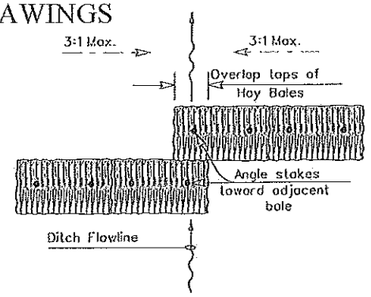
GENERAL NOTES

1. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

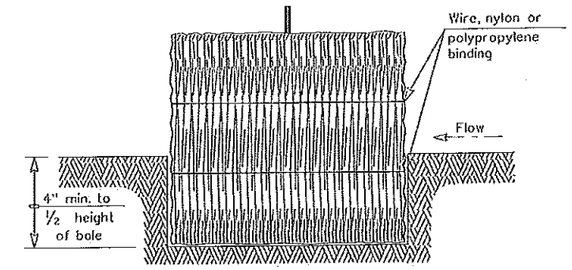


TEMPORARY SEDIMENT CONTROL FENCE

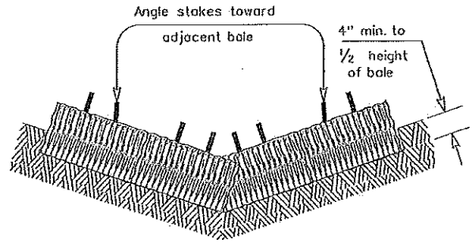
SCF



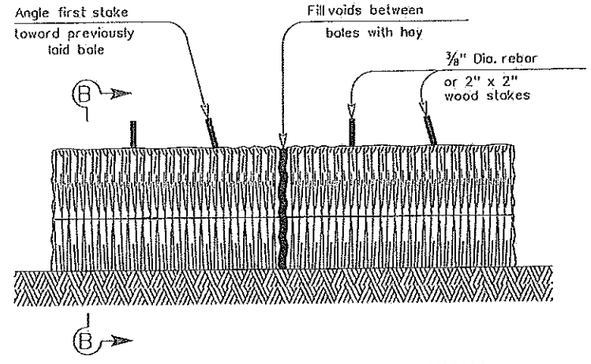
PLAN VIEW



SECTION B-B



PROFILE VIEW



BALED HAY FOR EROSION CONTROL

BH

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.

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 (Roadway)

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCED & BALED HAY

EC(1)-93

FILE: EC193.DGN	DN: HEJ	CK: HEJ	DW: BGD	CK:
©TxDOT JUNE 1993	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB	HIGHWAY

LEVELS Dept_AYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
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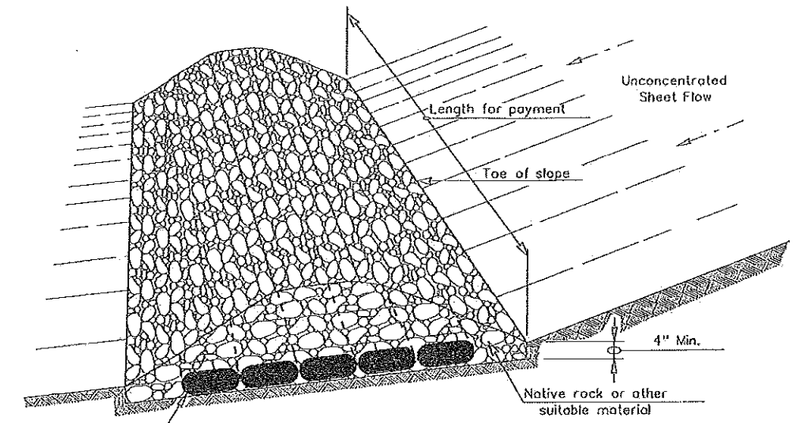
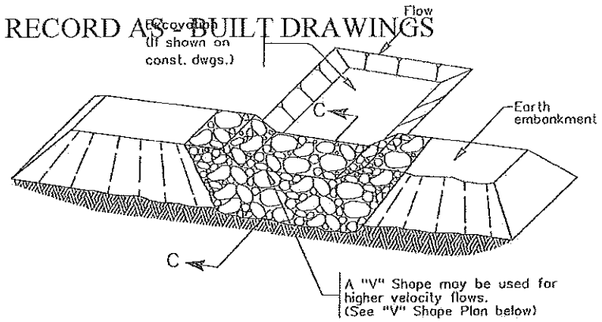


FILTER DAM AT TOE OF SLOPE

RFD1

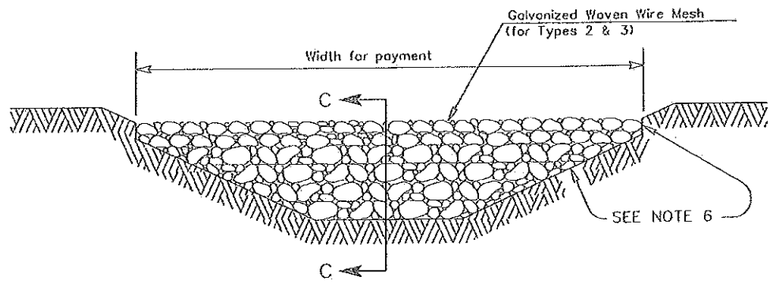
TYPE 1



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2

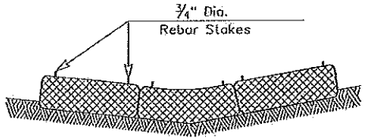
TYPE 1 OR TYPE 2



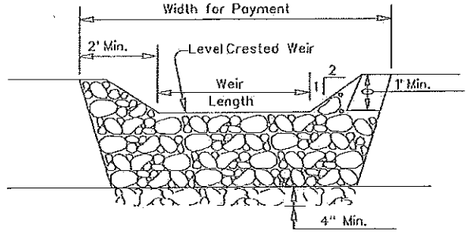
FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

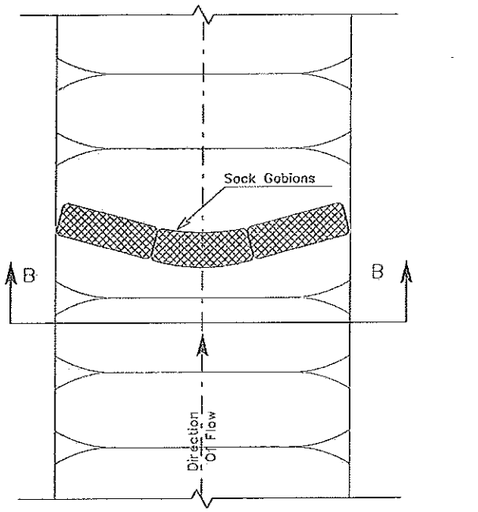
TYPE 1 OR TYPE 2



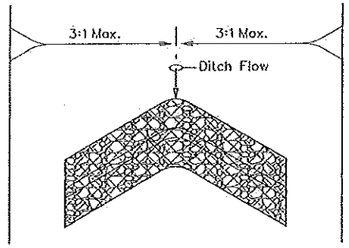
SECTION B-B



PROFILE

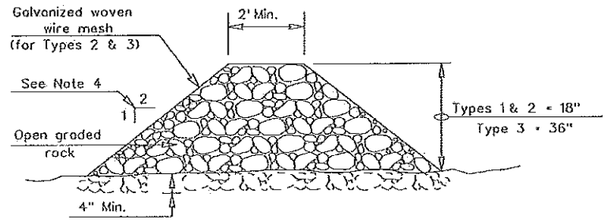


PLAN VIEW



"V" SHAPE

(Plan View)



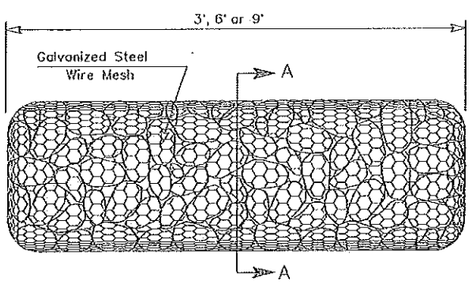
SECTION C-C

PLANS SHEET LEGEND

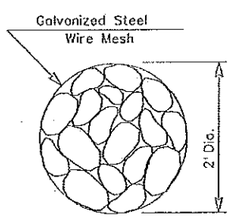
Type 1 Rock Filter Dam — RFD1

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 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.

LEVELS UNDEFINED

Texas Department of Transportation
Design Division (Roadway)

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-93

FILE: EC293.DGN	DN: HEJ	CK: HEJ	DW: BGD	CK:
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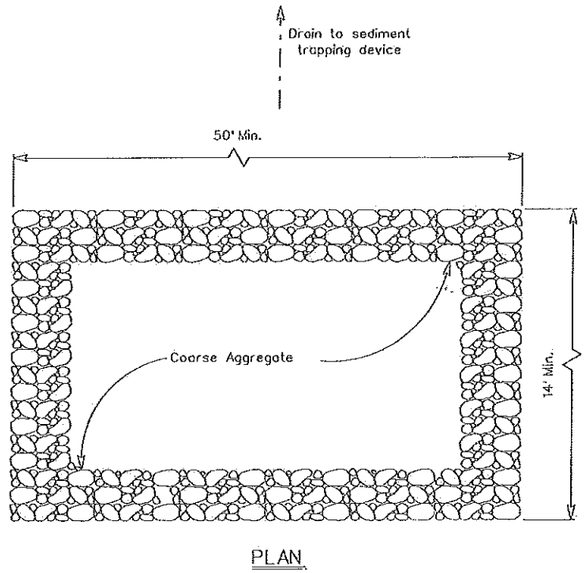
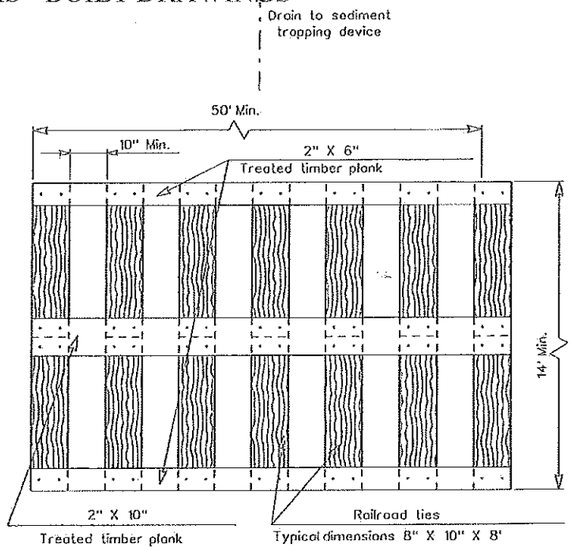
REVISIONS				
	COUNTY		CONTROL SECT	JOB HIGHWAY

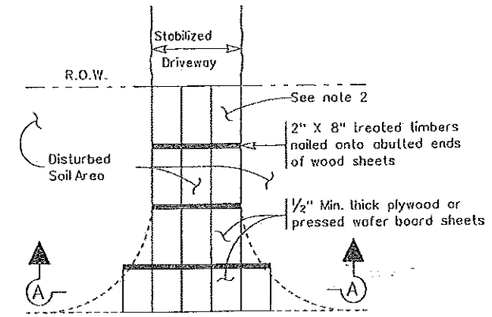
RECORD AS - BUILT DRAWINGS



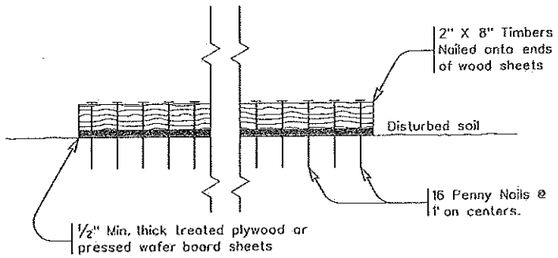
PLAN



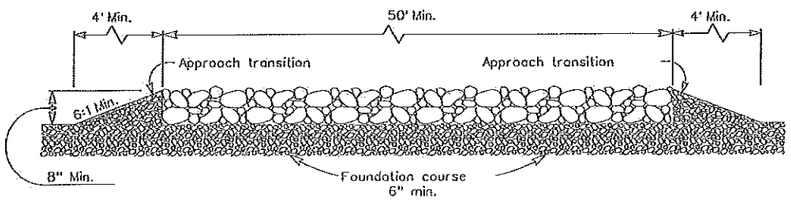
PLAN



PLAN



SECTION A-A

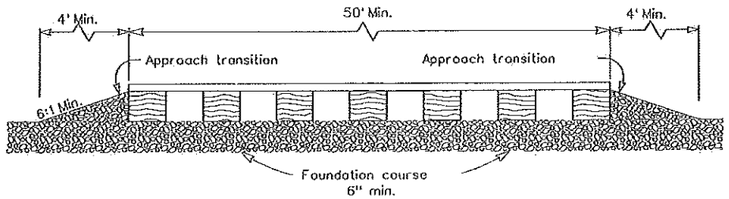


PROFILE

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.

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.

LEVELS DISPLAYED

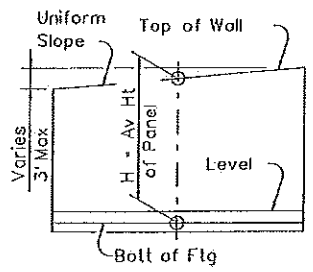
Texas Department of Transportation
Design Division (Roadway)

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-93

FILE: EC393.DGN	DN: HEJ	CK: HEJ	DW: BCD	CK:
©TxDOT JUNE 1993	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS	COUNTY	CONTROL	SECT	JOB	HIGHWAY



H DEFINITION

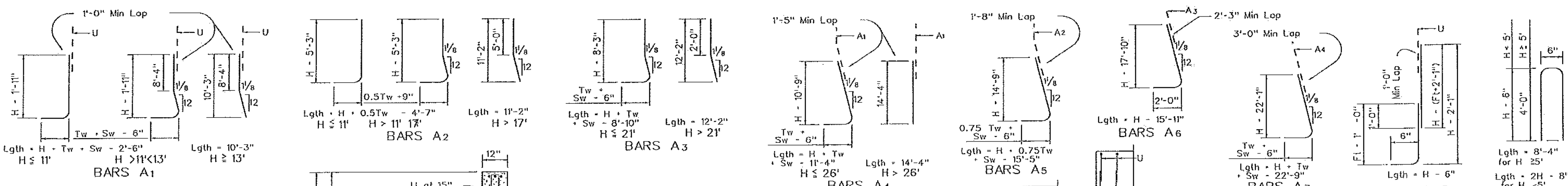
PROPERTIES

Wall Height "H" (Ft)	Fw	Tw	Sw	Hw	Ft	Kw	Max Soil Press T/SF
2	3'-6"	1'-9"	1'-0"	9"	1'-0"	9"	0.14
3	4'-3"	2'-2"	1'-0"	1'-1"	1'-0"	9"	0.17
4	5'-0"	2'-6"	1'-0"	1'-6"	1'-0"	9"	0.20
5	5'-8"	2'-10"	1'-0"	1'-10"	1'-0"	9"	0.24
6	6'-4"	3'-2"	1'-0"	2'-2"	1'-0"	9"	0.28
7	7'-0"	3'-6"	1'-0"	2'-6"	1'-0"	9"	0.32
8	7'-9"	3'-10"	1'-0"	2'-11"	1'-0"	9"	0.35
9	8'-6"	4'-3"	1'-0"	3'-3"	1'-0"	9"	0.37
10	9'-2"	4'-7"	1'-0"	3'-7"	1'-0"	9"	0.41
11	9'-10"	4'-11"	1'-0"	3'-11"	1'-0"	1'-0"	0.44
12	10'-6"	5'-3"	1'-1 1/8"	4'-1 7/8"	1'-0"	1'-0"	0.45
13	11'-2"	5'-7"	1'-2"	4'-5"	1'-3"	1'-3"	0.54
14	11'-10"	5'-11"	1'-3 1/8"	4'-7 7/8"	1'-3"	1'-3"	0.57
15	12'-6"	6'-3"	1'-4"	4'-11"	1'-6"	1'-3"	0.63
16	13'-3"	6'-7"	1'-5"	5'-3"	1'-6"	1'-6"	0.66
17	13'-10"	6'-11"	1'-6 1/4"	5'-4 3/4"	1'-6"	1'-6"	0.70
18	14'-6"	7'-3"	1'-7"	5'-8"	1'-9"	1'-6"	0.76
19	15'-2"	7'-7"	1'-8 1/8"	5'-10 7/8"	1'-9"	1'-6"	0.79
20	16'-0"	8'-0"	1'-9 1/4"	6'-2 3/4"	1'-9"	1'-6"	0.80
21	16'-6"	8'-3"	1'-10 1/8"	6'-4 7/8"	2'-0"	1'-6"	0.88
22	17'-3"	8'-7"	1'-11 1/4"	6'-8 3/4"	2'-0"	1'-6"	0.91
23	18'-0"	9'-0"	2'-0 1/8"	6'-11 7/8"	2'-3"	1'-6"	0.95
24	18'-6"	9'-4"	2'-1 1/4"	7'-0 3/4"	2'-3"	1'-6"	0.99
25	19'-3"	9'-7"	2'-2 3/8"	7'-5 5/8"	2'-3"	1'-9"	1.03
26	20'-0"	10'-0"	2'-3 1/2"	7'-8 1/2"	2'-3"	1'-9"	1.05
27	20'-6"	10'-4"	2'-4 5/8"	7'-9 3/8"	2'-3"	1'-9"	1.09
28	21'-3"	10'-7"	2'-5 3/4"	8'-2 1/4"	2'-3"	1'-9"	1.13
29	22'-0"	11'-0"	2'-6 1/2"	8'-5 1/2"	2'-6"	1'-9"	1.17

REINFORCING STEEL FOR ONE 32' PANEL (DESIGN C)

Wall Height "H" (Ft)	A1 ~ 26 #5 at 15" c-c Lgth	Wt	A2 ~ 25 #6 at 15" c-c Lgth	Wt	A3 ~ 25 #7 at 15" c-c Lgth	Wt	A4 ~ 26 #8 at 15" c-c Lgth	Wt	A5 ~ 25 #9 at 15" c-c Lgth	Wt	A6 ~ 25 #11 at 15" c-c Lgth	Wt	A7 ~ 26 #11 at 15" c-c Lgth	Wt	B ~ 26 #5 at 15" c-c Lgth	Wt
2																
3																
4	5'-0"	136													3'-6"	95
5	6'-4"	172													4'-6"	122
6	7'-8"	208													5'-6"	149
7	9'-0"	244	4'-2"	156											6'-6"	176
8	10'-4"	280	5'-4"	200											7'-6"	203
9	11'-9"	319	6'-7"	247											8'-6"	231
10	13'-1"	355	7'-8"	288	6'-9"	345									9'-6"	258
11	14'-5"	391	8'-11"	335	8'-1"	413									10'-6"	285
12	15'-10"	429	10'-1"	379	9'-6"	485									11'-6"	312
13	10'-3"	278	11'-2"	419	10'-11"	558	8'-5"	584							12'-6"	339
14	10'-3"	278	12'-5"	466	12'-4"	630	9'-10"	683							13'-6"	366
15	10'-3"	278	13'-7"	510	13'-9"	703	11'-2"	775							14'-6"	393
16	10'-3"	278	14'-9"	554	15'-2"	775	12'-8"	879							15'-6"	420
17	10'-3"	278	15'-11"	598	16'-7"	847	14'-1	978							16'-6"	447
18	10'-3"	278	11'-2"	419	18'-0"	920	15'-5"	1070	9'-7"	815					17'-6"	475
19	10'-3"	278	11'-2"	419	19'-5"	992	16'-11"	1174	10'-11"	928					18'-6"	502
20	10'-3"	278	11'-2"	419	20'-11"	1069	18'-5"	1278	12'-4"	1048					19'-6"	529
21	10'-3"	278	11'-2"	419	22'-3"	1137	19'-9"	1371	13'-7"	1155					20'-6"	556
22	10'-3"	278	11'-2"	419	12'-2"	622	21'-2"	1469	15'-0"	1275	6'-1"	808			21'-6"	583
23	10'-3"	278	11'-2"	419	12'-2"	622	22'-8"	1574	16'-4"	1388	7'-1"	941			22'-6"	610
24	10'-3"	278	11'-2"	419	12'-2"	622	24'-1"	1672	17'-8"	1502	8'-1"	1074			23'-6"	637
25	10'-3"	278	11'-2"	419	12'-2"	622	25'-5"	1764	19'-0"	1615	9'-1"	1206			24'-6"	664
26	10'-3"	278	11'-2"	419	12'-2"	622	27'-0"	1874	20'-5"	1735	10'-1"	1339			25'-6"	692
27	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	21'-9"	1849	11'-1"	1472	17'-0"	2348	26'-6"	719
28	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	23'-0"	1955	12'-1"	1605	18'-4"	2533	27'-6"	746
29	10'-3"	278	11'-2"	419	12'-2"	622	14'-4"	995	24'-5"	2075	13'-1"	1738	19'-10"	2740	28'-6"	773

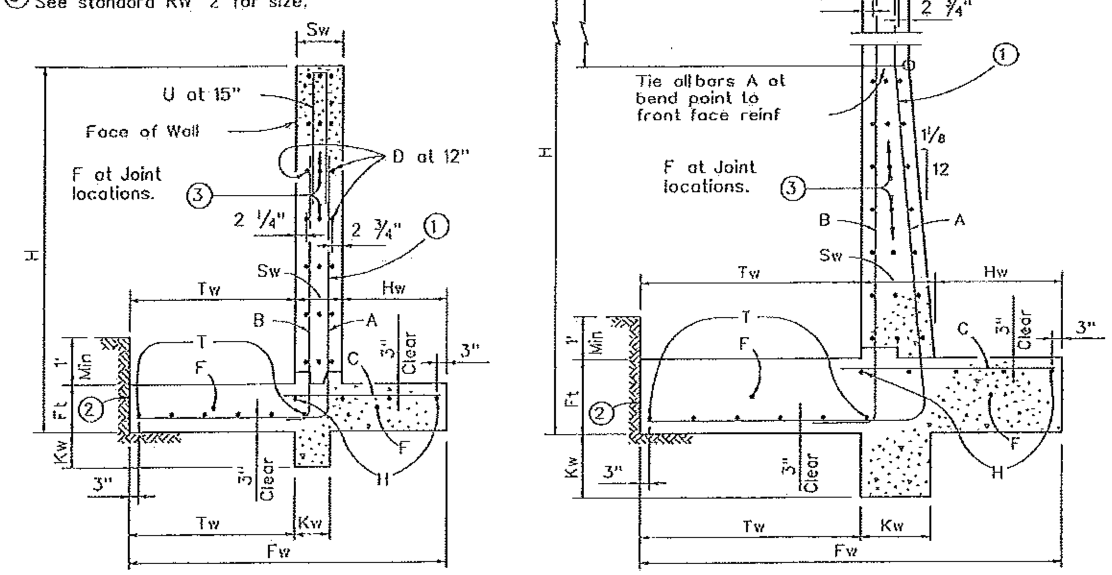
Wall Height "H" (Ft)	C Size	C No	C Spa	C Lgth	C Wt	D (#5) at 12" c-c No	Wt	Dowel F at 12" c-c No	Wt	H (#5) at 12" c-c No	Wt	T (#5) at 12" c-c No	Wt	U ~ 26 #5 at 15" c-c Lgth	Wt	QUANTITY FOR ONE 32' PANEL CONC (CY)	REINF (LB)	Wall Height "H" (Ft)
2	#4	26	15"	2'-3"	39	4	131	4	32	2	66	3	99	3'-4"	90	6.0	458	2
3	#4	26	15"	2'-8"	46	6	197	5	40	3	99	3	99	5'-4"	145	8.1	626	3
4	#4	26	15"	3'-0"	52	8	263	6	48	3	99	3	99	7'-4"	199	10.1	991	4
5	#4	26	15"	3'-4"	58	10	329	7	56	3	99	4	131	8'-4"	226	12.1	1193	5
6	#4	26	15"	3'-8"	64	12	394	8	64	3	99	4	131	8'-4"	226	14.1	1336	6
7	#4	38	10"	4'-0"	102	14	460	9	72	4	131	4	131	8'-4"	226	16.1	1698	7
8	#6	38	10"	4'-4"	247	16	526	10	80	4	131	5	164	8'-4"	226	18.1	2056	8
9	#6	38	10"	4'-9"	271	18	591	11	88	4	131	5	164	8'-4"	226	20.2	2268	9
10	#7	38	10"	5'-1"	395	20	657	12	96	5	164	6	197	8'-4"	226	22.2	2981	10
11	#8	38	10"	5'-5"	550	22	723	13	104	5	164	6	197	8'-4"	226	24.7	3382	11
12	#9	38	10"	5'-9"	743	24	789	14	112	6	197	6	197	8'-4"	226	26.7	3868	12
13	#9	38	10"	6'-1"	786	26	854	15	120	6	197	7	230	8'-4"	226	32.5	4591	13
14	#9	38	10"	6'-5"	829	28	920	16	128	7	230	7	230	8'-4"	226	34.9	4986	14
15	#9	38	10"	6'-9"	872	28	920	16	128	7	230	8	263	8'-4"	226	40.8	5298	15
16	#9	38	10"	7'-2"	926	30	986	17	136	7	230	8	263	8'-4"	226	44.5	5672	16
17	#10	38	10"	7'-5"	1213	32	1051	18	144	8	263	8	263	8'-4"	226	47.3	6308	17
18	#10	38	10"	7'-9"	1267	34	1117	19	152	8	263	9	296	8'-4"	226	54.2	7298	18
19	#10	38	10"	8'-1"	1322	36	1183	20	160	8	263	9	296	8'-4"	226	57.5	7743	19
20	#8	76	5"	8'-6"	1725	38	1248	21	168	9	296	10	329	8'-4"	226	61.3	8613	20
21	#8	76	5"	8'-9"	1776	40	1314	22	176	9	296	10	329	8'-4"	226	68.8	9033	21
22	#8	76	5"	9'-2"	1860	42	1380	23	184	9	296	10	329	8'-4"	226	72.8	9729	22
23	#8	76	5"	9'-6"	1928	44	1446	24	192	10	329	11	361	8'-4"	226	81.7	10314	23
24	#9	76	5"	9'-10"	2541	46	1511	25	200	10	329	11	361	8'-4"	226	85.4	11372	24
25	#9	76	5"	10'-1"	2606	48	1577	26	208	10	329	12	394	8'-4"	226	91.0	11909	25
26	#9	76	5"	10'-5"	2692	50	1643	27	217	11	361	12	394	8'-4"	226	95.6	12491	26
27	#10	76	5"	10'-9"	3516	52	1708	28	225	11	361	12	394	8'-4"	226	99.7	15132	27
28	#10	76	5"	11'-2"	3652	54	1774	29	233	11	361	13	427	8'-4"	226	104.6	15825	28
29	#10	76	5"	11'-6"	3761	54	1774	29	233	12	394	13	427	8'-4"	226	115.3	16454	29



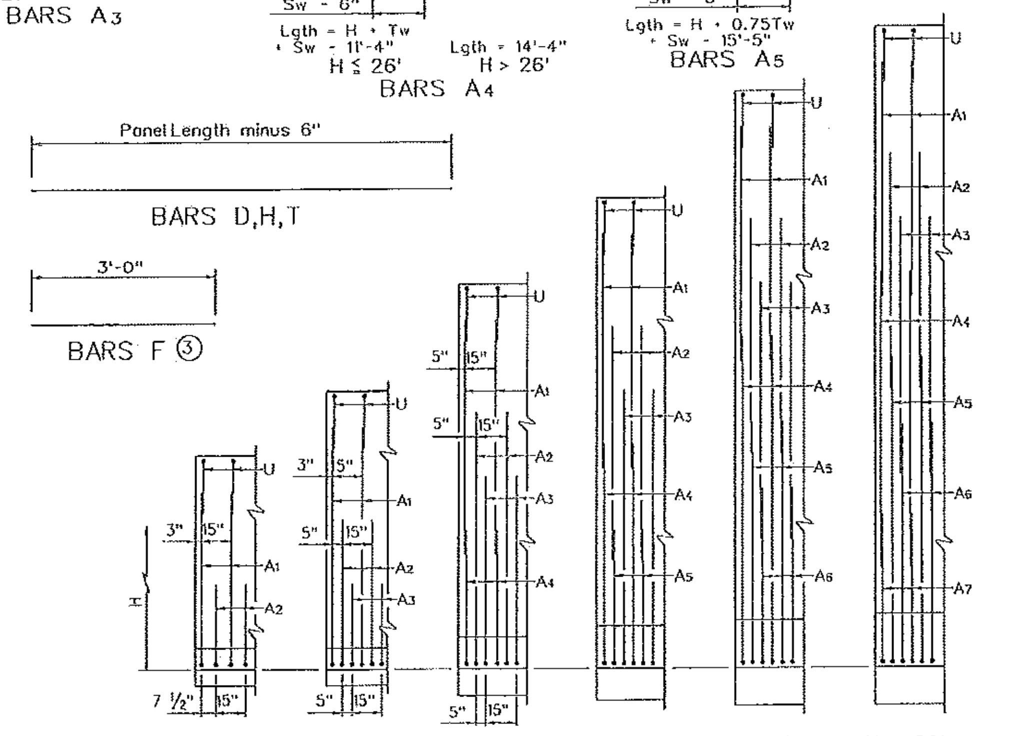
① Place vertical bars inside of horizontal bars (Typ both faces).

② Place footing toe against undisturbed soil.

③ See standard RW 2 for size.



SECTIONS



PARTIAL WALL ELEVATIONS

(Showing vertical reinforcing pattern in back face)

GENERAL NOTES:

All concrete to be Class "C".
All reinforcing steel to be Grade 60.
For notes and details not shown on this sheet see sheet RW2.
Quantities are based on "H" being average height of panel.
Retaining Walls are designed to be coded as follows on Retaining Wall Layout Sheets.

HC - 21 - 28
LA - 28 - 32

- Panel Length ~ 32' is standard; 28' requires special quantities
- Average Height "H" of panel
- Design - A = no surcharge or slope above wall
  B = slopes up to 4:1
  C = traffic surcharge and/or slopes up to 2.5:1
- Footing pressure design ~ L = low, H = high

Texas Department of Transportation
Bridge Division

RETAINING WALLS

RW 1(L)C

FILE: rwslde07.dgn	DN: TxDOT	CK: TxDOT	DW: GHO	CK: MPM
©TxDOT March 2010	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS	COUNTY	CONTROL SECT JOB		HIGHWAY

PATH:
LEVELS DISPLAYED

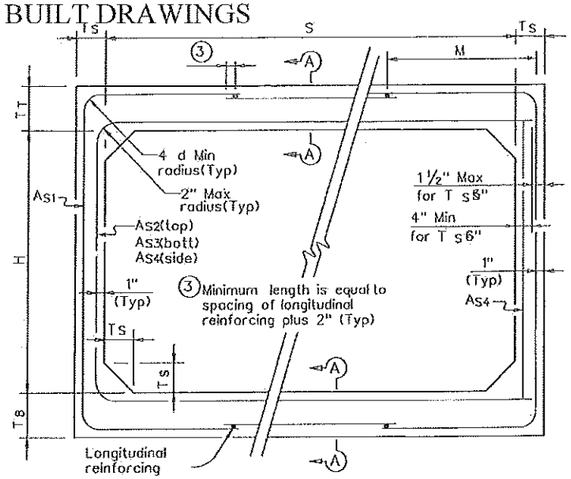
RECORD AS - BUILT DRAWINGS

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (in ²/ft) ②								Lift Weight (Tons) ①
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}	
6	3	8	7	7	<2	-	0.20	0.31	0.22	0.17	0.19	0.19	0.19	0.17	7.9
6	3	7	7	7	2<3	43	0.21	0.24	0.19	0.17	-	-	-	-	7.5
6	3	7	7	7	3-5	39	0.17	0.18	0.17	0.17	-	-	-	-	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	-	-	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	-	-	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	-	-	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	-	-	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	-	-	7.5
6	4	8	7	7	<2	-	0.19	0.34	0.25	0.17	0.19	0.19	0.19	0.17	8.6
6	4	7	7	7	2<3	43	0.19	0.27	0.21	0.17	-	-	-	-	8.2
6	4	7	7	7	3-5	39	0.17	0.21	0.19	0.17	-	-	-	-	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	-	-	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	-	-	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	-	-	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	-	-	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	-	-	8.2
6	5	8	7	7	<2	-	0.19	0.37	0.28	0.17	0.19	0.19	0.19	0.17	9.3
6	5	7	7	7	2<3	43	0.17	0.30	0.24	0.17	-	-	-	-	8.9
6	5	7	7	7	3-5	43	0.17	0.23	0.21	0.17	-	-	-	-	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	-	-	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	-	-	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	-	-	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	-	-	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	-	-	8.9
6	6	8	7	7	<2	-	0.19	0.38	0.30	0.17	0.19	0.19	0.19	0.17	10.0
6	6	7	7	7	2<3	52	0.17	0.32	0.26	0.17	-	-	-	-	9.6
6	6	7	7	7	3-5	52	0.17	0.24	0.22	0.17	-	-	-	-	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	-	-	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	-	-	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	-	-	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	-	-	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	-	-	9.6

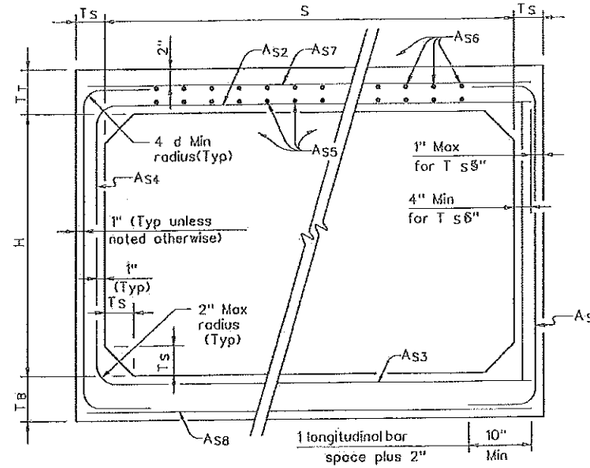
① For Box Length = 8'-0"

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



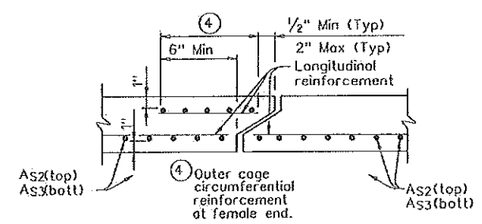
CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

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 Structures".

HL93 LOADING

Texas Department of Transportation
Bridge Division

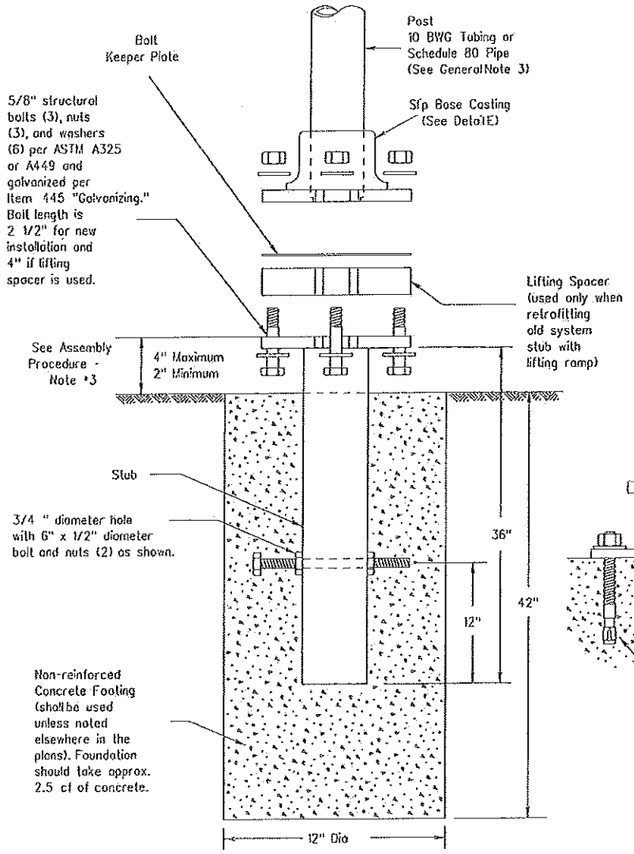
SINGLE BOX CULVERTS PRECAST 6'-0" SPAN

SCP-6

FILE: scp06ste.dgn	CK: GAF	DW: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB	HIGHWAY

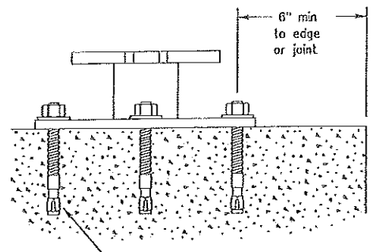
LEVELS DISPLAYED ACC:

Dallas District Triangular Slipbase System



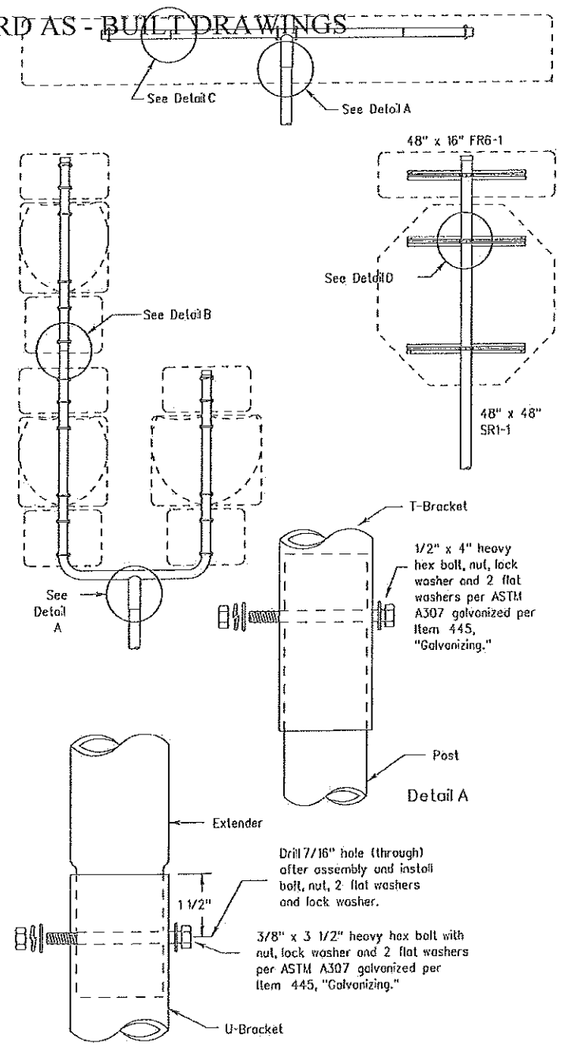
SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type II epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time, per the manufacturer's recommendations.



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

RECORD AS - BUILT DRAWINGS



GENERAL NOTES:

1. Finished components, except posts (10 BWG Tubing and Schedule 80 Pipe) and clamps, shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Except for posts (10 BWG Tubing and Schedule 80 Pipe), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the TxDOT Traffic Standards Engineer, or the Traffic Operations Division website. The website address is: http://www.dot.state.tx.us/insdtdot/orgchart/trf/trfeng/
3. Material used as post with this system shall conform to the following specifications:
   - 10 BWG Tubing (2.875" outside diameter)
     - 0.134" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing or pipe
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 20% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
     - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
     - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   - Schedule 80 Pipe (2.875" outside diameter)
     - 0.276" nominal wall thickness
     - Steel tubing per ASTM A500 Gr C
     - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
       - 46,000 PSI minimum yield strength
       - 62,000 PSI minimum tensile strength
       - 21% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
     - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
     - Galvanization per ASTM A123
4. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/traffic/slip.pdf
5. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

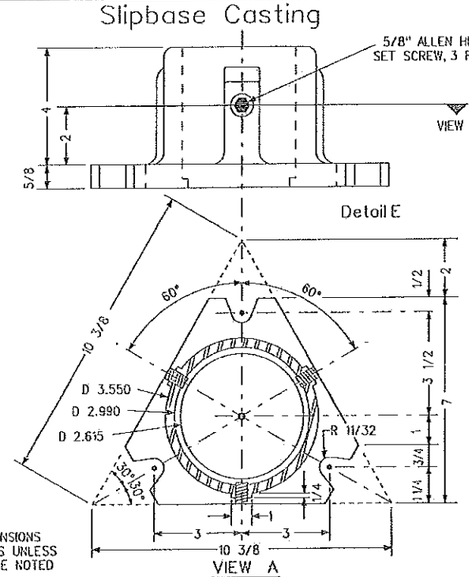
Foundation

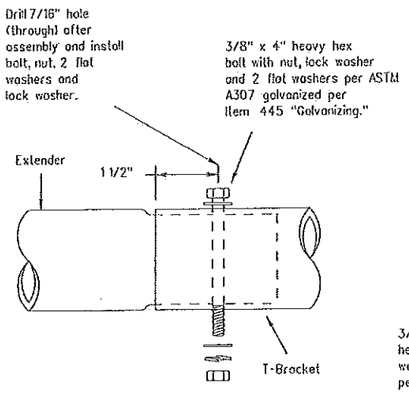
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. Thoroughly wet and mix concrete in a container. Place concrete into hole until it is approximately flush with the ground.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground. The upper value assures that an impacting vehicle should not snag on the footing. The lower value provides clearance for assembly.
4. Plumb the stub by using a torpedo level on the slip plate. Allow concrete adequate time to set.

Support

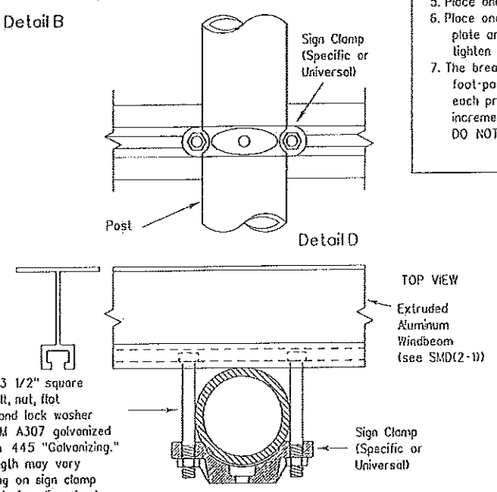
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the traveiway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the traveiway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.
3. Slide the slipbase casting onto the lower end of the sign support.
4. Drive a chisel or a flat-blade screwdriver into the cut on the locking collar to slightly pry the collar open. Slide the collar onto the end of the pipe so the edge of the pipe is between the face of the locking collar and the end of the edge bevel. A dead-blow hammer may be useful in positioning the collar correctly. Remove the tool used to pry the collar open. Torque the allen bolt to 60 foot-pounds (720 inch-pounds). DO NOT OVERTIGHTEN.
5. Place and align bolt keeper plate on slip plate and lift assembled sign and support into position.
6. Place one washer on each bolt and insert them through keeper plate and the notches on the slip plate and casting. After inserting each bolt, place one washer and a nut on the bolt and hand-tighten all three.
7. The breakaway features of this system will work when all three bolts are tightened between 40 to 80 foot-pounds (480 to 960 inch-pounds). The Engineer shall determine the appropriate bolt torque for each project. Tighten all bolts by working around the support in approximately 10 foot-pound increments to assure a balanced tension in the bolts. All three bolts shall be torqued the same. DO NOT OVERTIGHTEN.

Slipbase Casting





Splices shall only be allowed behind the sign substrate.



MODIFICATIONS

MODIFIED SLIP BASE CASTING FROM SINGLE BOLT TO MULTIPLE SET SCREWS TO PREVENT SIGN ROTATING.

STANDARD PLANS
Texas Department of Transportation
Dallas District Standard

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-02 (DAL)

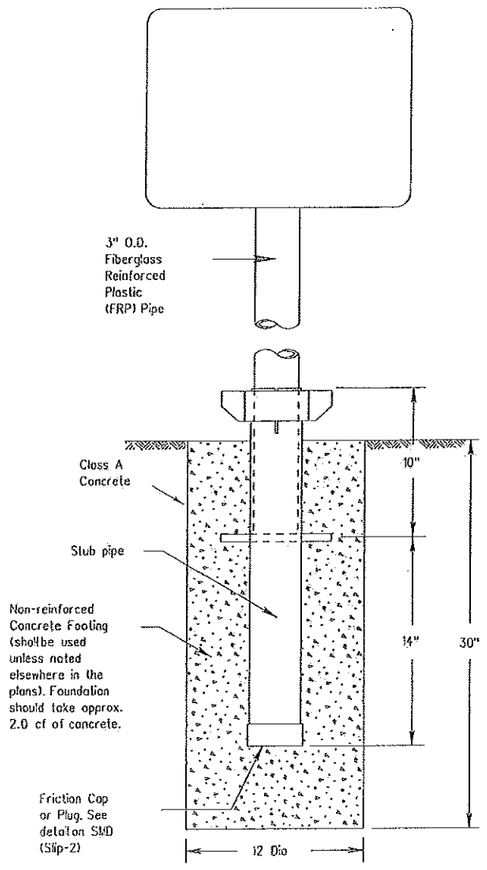
©TxDOT July 2002	DN:	CK:	DW:	CK:	SHEET
REVISIONS	STATE DISTRICT: DALLAS	FEDERAL AID PROJECT: 6			
	COUNTY: DALLAS	CONTROL: 0091	SECTION: 05	JOB: 049	HIGHWAY: SH 289

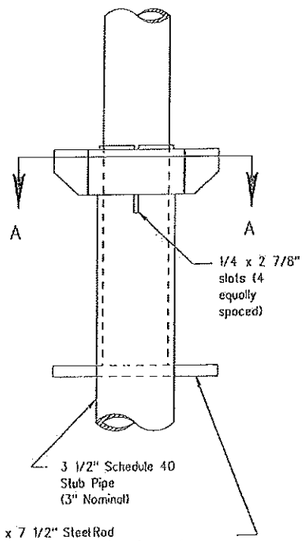
268

DATE:
FILE:

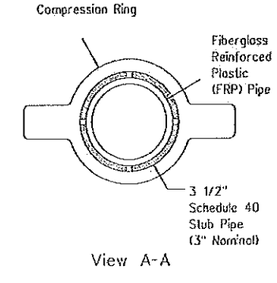
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post

RECORD AS - BUILT DRAWINGS

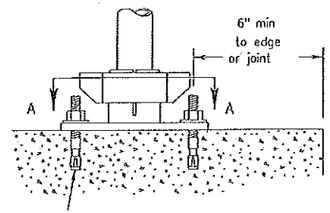




1/2 x 7 1/2" Steel Rod
Acts as a "stop" for the sign post and prevents stub from turning in the foundation.



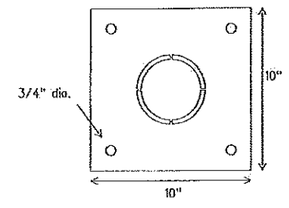
SM RD SGN ASSM TY FRP(X)UA(P)

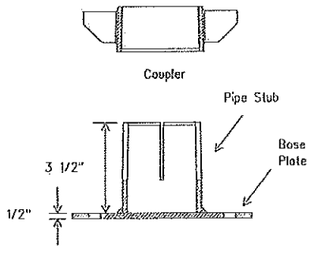


5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS





SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 18 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

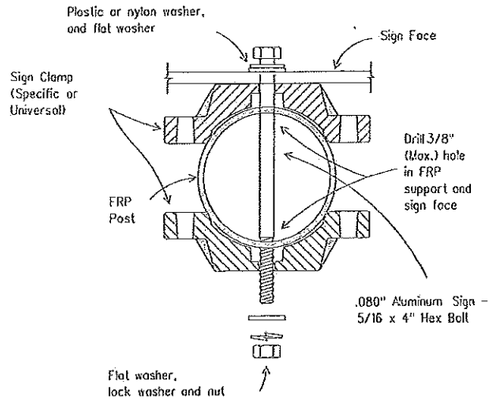
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

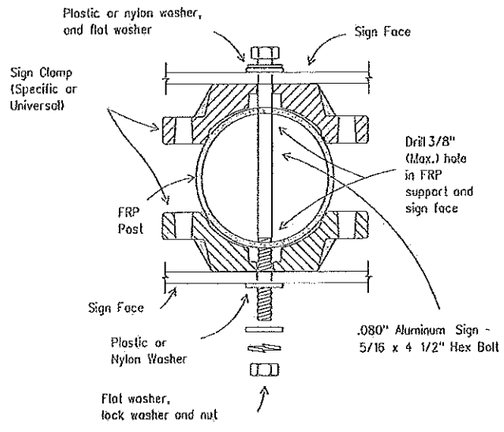
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

REVISIONS	DIV TxDOT	CO: TxDOT	DIST TxDOT	CO: TxDOT
9-08	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

26F

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DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

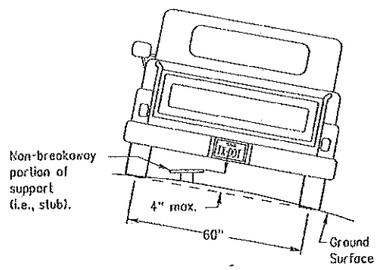
Post Type
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type
- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation
- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
- IF REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

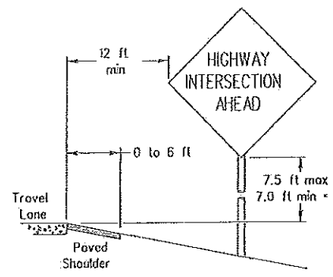


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheelpaths).

RECORD AS-BUILT DRAWINGS

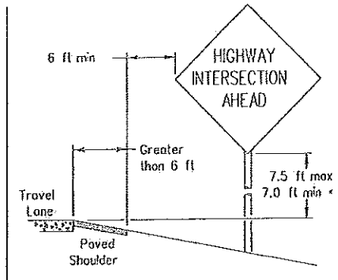
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

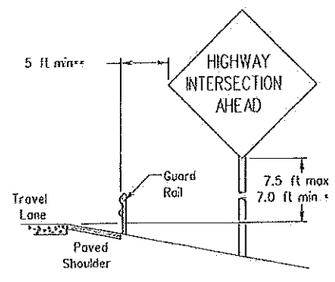
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travellane.



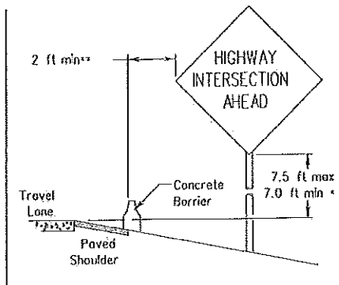
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



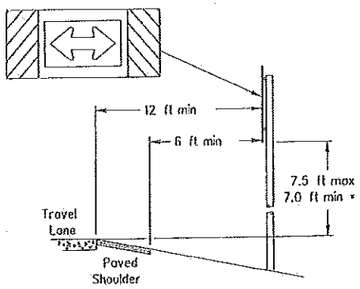
BEHIND GUARDRAIL



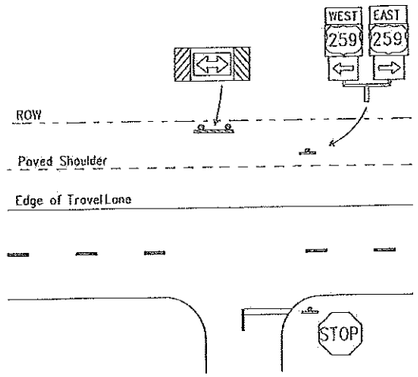
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travellane or

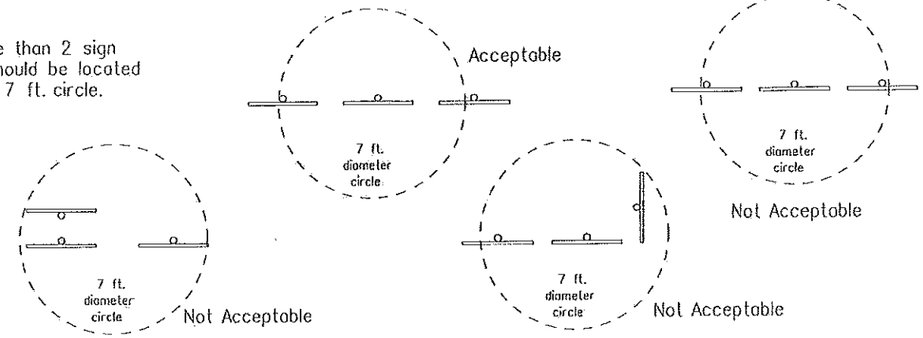
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

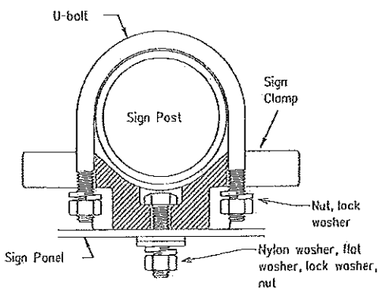
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

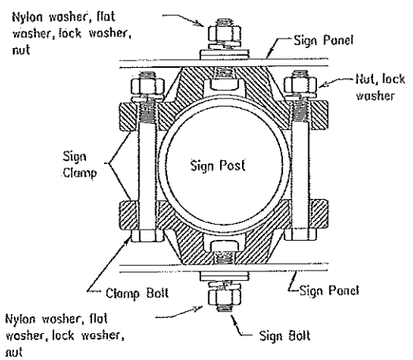


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

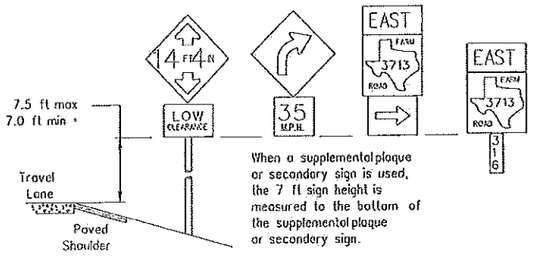
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



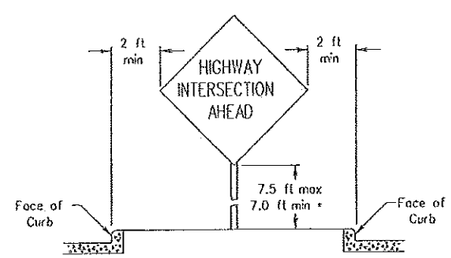
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



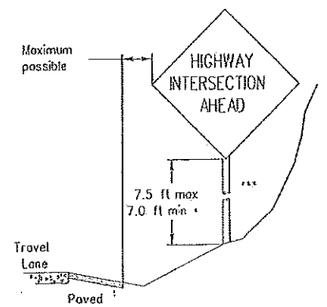
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travellane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

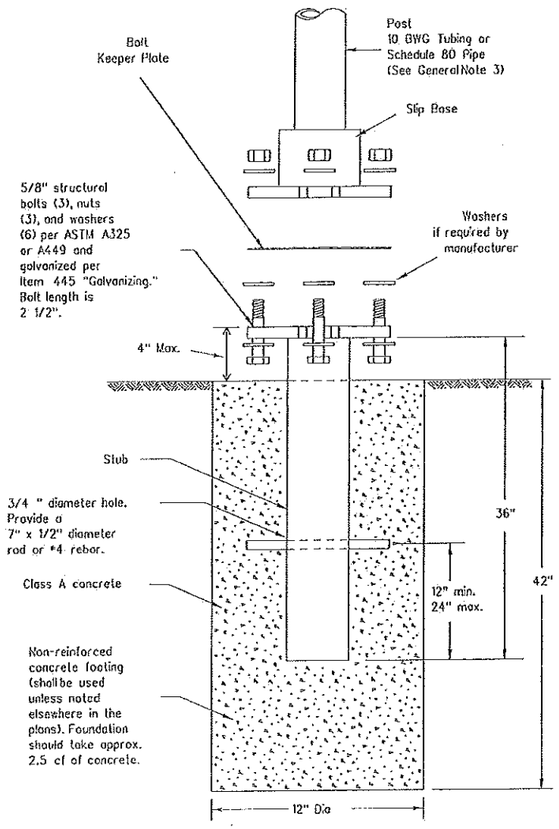
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

264

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved
for the Triangular Slipbase System.
Please reference the Material Producer
List for approved slip base systems.
http://www.txdot.gov/business/producer list.htm_
The devices shall be installed per
manufacturers' recommendations.
Installation procedures shall be
provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   - 10 BWG Tubing (2.875" outside diameter)
     - 0.134" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing or pipe
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 20% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
     - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
     - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   - Schedule 80 Pipe (2.875" outside diameter)
     - 0.276" nominal wall thickness
     - Steel tubing per ASTM A500 Gr C
     - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
       - 46,000 PSI minimum yield strength
       - 62,000 PSI minimum tensile strength
       - 21% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
     - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
     - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is:
   http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

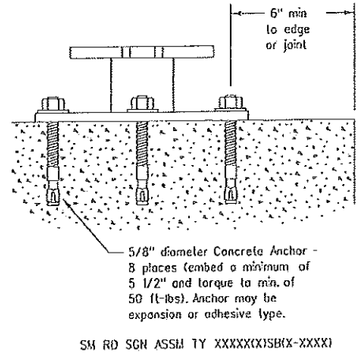
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

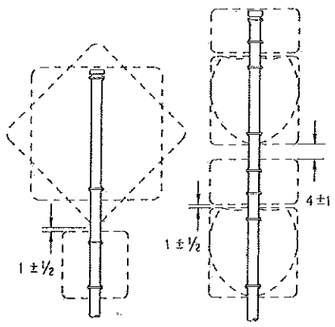
REVISIONS					
9-08					

CK: TxDOT	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB		HIGHWAY
DIST	COUNTY			SHEET NO.

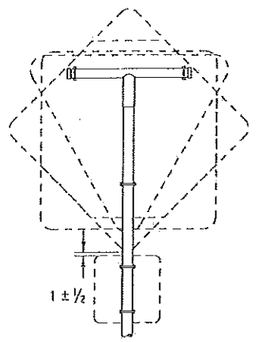
268

DATE:
FILE:

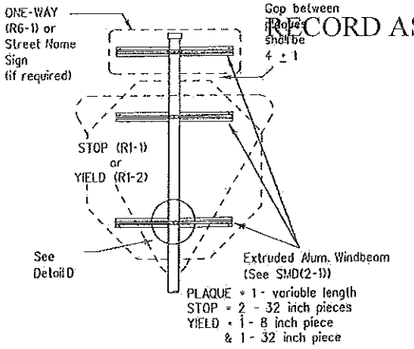
DATE:
FILE:



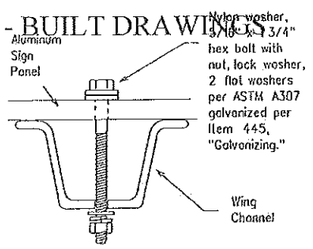
SM RD SGN ASSM TY XXXXX(1)XX(P)



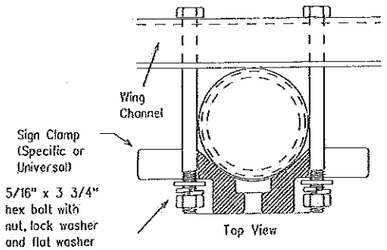
SM RD SGN ASSM TY XXXXX(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



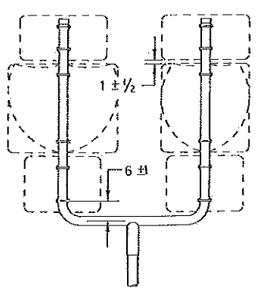
Detail B

GENERAL NOTES:

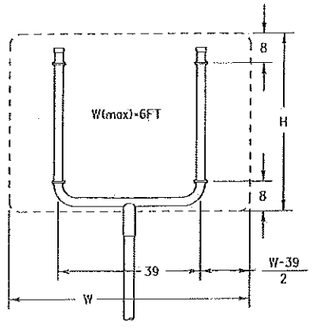
1.

SIGN SUPPORT	OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

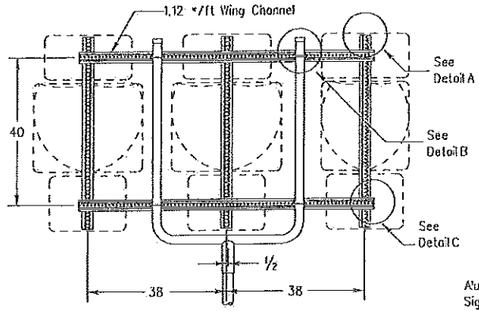
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY XXXXX(1)XX(U)

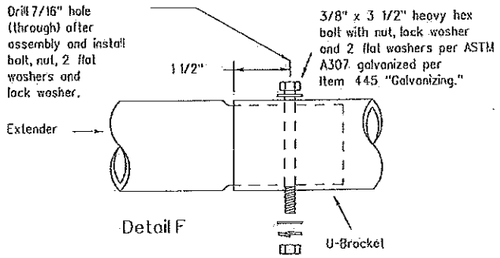


SM RD SGN ASSM TY XXXXX(1)XX(U)



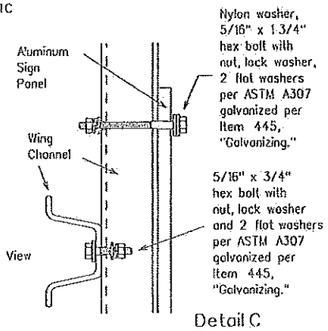
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.

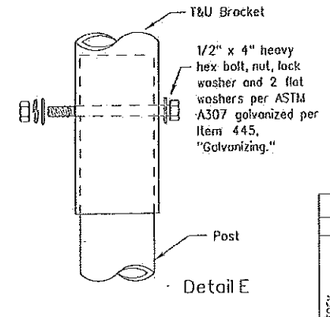


Detail F

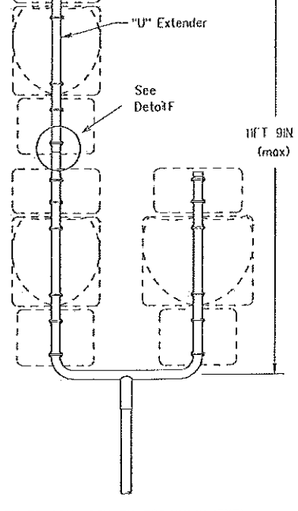
Splices shall only be allowed behind the sign substrate.



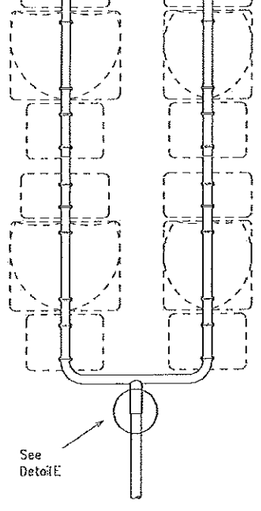
Detail C



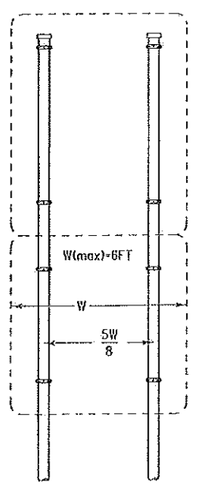
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

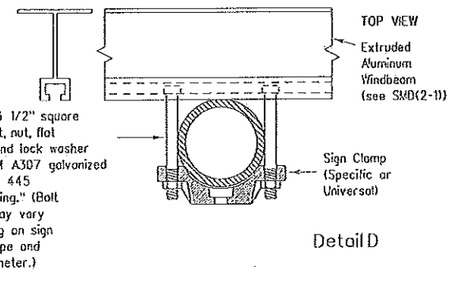


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

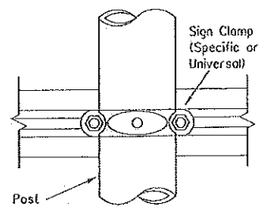


SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW

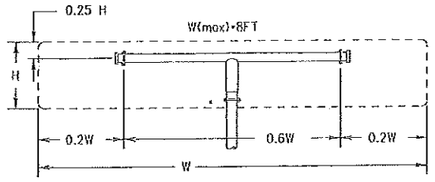


Detail D



REQUIRED SUPPORT

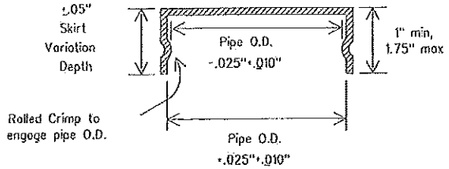
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(± - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

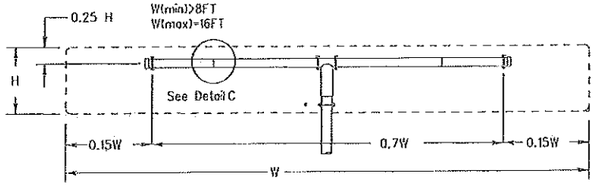
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

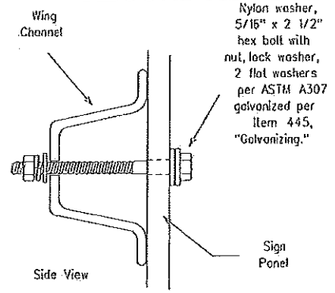
SMD(SLIP-2)-08

REVISIONS	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

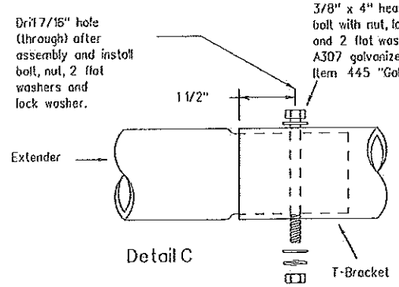
RECORD AS - BUILT DRAWINGS



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(• - See Note 12)

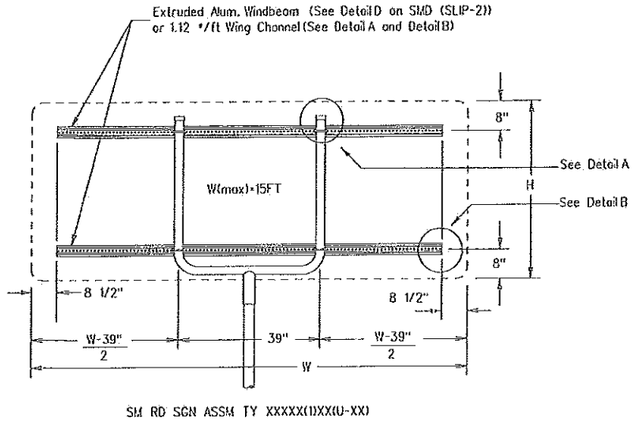


Detail B

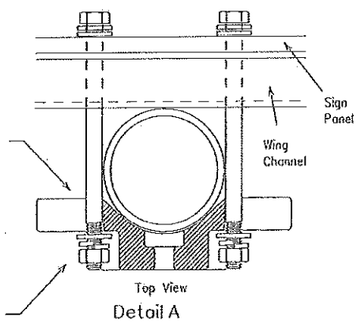


Detail C

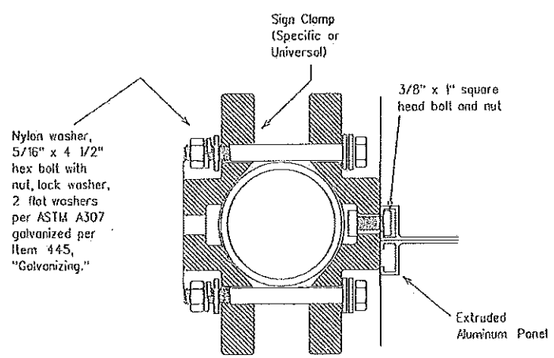
Splices shall only be allowed behind the sign substrate.



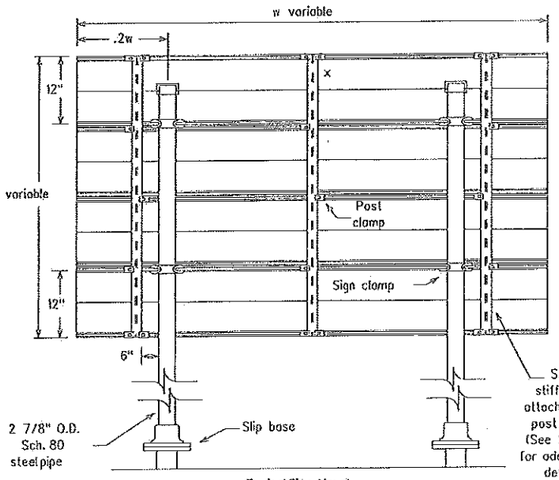
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



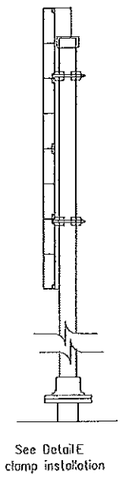
Detail A



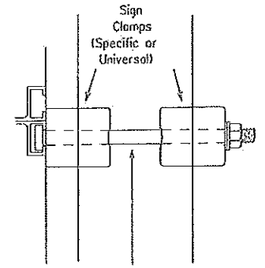
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



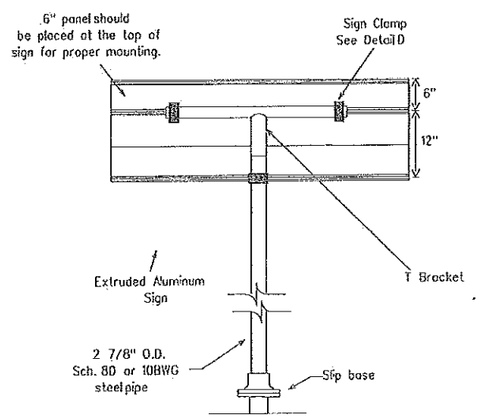
Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)
x Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



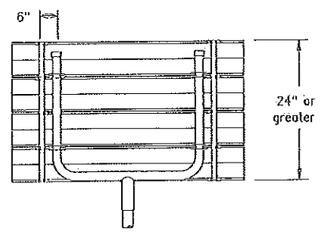
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a hillslope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.

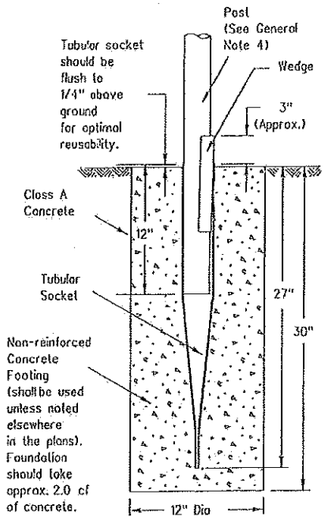
260

DATE:
FILE:

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

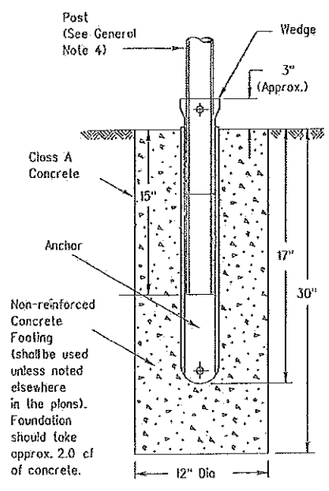
DATE:
FILE:

Wedge Anchor Steel System



SM RD SGN ASSM TY TWT(X)WS(X)

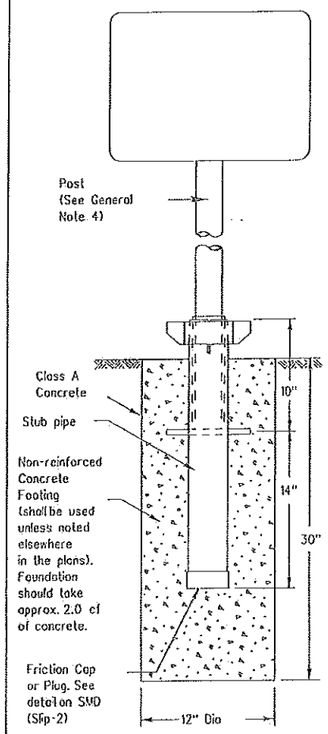
Wedge Anchor High Density Polyethylene (HDPE) System



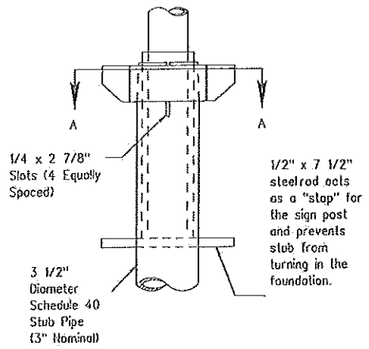
SMD RD SGN ASSM TY TWT(X)WP(X)

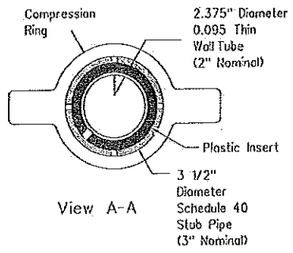
Universal Anchor System with Thin-Walled Tubing Post

RECORD AS-BUILT DRAWINGS



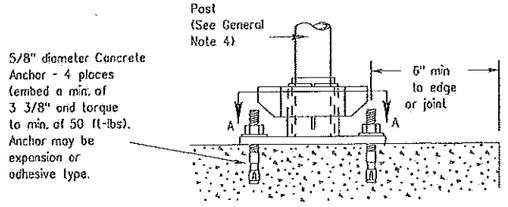
SM RD SGN ASSM TY TWT(X)UA(P)



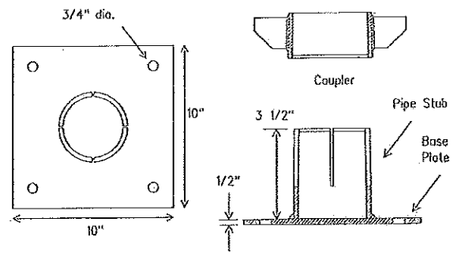


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

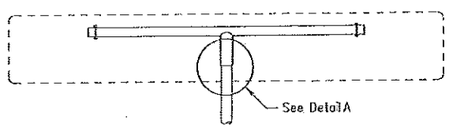


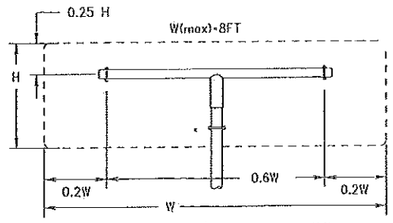
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

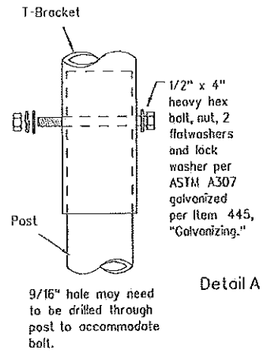
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer_list.htm
4. Material used as post with this system shall conform to the following specifications:
   - 13 BWG Tubing (2.375" outside diameter) (TWT)
     - 0.095" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 18% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of .083" to .099"
     - Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
     - Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximately 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

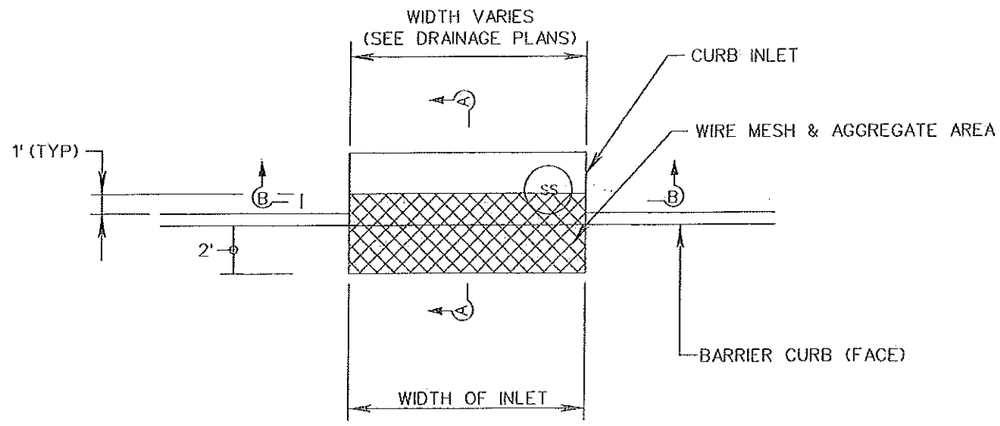
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

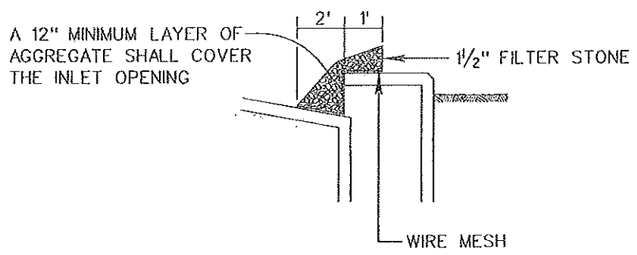
DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

9-08 REVISIONS

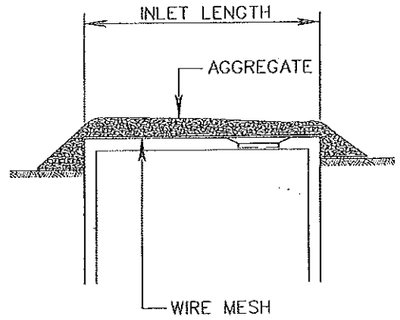
RECORD AS - BUILT DRAWINGS



PLAN



SECTION A-A



SECTION B-B

EROSION CONTROL FOR CURB INLETS

NOTES:

1. WIRE MESH AND AGGREGATE PROTECTION FOR CURB INLETS SHALL BE INSTALLED AT EACH INLET LOCATION IMMEDIATELY AFTER THE INLET TOP IS SET TO FINAL GRADE. WIRE MESH AND AGGREGATE SHALL REMAIN IN PLACE UNTIL THE ENTIRE DISTURBED DRAINAGE AREA THAT CONTRIBUTES TO THE INLET HAS BEEN PERMANENTLY STABILIZED. AT LOW POINT LOCATIONS, WIRE MESH AND AGGREGATE PROTECTION SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION ACTIVITIES.

2. WIRE MESH SHALL BE HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH AN OPENING SIZE NOT TO EXCEED ½ INCH. THE CONTRACTOR SHALL ENSURE THAT THE WIRE MESH IS FIRMLY SECURED TO PREVENT LOSS OF AGGREGATE INTO THE STORM SEWER SYSTEM.

EROSION CONTROL GENERAL NOTES

1. WHERE APPLICABLE, EROSION CONTROL FEATURES SHALL BE INSTALLED PRIOR TO ANY ACTIVITIES WHICH DISTURB SOIL

2. WHERE APPLICABLE, TEMPORARY EROSION CONTROL FEATURES SHALL REMAIN IN SERVICE UNTIL PERMANENT STABILIZATION ACTIVITIES ARE COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL TEMPORARY EROSION CONTROL APPURTENANCES UPON COMPLETION OF CONSTRUCTION ACTIVITIES.

   SHOULD ANY EROSION CONTROL FEATURE BE REMOVED FOR CONSTRUCTION AND/OR ACCESS PURPOSES, THE CONTRACTOR SHALL REPLACE IT PRIOR TO THE END OF THE SAME WORK DAY.

3. THE NOTICE OF INTENT (NOI), AS REQUIRED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) GENERAL PERMIT, MUST BE PROPERLY DISPLAYED ON SITE AT ALL TIMES BY THE OPERATOR.

NO.	REVISION	BY	DATE

COUNTY OF DALLAS, TEXAS
DEPARTMENT OF PUBLIC WORKS
INLET PROTECTION

DESIGNED YF	DRAWN YF	DATE MAY 2011	FILE: Inlet protection.dgn
APPROVED LA	CHECKED LA	SCALE: N / A	

RECORD AS - BUILT DRAWINGS